

**CASH FLOW MANAGEMENT IN THE CONSTRUCTION INDUSTRY
OF PAKISTAN**



by

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DEDICATED

TO

MY PARENTS

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First of all I want to thank Allah Almighty who gave me the strength, opportunity and ability to complete my master degree. I am especially thankful to my Parents and my sisters who gave me their equivocal support throughout, as always, for which my mere expression of thanks does not suffice. It's an honor for me to thank my committee members Dr. Babar Khan, Engr. Mansoor Ahmed Malik and Engr. Zia Ud Din for their utmost support and guidance during the process of my research. I am really grateful to my thesis supervisor; Dr.Hamza Farooq Gabriel for his continuous support and guidance for paving my way to complete my thesis work. He has always been there taking out his precious time for my guidance.

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ABSTRACT

Cash flow management is an important field of construction industry and has gained more importance internationally due to the latest researches carried out on large scale. In Pakistan, however, it is relatively a new field which requires more attention to get benefit out of it. The construction projects in Pakistan are facing a number of cash flow problems which are having negative effects on the project objects like time, cost and quality etc. This study is based on the findings of a questionnaire base survey on cash flow management in construction industry of Pakistan while reporting the significance of different factors, their ultimate responsibility and the effectiveness of some ways of improving cash flow management. A brief literature review was conducted to enlist different factors affecting cash flow management in the construction industry of Pakistan, after enlisting different factors a detailed discussion was conducted with industry experts to find out the relevance of enlisted factors in the construction industry of Pakistan. A list was concluded with 40 factors, upon which questionnaire based research was conducted. Similar process was used to finalize 10 ways to improve cash flow management.

A questionnaire was made enlisting all forty factors which can affect cash flow management, parties responsible for each factor and ways of improving cash flow management. Likert scale methodology was used in preparing the questionnaire. The questionnaire was floated amongst industry experts in Pakistan focusing different sectors such as building, roads, bridges etc. After getting sufficient responses, analysis was conducted to find out the results. It was found that the factor which most affects the cash flow management and causes problem was improper cash flow planning in the initial stage of the project for which the contractors are mostly responsible.

It was found that constant monitoring of cash flow throughout the construction process can efficiently improve cash flow management and decrease cash flow problems during the construction process. This study also concluded that for better cash flow management, invoicing should be done well in time along with proper documentation. It was also found that to avoid cash flow problems a brief review of construction document should be made and tendering should be done with accurate information. Finally recommendations were made at the end of the study to further explore the horizon of cash flow management in the construction industry of Pakistan.

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INTRODUCTION

1.1 OVERVIEW

Construction industry is one of the most significant industries which is influenced by the economy and the political situation of a country. Construction companies have a very high risk in terms of bankruptcy and failure which is usually affected by the way how companies manage their financial operations. In short, their fortunes are much dependent on how they manage their Cash flow. It is also one of the most fundamental elements and yet the most challenging task in management for nowadays contractors to survive in the industry. Without a proper management of the contractors' cash, this will definitely cause problem to the construction and within the construction company itself. It should be monitored and well-planned throughout the whole construction process to ensure loss is being minimized. The main reason the cost management in cash flow was introduced is to gain a maximum profit that take into the consideration of some elements such as materials used, schedule, satisfactory of works and other related reasons.

Cash is the most important element in a construction company and most of the construction companies which face failure nowadays are due to the lack of liquidity to support their daily process (Park et al., 1995). It is also said that the majority of the construction companies nowadays encounter failure due to economic factors.

A well organized and a good planning before construction starts, for sure will produce a more positive outcome because most of the task are planned beforehand. An estimated project cost and risk analysis is also an advantage in the control of the cash flow of the contractors.

1.2 PROBLEM STATEMENT

The construction industry of Pakistan is passing through a difficult phase. It had a share of 2.3 per cent in total GDP of Pakistan in 2009-10 and grew by 15.3 per cent in 2009-10 against a negative growth of 11.2 per cent in 2008-09 (State Bank of Pakistan 2010). Cash flows, if not managed properly may lead to failure to meet intended project objectives resulting in increased cost, time delays, lack of quality and issues related to functionality of facilities. Effective cash flow management will provide a competitive edge in bidding process and will increase chances of meeting key projects objectives in more efficient way.

1.3 RESEARCH OBJECTIVE

Cash is one of the most important resources of a construction company. Most of the construction companies fail due to the lack of liquidity for supporting every day activities rather than because of inadequate management of other resources. This study will help to determine factors affecting cash flow management and ways of improving cash flow management.

Benefits of the Objectives:

1. To identify the factors affecting cash flow management in the Construction Industry of Pakistan.
2. To prioritize factors affecting cash flow management after analysis.
3. To determine which party has the responsibility for a particular factor affecting cash flow management.
4. To determine ways to improve company's/project's cash flow management in the local construction industry.

1.4 RESEARCH PROCESS AND METHODOLOGY

To carry out the research in a systematic manner and to attain the research objective the methodology adopted consist of four stages i.e. 1st stage: through literature review, identification of research topic, fixing of objectives & scope and furnishing outline, 2nd stage: collection and recording of data through survey and other sources, 3rd stage: research analysis and interpretation and 4th stage: conclusions, recommendations and writing. The diagrammatic illustration is shown in Figure: 1.1. The detailed research methodology is discussed in chapter 3.

1.5 SCOPE

The scope of this study is limited to the construction industry of Pakistan and mainly covers key stakeholders i.e. clients, consultants and contractors. An effort has been made to include as many types of projects as possible like highways, buildings,

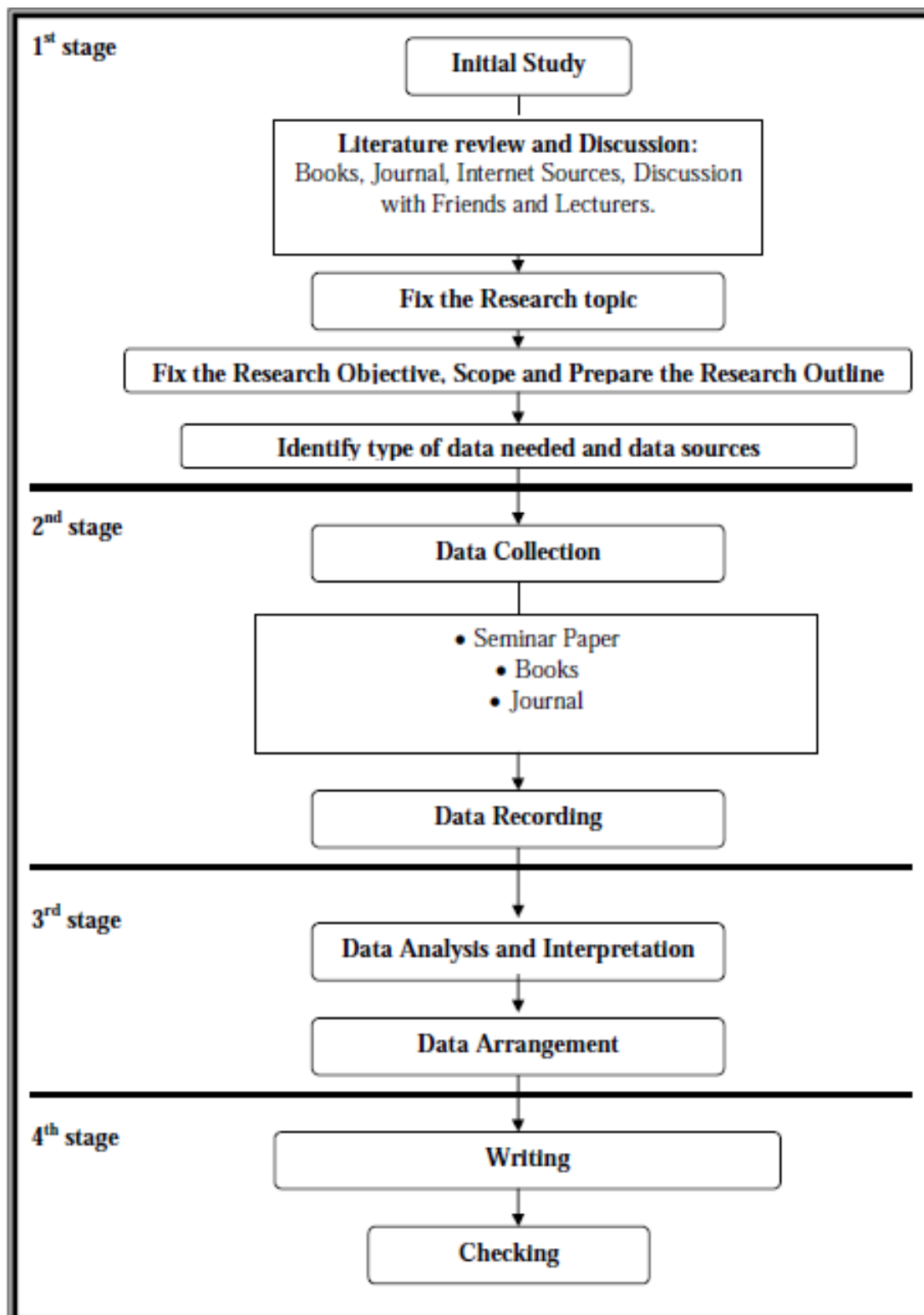


Figure 1:1 Research Process and Methods of Approach

water supply and port. Four main geographical areas of Pakistan, namely Karachi, Lahore, Rawalpindi and Islamabad were selected for a questionnaire survey and interviews.

1.6 ORGANIZATION OF THESIS

The thesis is organized in six chapters with chapter 1 covering an introduction to cash flow management and chapter 2 covering literature review. Chapter 3 covers methodology used in the research and chapter 4 covers results and analysis. Chapter 5 covers the discussion regarding the results. The final (6th) chapter deals with conclusions and recommendations.

1.7 SUMMARY

This chapter gave an introduction of cash flow management and listed objectives of research. The theoretical base for this study comes from an extensive literature review (see Chapter 2).Chapter also briefly highlighted the methodology adopted for this research as well as its scope and limitations. Furthermore, this chapter provided overview of this dissertation.

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter briefly presents the review of research literature already conducted on the topic of cash flow management in construction industry. Researches on this topic have been conducted in different countries mostly in the developed countries in which different aspects of cash flow and its management is studied and presented. The study of the previous research literature will help in understanding and clarification of the topic and will help in development of framework for this study to be conducted on the building construction sector of Pakistan's construction industry.

2.2 CASH FLOW

Money is the utmost vital of the building firm's resources, because more buildingfirms fail due to lack of fluidity for backing up their daily deeds than because of insufficient organization of other assets (Singh and Lakanathan, 1992). Money constraint and cost-effectiveness are two unlike issues, even however they are associated. Peer and Rosental (1982) stated that a firm can tolerate for a provisional period without showing income, or even with forfeiture, but that it may disaster due to absence of money even if it has a very positive balance. They also state that most of

the construction companies in the world that have botched were due to the lack of working capital and in spite of their profitability.

2.2.1 Cash Flow Management

Cash flow can be defined as the measure in or out from a business. This division of the net cash flow is shown in the Figure 2.1. Money flowing into the business can be termed as positive cash flow while money flowing out from the business can be termed as the negative cash flow (Singh, 1990). Amongst all the construction resources, the cash flow planning is one of the most dire task since most contractors failed in their business due to lack of liquidity and inadequate planning towards the cash flow of their business.

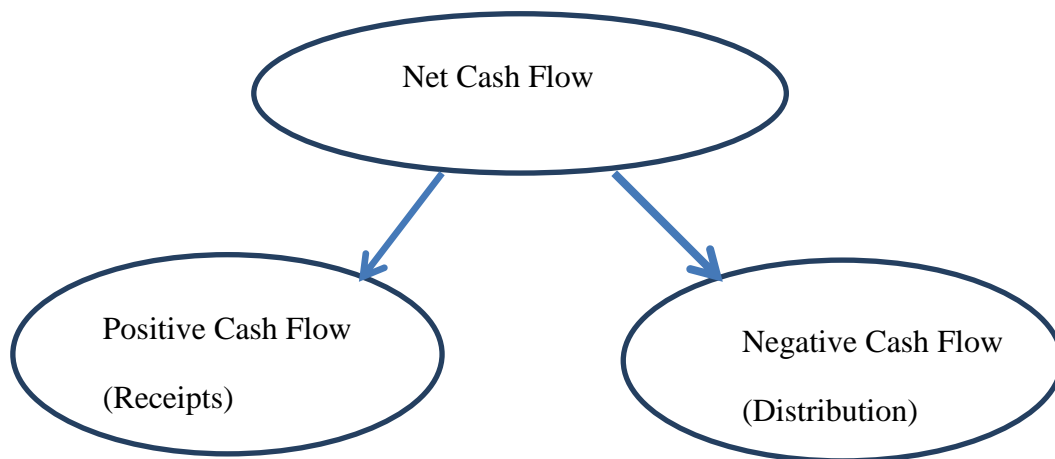


Figure 2:1 Cash Flow in a Business (Singh, 1990)

According to Mawdesley et al., (1997), finance has been claimed as one of the most important resource in the construction process.

2.2.2 General Facts about Cash Flow

There are a lot of contractor that do good work but when it comes to taking care of the business, they struggle. During the past decades, especially when economy turndown, many contractors did fail in their businesses but there are also those who can keep their business throughout the dark by well managing their cash flow (Marston, 2009). According to Park et al. (2005) most of the construction projects have their own cash sequence based on the cost of activities connected to the project and on payments from clients. Typically, cash flow on a building project consists of cash in and cash out. Cash flow at the development level consists of a whole history of all cash expenditure and all earnings established as a result of project being performed. A lot of constructions have undesirable net cash flow, until the conclusion of the construction when the ultimate payment is received or progressive payment is received before beginning a project. This is a very typical condition when the final payment contains of retention money and the fraction is greater than the turnover percentage of the venture.

Most of the construction companies in Pakistan especially small company of Class D contractors do not have a proper way to manage their cost or we can simply say they just have the traditional way to manage them. In all construction companies, one of the major methods in financing the cash flow is through the cash flow forecasting. This method enables the timing of financial requirement to be predicted in advance and also as a way to make sure that the financial needs are enough for further unpredictable consequences (Odeyinka et al., 2008).

Another reason that leads to the failures in the construction companies is that they lack of cash scheduling which is due to their nature of the business. Contractors do not know that there is an important time interval when they are contracted a project; sustain labor, material and the expenditures that are actually paid to complete work. Other issues such as retention, decision whether to hire sub-contractor or to use own labor, renting versus the purchasing of the equipment and the timelines of the client's payment have impact on the contractors' cash flow (Tremel, 2009).

A vital element of the business strategy process is assigning capital and corporate assets. Managers of this course are often faced with thwarting factors such as financial restraints and doubt about potential results. The accent placed on strategic development, over the past two eras, it reflects that there are momentous benefits to gain through formulating a project's cash-flow analysis and planning strategy toward various common set of aims or goals. To manage cash flow contractors must begin by setting a budget the company overhead. A fully utilized of manpower must also be taken into consideration on his workload and yet other factors to be considered.

2.2.3 Methods in Cash Flow Projection

According to Singh (1990) basically there are two types of cash flow projection method in the construction industry, they are the projection based on planning techniques and the projection based on the Standard 'S' curves. Most of the medium and large construction project they will have their own program developed to assist in the cash flow projection. Some of the convenient planned techniques are such as using the bar charts, Critical Path Method, precedence diagrams and line of balance. From

these program developed, they can be assisted in the cost of various resources needed for their operations, credit conditions, sub-contractor, material supplier and so on.

Secondly, according to Singh (1990) again, cash flow projection can be assisted based on the development of the Standard ‘S’ curves. Some of the past cost information and details of completed projects have shown its enormous value in cost planning at the initial stages of design. Such information can be utilized for establishing cash flow in different type of projects. Besides it also can be utilized for the cash flow planning for both the client and the contractors’ considerations. The standard cumulative value versus time curves based on the past information of the completed project can be developed. Hyung in 2005 described the actual cost of construction as the difference of initial budget and remaining budget. This description is graphically represented in figure Fig: 2.2.

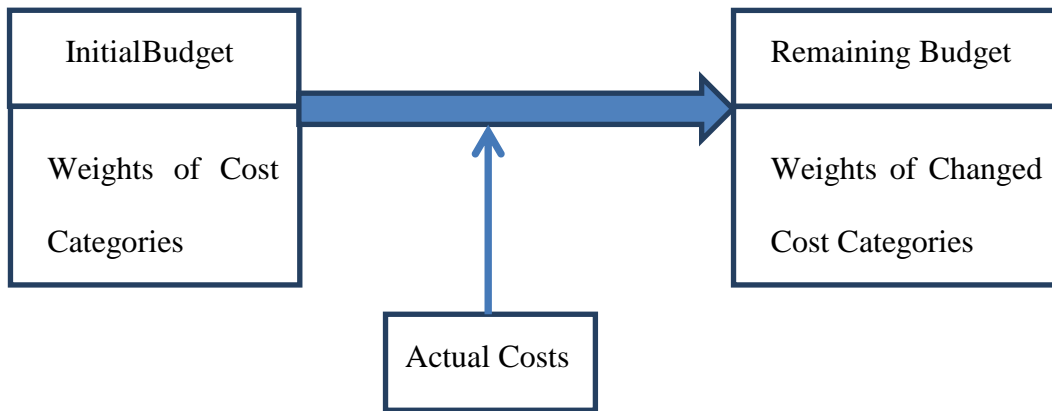


Figure 2:2 Characteristics of Budget During Construction Period (Hyung, 2005)

The development of mockups for cash flow or expense forecasting can be divided in broad categories rendering to the intricacy level (Barbosa and Pimentel, 2001). Contractors can commence cash-flow predictions at the assessing and tendering stage when the prediction is for a sole project. Probably the earliest effort in this

category was led by (Gates and Scarpa, 1979). They described a simple estimate method for developing cash-flow investigation—income and expenditures, surplus, and deficit—as a purpose of time over the existence of the project. The simpler techniques are valuable tools that allow servicers to achieve a quicker cash-flow prediction with reasonable correctness. Kaka and Price (1991) improved the correctness of cash-flow forecast by means of cost commitment curvatures. Navon (1995) presented a resource-based electronic cash-flow predicting model. Hsu (2003) established statistic mockups to forecast regulator of or assess construction development cash flow by S-curve. Park et al., 2005 espoused moving weights of cost groups in a budget as long as a tool that can be appropriate during the construction stage based on the deliberate earned value and the realsustained cost on a job location level. Blyth and Kaka, 2006 made a multiple linear reversion model that predicts S-curves for different projects, aiming at regulating activities and predicting the duration, cost, and end dates of these events.

2.2.4 Optimization Models in Cash Flow Management

Karshenas and Haber (1990) were amid those who first presented optimization models in cash-flow administration. Their model aimed at reduction of the total project price through cash-flow prediction. Barbosa and Pimentel (2001) showed important research in suggesting a linear programming archetypal that is designed for best cash-flow management, though addressing maximizing final cash steadiness. Their model included typical monetary transactions, possible postponements on payments, use of accessible credit lines, the result of changing interest tariffs, and budget constraints

that frequently occur in the construction business. Other contributions include the usage of nonlinear optimization and genetic algorithms (Li and Love, 1997).

Despite the relative success for many models and applications, building companies continue to face contests in implementing company-wide source planning and allocation, budgeting, sales goals instead of company-level capital and source planning and distribution. Indeed, competitive companies may develop their own procedures or practices based on their key objectives and operation model. For these companies, budgeting, deal goals, and resource allocation examination and management have a tactical role as a tool of decision making. This is the perspective expected for the potential use for the proposed strategic costing and resource planning and distribution model. Cost structures and other monetary parameters are used as contribution to the model. Once they are defined, optimization algorithm finds a retort to manipulate sales goals, resources allocation, improve management efficiency of the planning horizon, aim at achieving greater incomes.

2.3 CURRENT VERSUS FUTURE CASH NEEDS

According to Tremel (2009), examination of working capital and present cash needs does not offer a signal of a business future cash flow needs & it does not show ability of a company in treatment any cash flow interruption owing to any current contract, nor indicates any future money needs as a result for being awarded a new contract. All this only be dependent to determine through the training of a cash flow forecast.

The purpose of the money flow projection is to regulate the amount the cash is necessary to handle the expected level of a company process and determine when the money is needed. We have to always recall that every contract have their own cash flow cycle. At times, a contractor may be the user of money while and at the additional times, at the end of lucrative contract, it will be a provider of cash. The ability of a business to supply cash is actual much dependent on the money flow position of its whole project in any interval.

2.4 CASH FLOW PROJECTION

Cash flow projection is the forecast of cash funds which a company which shows that forestalls of receiving and paying throughout the course of assumed duration of time and likewise the cash situation at explicit time during the period of project execution. One of the importance in preparing the cash flow forecast is to know the lack or excesses in cash for operating the business during the period in which the projection has prepared. If cash shortage is exposed, there must be a strategy to provide more cash unless a balance cash flow has been obtained.

2.5 CASH FLOW PROCESS

According to Tremel (2009) again, the preparation of the cash flow projection can be divided into three phase and they are as follow:

- a) Prepare a job operating schedules.
- b) Prepare the cash flow projection of current and expected contract

c) Prepare the company-wide cash flow projection which will include every detail of the jobs.

A job operating schedule for a month by month examination of expected contract production, change bills and revenue recognition in each contract. The developing of the agenda since the estimating phase once the contract was first projected and bid. This schedule should include timing of the labor, sub-contractors, resources and equipment which is rummage-sale in the contract.

Once the schedule is organized, the job cash flow forecast can be accomplished. This projection indicates the cash incurrence and expecting to be paid and when progress flyers are collected. Some of the factors in developing these projections are such as the company payment rules and past history with client.

The job operating schedule and a job cash flow forecast may be different as same are usually different for each contract. This is when the corporation expects to expand their monetary resources or to collect reserves during the planning period where this include the current agreements, anticipated work and closed agreement with remaining receivable balance. This schedule should be efficient monthly in order to demonstration the changes in the agreement pricing, costs and timing.

2.6 FACTORS INFLUENCING THE CASH FLOW

There are a lot of situations which can easily affect the cash flow whether it's positive or the negative cash flow. Most of these situations cannot be avoided by the contractor as he needs to do a lot of activities concerning paying out money or

receiving cash such as paying money to the sub-contractor and receiving money from the client.

2.6.1 Late and Non-Payment

Some of the reasons that contractors face for late or non-payment situation are delay in certification, paymaster's poor financial management, local attitude and underpayment of certified amounts by paymaster. According to Danuri (2007), these factors will lead to accounting problem, tax computation, poor perception of industry players, affecting the growth of a company and cause heavy cash flow for the main contractor to operate and possibility of happening of the sabotage from the sub-contractor who have not been paid as the result of the chain effect. From this study, they found out that more than 60% of the local contractor experienced late or non-payment problem and this will definitely affect their cash flow.

2.6.2 Relation to Works

Some of relations to works factors that can lead to cash flow contractors are such as the changes to initial design, inclement weather, problem with foundation, labor strikes and archeological remains. According to Neo (1976), a policy of over measure the amount of work done each month may be pursued by contractors provided that such situation are not rejected by client. He also mentioned that, no matter how much is the over measured, it does definitely have a contributory towards the cash flow.

2.6.3 Cash Management

Factors that can be considered as contributing to the cash flow problem among contractors in cash management are as the estimating error, tendering strategies such as tender unbalancing, cost variance and duration overrun. While Lowe (1987) states that the factors that can contribute to the cash flow problem are such as the inflation, changes in the interest rate and in the currency exchange. According to Neo (1976), the change in the interest rate on loans of the overdrafts increase the project cost and will adverse the effect of the cash flow and since self-financing contracts will involve no overdrafts, there are no interest charges.

2.7 CASH FLOW AND RISK IN CASH FLOW FORECASTING

Construction contracting business is one of the highest risk businesses and they are placed in second of the ranking of all businesses (Adnan et al., 2006). According to Oxley and Poskitt (1996), construction cash flow can be categorized in two different ways as follows:

- i. Cash flow considered as the net receipt which resulting from receipts and disbursements occurring in the same period and in terms of equation they can be represented as such

$$\text{cash flow} = \text{receipts} - \text{disbursements} \dots\dots\dots (2.1)$$

A positive cash flow shows that a net receipt in a particular interest period or year while the negative cash flow shows a net disbursement in that period.

ii. Cash flow as the actual movement or the transfer of money into or out of a company. Money flow into the business can be termed as the positive cash flow and can be says as cash receives while monies paid out will be termed as the negative cash flow. The difference between the positive and the negative cash flow can be considered as the net cash flow:

$$\text{net cash flow} = \text{positive cash flow} - \text{negative cash flow} \dots\dots\dots(2.2)$$

According to Mawdesley et al. (1997), the negative cash flow also can be considered as the liability, expenditure, payment or cost commitment. In simple, the negative cash flow are the related monies expended on a contract in order to do some of the works related categories such as to pay salary, materials, plants, sub-contractors' account rendered, preliminaries and general overheads. The positive cash flow can be say as the earnings, income, value or receipts. These are the contributing factors towards the cash flow of contractors. Some of the factors that might contribute to the risk in cash flow forecasting are contractual, programming, pricing, valuation and economic factors. From Park et al. (2005), the contractor's risk perception can be measured by using the following equation:

$$R = P \times I \dots\dots\dots(2.3)$$

Where R = degree of risk; P = probability of occurrence of a risk; and I = consequence or perceived impact on a project. A three dimensional of risk can be considered when measuring the contractor's perception of risk. And the three dimension of risk were

considered namely, probability of risk occurrence, extend of risk occurrence and the impact of occurrence. The model is shown in Figure 2.3,

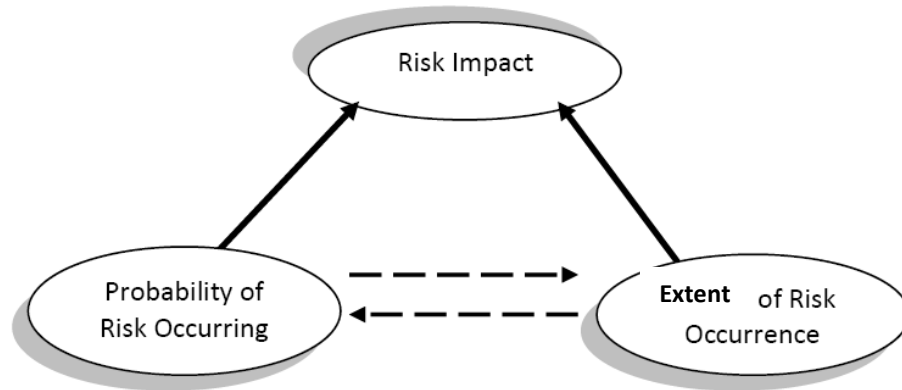


Figure 2:3 A Three Dimensional Model of Risk (Odevinka et al., 2008)

This three dimensional illustration of risk can be viewed into two pairs. The first is the probability of risk to occur or its impact on of occurrence. The second considers the pair of extend of risk occurrence and the impact of occurrence.

2.8 STRATEGIES TO IMPROVE CONTRACTORS' CASH FLOW

Improving the cash flow is not an easy task especially when almost all of the works to be done as a contractor are dealing with money. When there is a good cash flow, contractor can survive in the industry and in order for them to succeed; they will need some tactics and strategies to enhance the growth of the company. According to Warshauer (2007), improving contractor's cash flow can be done by applying the following strategies in managing the cash flow of the company,

- a) Dealing with the contract

- b) Strategies enhancing cash flow

- c) Avoid bad jobs
- d) Financing the company
- e) Collection of information needed from parties involved
- f) Pay all bills
- g) Taxes Planning
- h) Operational reviews

While according to Cooke (2004), contractors can actually make money by keeping others people money for as long as possible and it's also a way to reducing the negative cash flow and they can be done with the following strategies of three stages:

- a) At tender stage
 - i. Load money into under measured items
 - ii. Load money into early items such as excavation and substructures
 - iii. Load money into mobilization items in preliminary
- b) During the contract – these methods will reduce working capital requirement
 - i. Submit interim application on time

- ii. Over measure the work in progress
- iii. Overvalue materials on site
- iv. Agree the value of variations as soon as possible
- v. Keep good records and submit claims early
- vi. Deal with defective work quickly to avoid delayed payment
- vii. Make maximum use of trade credit facilities

c) Post contract – This level will increase profit levels

- i. Submit all documentation as soon as possible
- ii. Ensure timely release of retentions by submitting health and safety file information on time
- iii. Agree final account as soon as possible
- iv. Collect outstanding retentions on time

2.9 SUMMARY

This chapter concisely described aspects of factors affecting cash flow management from literature review on the subject through numerous sources. Almost all of the construction assignments will heavily rely on cash flow management. This chapter

gives an overview of current development in cash flow management and also helps to explore many unanswered questions which can be a subject of future research. This chapter also gives an overview of factors which can effect cash flow management in construction industry. However it was found that there are number of research areas which can be explored but there is a very few content available related to factors effecting cash flow management in the construction industry of Pakistan.

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the methodology followed for achievement of the objectives of this research study. It describes the data collection procedure and the techniques used for the analysis of the data to obtain the results. The chapter described show the whole process of the study ran, how data was collected and analyzed to achieve the objectives.

3.2 RESEARCH PLAN

Owing to the importance of cash flow and its management in projects, the study is aimed at investigating the factors affecting cash flow management in construction industry of Pakistan and ways of improving it. The research plan can be subdivided into four main phases i.e. Preliminary study, Data collection, Data analysis and write-up of the study.

1. In the preliminary study phase, appropriate literature related to the study was searched in journals and books and reviewed to get the necessary knowledge of the research topic and objectives locked accordingly. The research studies already conducted in the topic was reviewed in detail for the design of the questionnaire. The questionnaire was then developed on the basis of the literature review. It was then discussed with the industry experts at the pilot run

stage for necessary improvements and then finalized accordingly for use in the data collection phase.

2. In the data collection phase, the sole tool for data collection was that of the questionnaire. The questionnaire was distributed in the construction companies dealing with the road, building and bridge construction projects which included the clients, consultants and that of the contractors. All these companies were physically visited for any clarification related to any ambiguity faced in questionnaire filling. Once the questionnaires were filled, they were collected for the use in the analysis phase.
3. Data analysis phase, composed of the necessary analysis of the data collected through the filled questionnaires. The data was entered and compiled in the excel sheet for different analysis to be carried on this compiled data. The percentage scoring criteria was used as a necessary tool for finding the significance of factors affecting cash flow management and ways of improving it. The percentage scoring was calculated by multiplying the RII (Relative Importance of Index) by 100 with the help of excel sheet and responsibility of the factor was also calculated accordingly. Different graphs were plotted for effective display of the results.
4. The last phase was the write-up phase with deals with the publications as per the data collected and analyzed. The results were published and discussed in detail and then necessary conclusion and recommendations were also published in the same write-up.

The complete study process is shown in the Fig. 3.1. The different phases of this research as discussed are described in detail as under.

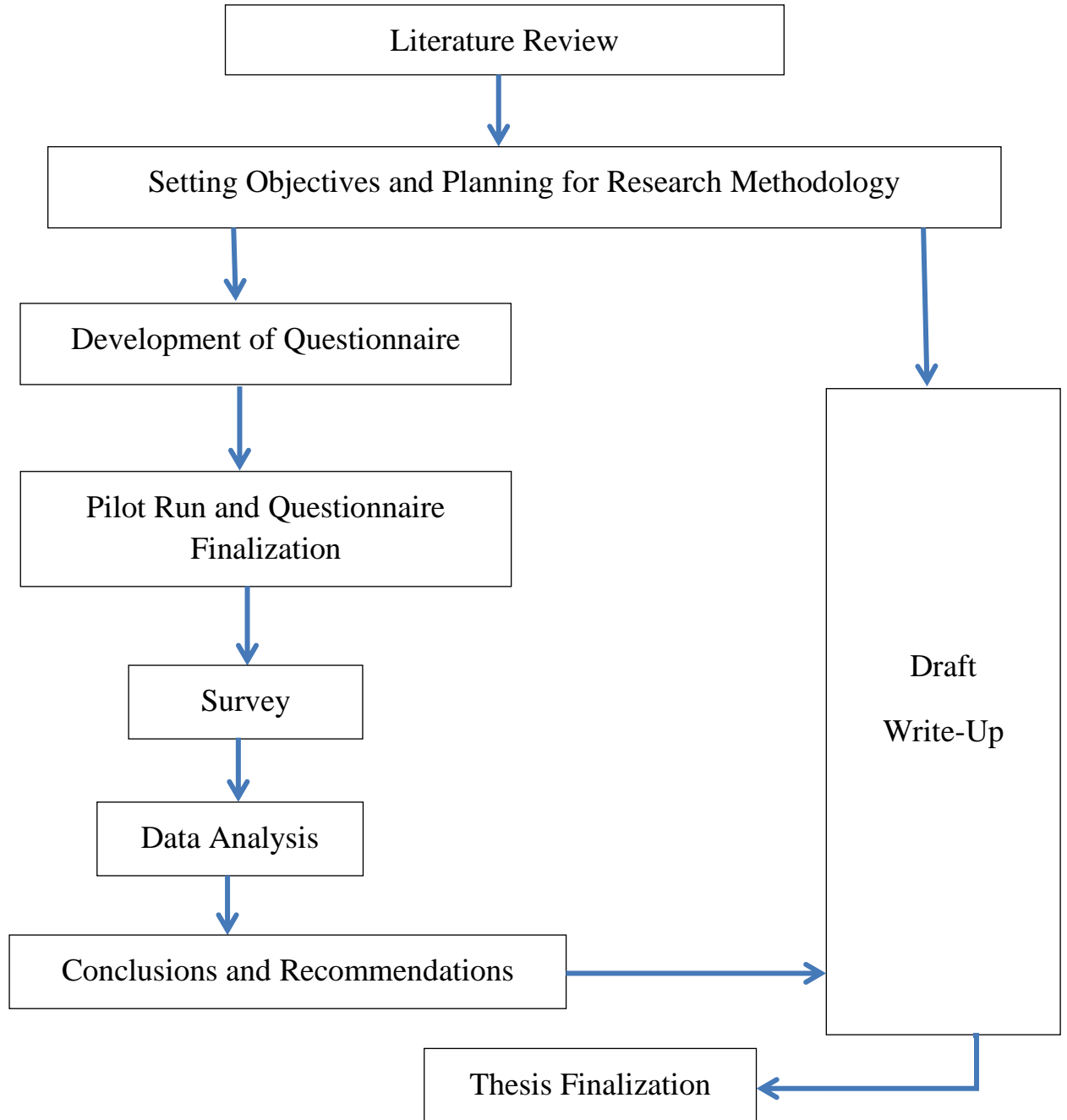


Figure 3:1 Research Plan

3.3 PRELIMINARY STUDY

This was the first phase of the study. It was carried out to have the prerequisite knowledge of the topic and have an insight into the studies already carried out in this field. The necessary literature was searched from different journals and books and studied in detail. On the basis of this study the objectives were developed and finalized. The preliminary questionnaire was developed on the basis of this study. The questionnaire consisted of two main portions. The first one was related to the different factors affecting cash flow management in the construction industry of Pakistan and the second portion dealt with the ways of improving cash flow management. Different research studies were reviewed in detail to highlight different factors which effected cash flow management in construction projects in different regions of the world. Once the complete list of factors was prepared, it will then be filtered for the most appropriate factors related to the construction projects in Pakistan after detailed discussion with the industry experts. So, the first part of the questionnaire consisted of 40 different types of factors.

The questionnaire needed some level of agreement from the respondent and it's important to be in ordinance scale from 1 to 5. The respondents were required to choose from the ordinance scale according to the understanding and acceptance of the respondent. The questionnaire was based on Likert scale of ordinal measure of agreement towards each statement as in Figure 3.2. The respondents were required to give scoring to these factors as per their significance on liker scale (1-5) with 1 representing the strong disagreement and 5 representing the strong agreement. The

respondents were also required to identify the party responsible for that particular factor out of client, contractor and shared responsibility. As consultant acts as the client's agent so the responsibility of the factors related to consultant were considered to be that of the client. The second portion of the questionnaire dealt with the different ways of improving cash flow management. This portion consisted of 10 ways of improving cash flow management in the construction industry of Pakistan. The respondents were required to give scoring to these management techniques as per their significance on liker scale (1-5) with 1 representing the strong disagreement and 5 representing the strong agreement. Thus the questionnaire was ultimately finalized for use in the survey for necessary data collection.

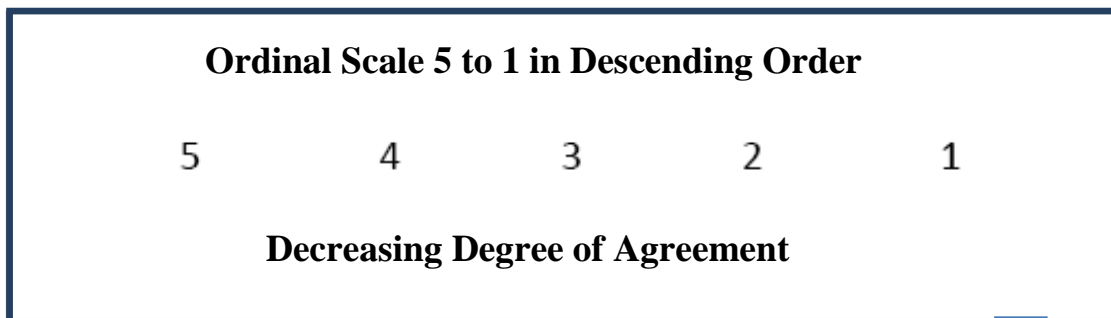


Figure3:2 Likert Scale for Five Ordinal Measurements

Each of the 5 ordinal scales represents the following ratings

Ordinal scale	Level of agreement
5	Strongly agree
4	Agree
3	Undecided
2	Disagree
1	Strongly disagree

3.4 DATA COLLECTION

Once the questionnaire was prepared, it was ready to be used for data collection that was used for the research study. “The non-probability sampling techniques are useful when there are limited resources, an inability to identify the members of population, and a need to establish the existence of problem” (Henry, 1990). “Non-probability samples that are unrestricted are called convenience samples” (Cooper and Schindler, 2001). In convenient non probability sampling the members of population are chosen based on their relative ease of access which was used for the survey. The questionnaire was distributed in different companies in Islamabad/Rawalpindi, Lahore and Karachi which included the clients, consultants and the contractor companies working in the construction industry. The companies were physically visited for distribution of the questionnaires and clarification of any ambiguities in relation to the questionnaire filling.

The questionnaire was required to be filled by minimum engineer level position that have necessary knowledge of the factors affecting and ways of improving cash flow management in Pakistan as there was very less awareness of the factors affecting and ways of improving cash flow management on the lower levels. The data represented the perception of the respondent how he/she thinks of the significance of different factors, its responsibility and ways of improving cash flow management. The filled questionnaires were collected back accordingly via postal mails and personally once they were filled.

3.5 DATA ANALYSIS

Once the questionnaires were collected back, they were ready to be compiled and were analyzed in the data analysis phase. The MS Excel was used as the main data compilation and analysis tool in this research study. The data was entered into the excel sheet for all the questionnaires and compiled accordingly so as to make it ready for necessary analysis.

The Relative Importance Index (RII) is normally used in a number of studies to find the significance of any attribute under consideration. “The RII is a commonly used method in construction to obtain priority ranking of attributes, and it is particularly useful where a structured questionnaire is used to solicit measurements that are subjective in nature” (Holt, 1997). Cheung et al., (2010) used the following formula to calculate RII.

$$RII_a = \frac{\sum_{i=1}^n Ra_i}{Mn} \dots\dots\dots (3.1)$$

In Equation 3.1 “RII_a” is the relative importance index of attribute “a”, “Ra_i” is rating score against attribute “a” from respondent “i”, “M” is the maximum score obtainable and “n” is the number of responses. Another formula has been used by Chinyio et al. (2010) to calculate RII which is as under in Equation 3.2:

$$RII = \left(\frac{\sum W}{A \times N} \right) \dots\dots\dots (3.2)$$

Where “RII” is the relative importance index, “W” is the respondent’s score, “A” is the maximum score obtainable and “N” is the number of responses. Similar type of formula has also been used by Kumaraswami and Chan (2010) in their study to calculate RII:

$$RII = \frac{\sum w}{A \times N} \dots\dots\dots (3.3)$$

Where “RII” is the relative importance index, “w” is the respondent’s score, “A” is the maximum score obtainable and “N” is the number of responses. However, I have used the percentage scoring criteria to find the significance of each factor affecting cash flow management and ways of improving it as it is generally used in our daily life and is easy to understand by everyone. It is found just by multiplying the RII with “100”. The one with more percentage score as the more significant and lesser percentage score representing the lower significance. The percentage scoring is calculated using the below mentioned formula:

$$\% \text{ Age Score} = \frac{\sum W}{A \times N} \times 100 \dots\dots\dots(3.4)$$

In Equation 3.4 “W” is the score obtained from each respondent, “A” is the maximum score which is “5” in this case and “N” is the total number of respondents for this survey. Using the above mentioned formula, the significance of all the factors affecting cash flow management and ways of improving it will be found and summarized.

The data related to the factor’s responsibility was also needed to be summarized and percentage responsibilities calculated for each category as per the respondent’s data. For each category the factor’s responsibility is ultimately

considered if the percentage responsibility as per the respondent's data is equal to or more than 50 percent. The percentage responsibility was calculated using the below mentioned formula:

$$\% \textit{ Age Responsibility} = \frac{R}{N} \times 100 \dots\dots\dots(3.5)$$

In Equation 3.5 “R” is the total number of the respondents opting for the responsibility of that particular category out of client, contractor and shared and “N” is the total number of respondents in this study (total questionnaires).

Once the analysis calculations are completed, the necessary graphs will be plotted using the excel inbuilt features for effective representation of the analysis findings and results.

3.6 TABLES AND CHARTS

Tables and charts were formed from the data collected especially from the questionnaire. This presentation of data provided an easier way in analyzing the data. The data was categorized in terms of numbers or percentage. Tables and charts were able to represent the data in quantitative way as it represent data in a visual form.

3.7 FISHBONE DIAGRAM

The fishbone diagram was used in the analysis of the causes that affect the cash flow of the contractor. It was also used to analyze and to relate some interactions among the factors affecting a particular problem. From this method, it will help in

considering all possible causes of a problem concerning this study. The Figure 3.3 can illustrate on the fishbone diagram.

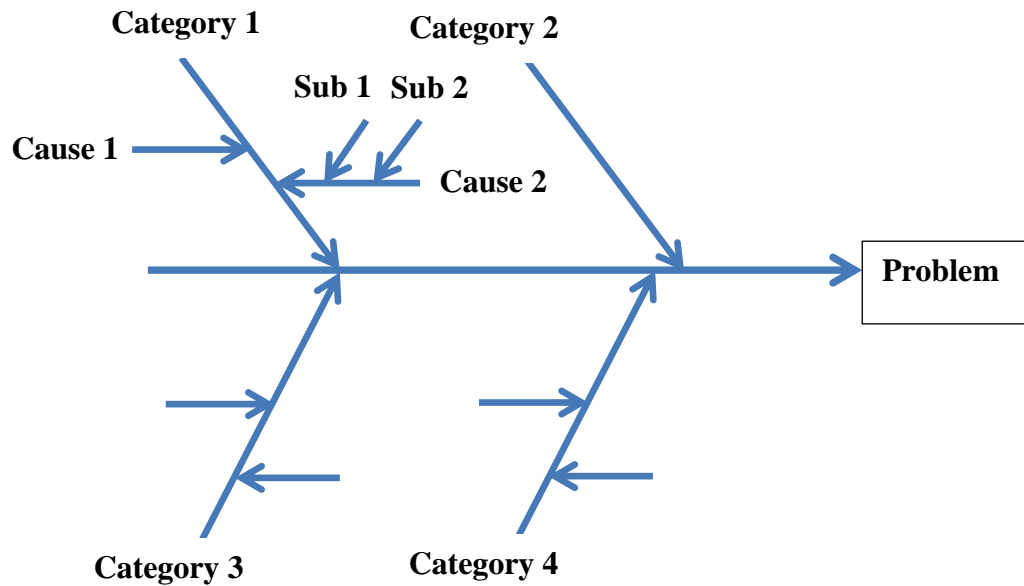


Figure 3:3 Fishbone Diagram (Ishikawa, 1943)

3.8 SUMMARY

This chapter described the framework of the research study conducted on the subject. A questionnaire was prepared which was modified and finalized after discussion with the experts. Data was collected with the help of the questionnaire which was compiled and analyzed accordingly to achieve the research objective.

RESULTS AND ANALYSIS

4.1 INTRODUCTION

This chapter provides the data analysis and results of the questionnaire based survey conducted in Pakistan on cash flow management in construction projects. The data collected with the help of questionnaire based survey was compiled and analyzed. The chapter describes the complete analysis stage as how the collected data was analyzed and results were found out for necessary conclusions and recommendations.

4.2 RESULTS

The filled questionnaires were collected back from the respondents and the data was entered into the excel sheet for further analysis. Total 130 questionnaires were collected in completely filled form, however 150 questionnaires were distributed. The respondents included all the three main parties to the construction contracts i.e. client, contractor and the consultant. The respondents also possessed different number of years in experience. Following figure i.e. Fig: 4.1 shows the graphical representation for the distribution of respondents in terms of number of years in experience. Respondents were divided into four categories in terms of number of years in experience i.e. less than five years of experience, more than five years of experience, more than 10 years of experience and more than fifteen years of experience.

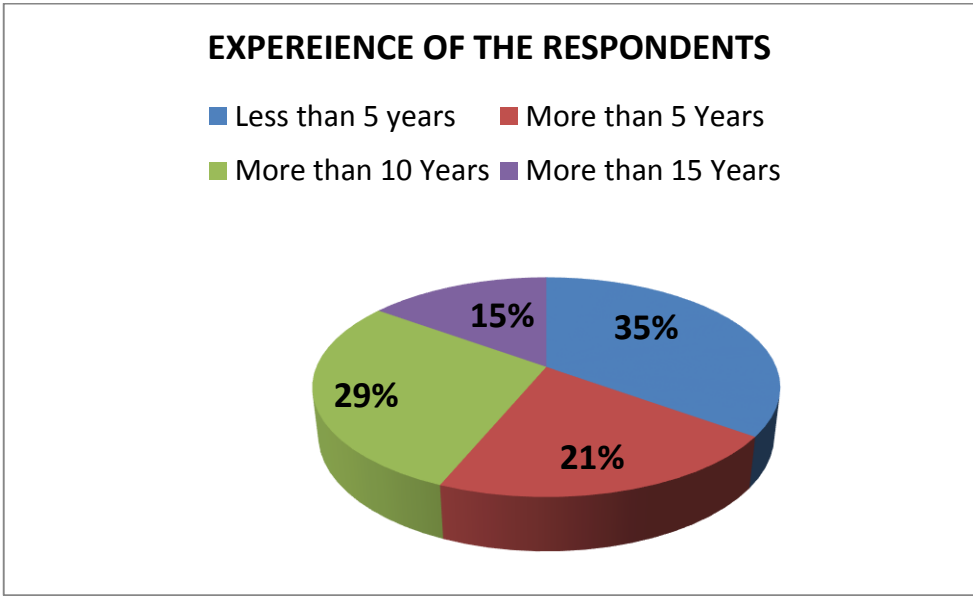


Figure 4:1 Experience of the Respondents

Following figure Fig: 4.2 shows the distribution of respondents in terms of nature of their employment organization i.e. Client, Consultant and Contractor. Fig: 4.2, shows that 49% of the respondents were working with a contractor, 32% with client and 19% with consultant.

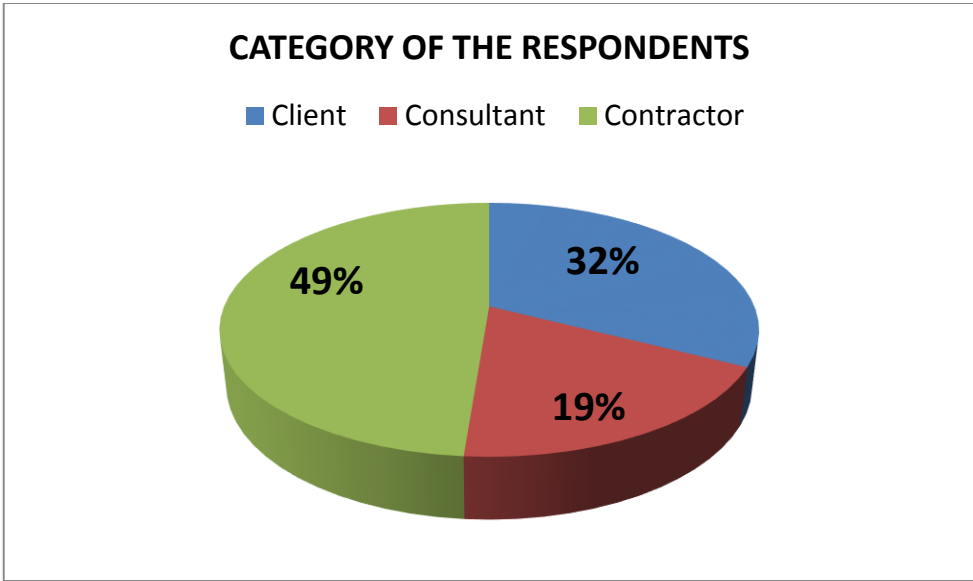


Figure 4:2Category of the Respondents

Data was also collected to find out how many respondents were actually practicing cash flow management processes in their organizations, following Fig 4.3 shows graphical representation of the same,

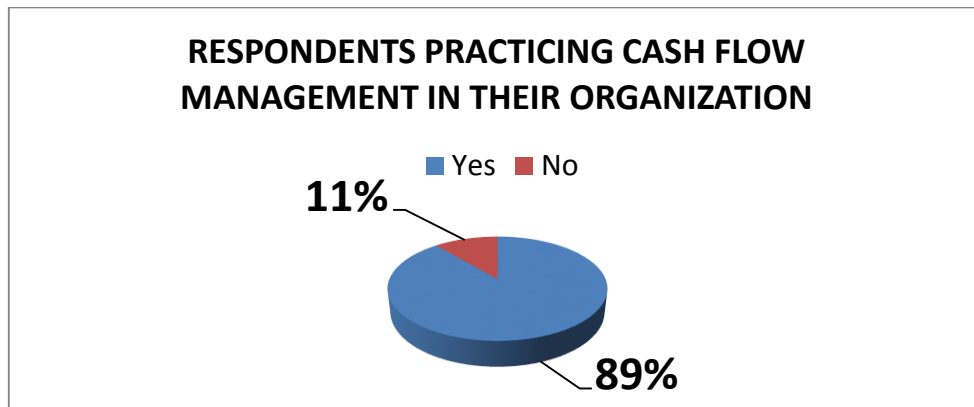


Figure 4:3 Respondents Practicing Cash Flow Management

It was also tried to find out if the respondent's organization has been involved in a joint venture. Fig 4.4 shows the graphical representation of the same, it shows that 48% of the respondent's organizations were involved in more than 10 joint ventures, 11% with more than 5 and rest were involved in less than 5 joint ventures.

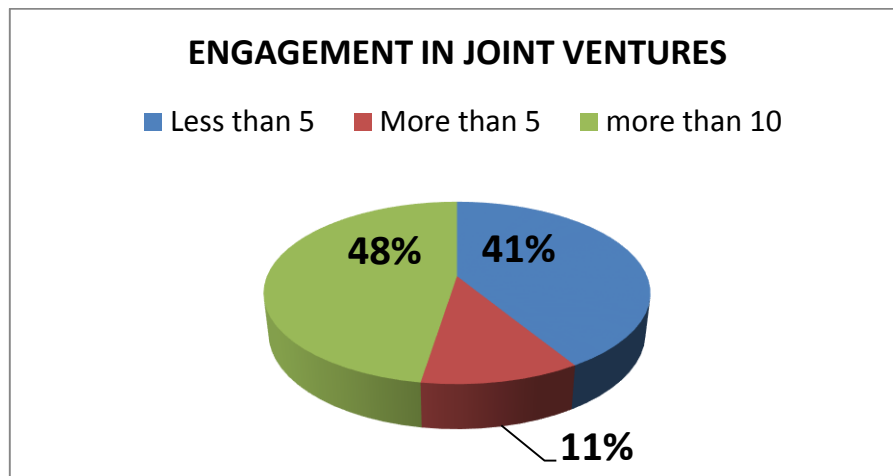


Figure 4:4 Number of Joint Ventures the Organizations Involved

Once the data was entered into excel sheet, the percentage scoring criteria was used to find out the significance of each of the factor and the effectiveness of ways of improving cash flow management and then percentage responsibility of each of the party for every factor was calculated on the basis of the responses provided in the questionnaires.

On the basis of this the ultimate responsible parties were identified for each factor. The questionnaire used in this study can be divided into three independent portions. The first one related to the significance of the factors affecting cash flow management, the second one to the responsible party for each of these factors and the last portion to the effectiveness of the ways of improving cash flow management. The collected data and its results after the analysis are discussed in the following part.

4.2.1 Significance of Factors Affecting Cash Flow Management

Different factors that were already highlighted from literature review and discussion with the industry experts were incorporated in the questionnaire to find their significance. Total 40 factors are incorporated in the questionnaire for which the respondents were required to give scoring on Likert scale (1-5) (See Appendix I). The data collected from the filled questionnaires for this portion was entered and compiled in the excel sheet. Once the data was compiled, percentage scoring was calculated for each of the factor which identifies its significance.

The factor with greater percentage score represents the higher significance and vice versa. The percentage score is calculated using the following formula already discussed in the previous chapter:

$$\% \text{ Age Score} = \frac{\sum W}{A \times N} \times 100 \dots\dots\dots(4.1)$$

Where “W” is the score obtained from each respondent, “A” is the maximum score which is “5” in this case and “N” is the total number of respondents 130 for this survey. The compiled data of all the 130 questionnaires is shown in the Table 1 of Appendix B which represents the responses of all the respondents, the total score obtained and the percentage score obtained by each of the factor. Once the percentage score was calculated, the factors were arranged in descending order with most significant risks at the top and least significant at the bottom. The data is also represented graphically in Fig. 4.5.

4.2.2 Responsibility of the Owner, Contractor and Consultant Against Each Factor

The second part of the questionnaire dealt with the responsible party for each of the factor. Three categories for responsibility were identified that is the client, contractor and shared responsibility (See Appendix I). The consultant’s responsibility was not mentioned in the questionnaire as client acts as the owner’s representative and his responsibility is ultimately considered as that of the client’s responsibility. The data for the responsible party regarding each factor was compiled in same way as that of the significance and the percentage responsibility for each of the risk was calculated using the below mentioned formula:

$$\% \text{ Age Responsibility} = \frac{R}{N} \times 100 \dots\dots\dots(4.2)$$

SIGNIFICANCE OF FACTORS

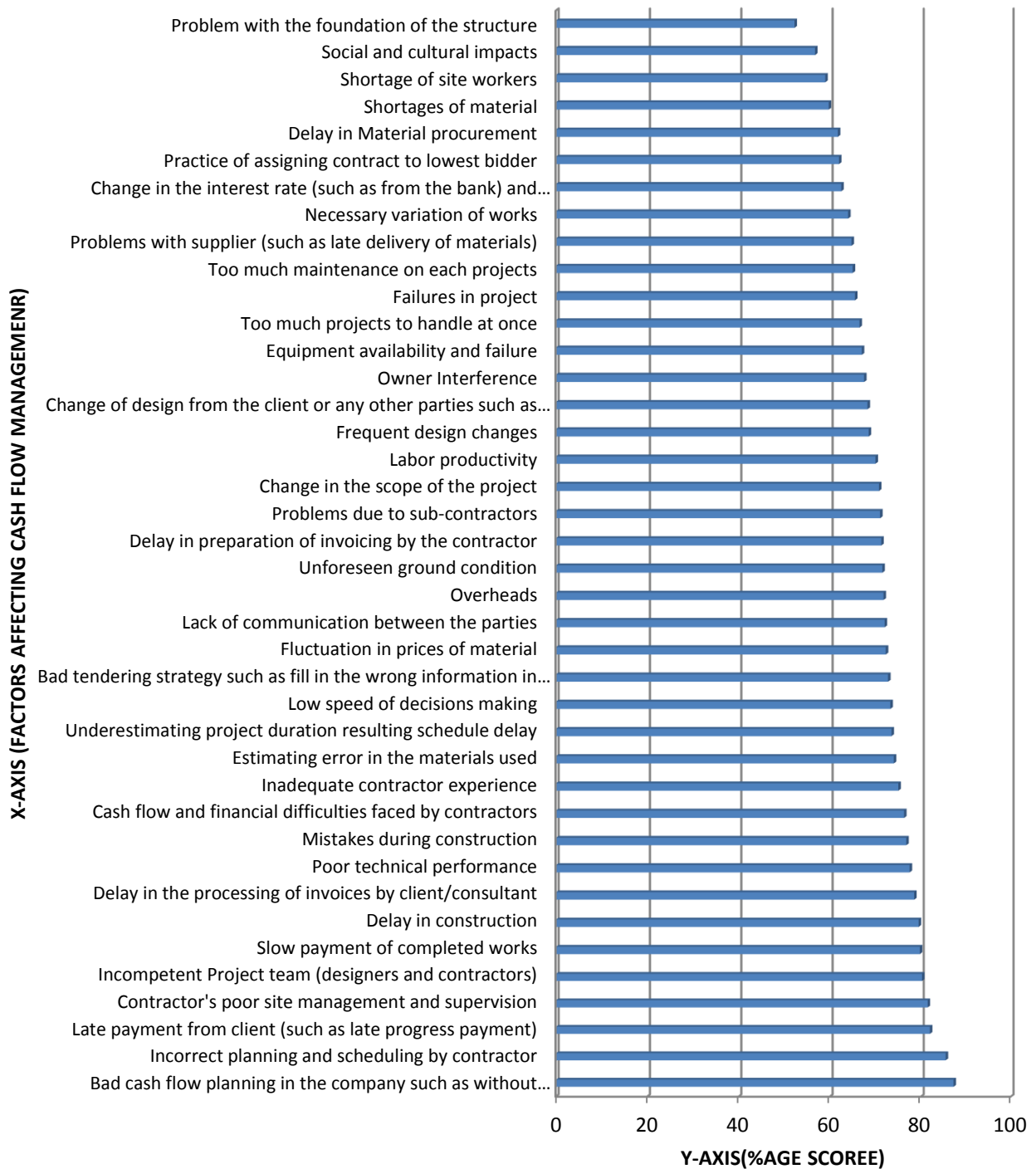


Figure 4:5 Significance of Factors Affecting Cash Flow Management

Where “R” is the total number of the respondents opting for the responsibility of that particular category out of client, contractor and shared and “N” is the total number of respondents which is 130 in this study (total questionnaires). The compiled data and the results are shown in the Table 2 of Appendix B.

Once the percentage responsibilities were calculated, the ultimate responsibility of a single party needed to be reached upon. As a bench mark the factor was considered to be the responsibility of a particular party if its percentage responsibility came out to be greater than 50 percent. Thus the factors were divided into 4 different categories according to their responsible party as owner’s responsibility, contractor’s responsibility, shared responsibility and unidentified responsibility where none of the category obtained responsibility of more than 50 percent. Table 4.1 shows the data which relates to the factors pertaining under the Contractor’s responsibility.

Table 4.1 enlists the description of these 21 factors having more than 50% responses in favor of Contractor. This shows that Contractors are responsible for maximum of the factors which were included in the questionnaire. Next table shows the list of factors falling under the domain of Client.

Table 4:1 Contractor's Responsibility

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	RESPONSIBILITY IN PERCENTAGE		
		Client	Contractor	Shared
1	Incorrect planning and scheduling by contractor	0.00	93.85	6.15
2	Unforeseen ground condition	12.31	82.31	5.38
3	Shortages of material	27.69	55.38	16.92
4	Inadequate contractor experience	8.48	76.92	14.62

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	RESPONSIBILITY IN PERCENTAGE		
		Client	Contractor	Shared
5	Cash flow and financial difficulties faced by contractors	27.69	53.85	18.46
6	Contractor's poor site management and supervision	17.69	55.38	26.92
7	Shortage of site workers	3.85	69.23	26.92
8	Delay in Material procurement	13.85	71.54	14.62
9	Equipment availability and failure	5	70	25
10	Labor productivity	2.31	61.54	36.15
11	Mistakes during construction	14.62	56.15	29.23
12	Poor technical performance	15.38	61.54	23.08
13	Slow payment of completed works	0.00	89.23	10.77
14	Improper Cash flow planning by the company	2.31	81.54	18.15
15	Change of design from the client or any other parties such as architect and consultant	14.62	55.38	30
16	Delay in construction	13.85	63.85	22.31
17	Problems due to sub-contractors	15.38	63.85	20.77
18	Estimating error in the materials used	6.15	86.15	7.69
19	Delay in preparation of invoicing by the contractor	2.31	81.54	16.15
20	Overheads	2.31	76.15	21.54
21	Too much maintenance on each projects	15.38	56.15	28.46

Figure 4.6 is the graphical representation of the responsibility of these 21 factors out of 40 factors which came under the domain of Contractors. This shows that most of the factors which effect the cash flow management in a construction project are related to the Contractors. In Fig: 4.6, factors for which Contractor is responsible are on X-axis and percentage responsibility is on Y-axis.

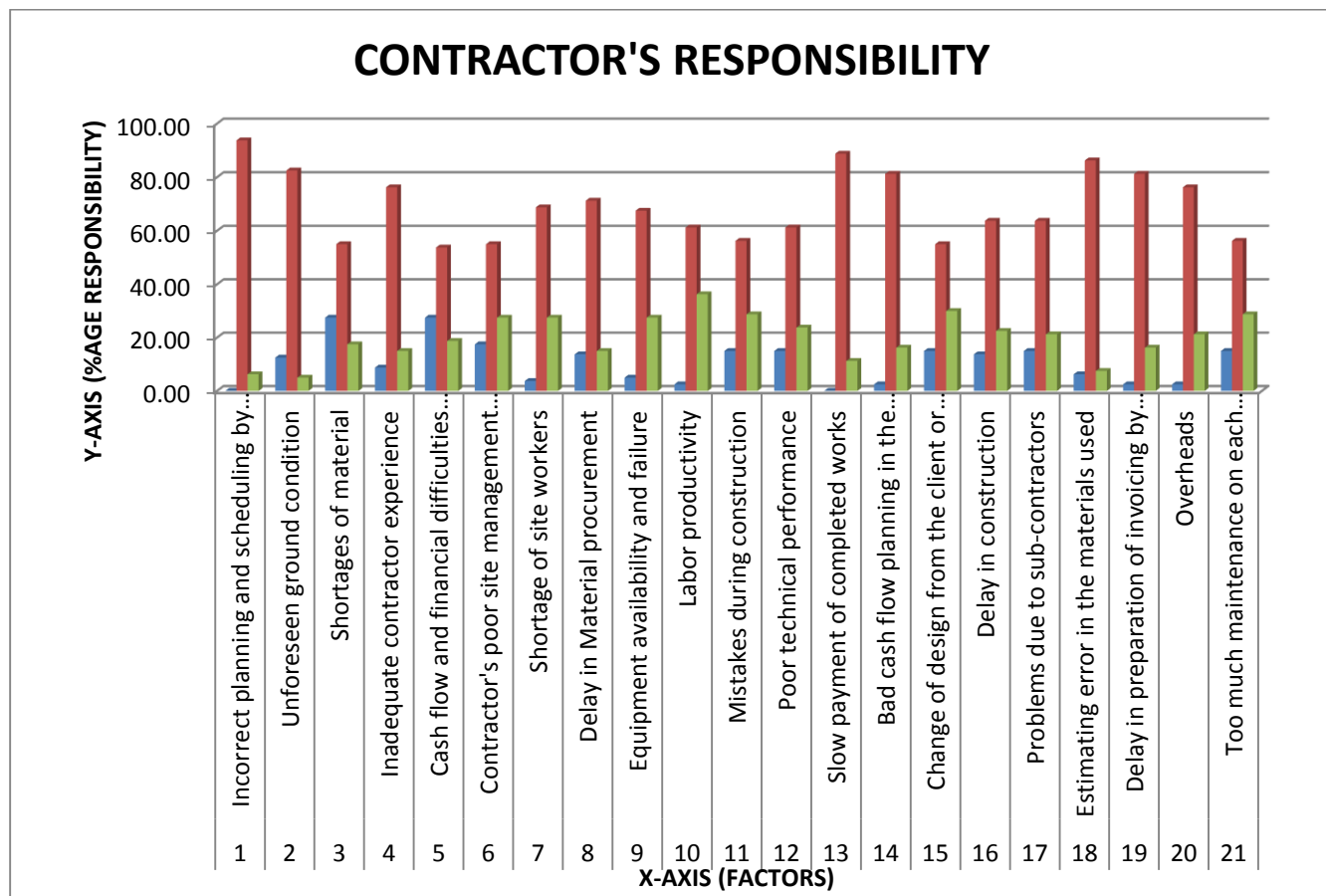


Figure 4:6 Contractor's Responsibility

Table 4.2 enlists the description of 7 factors having more than 50% responses in favor of Client. This shows that Clients are least responsible for the factors which were included in the questionnaire. These factors include frequent design changes, change in the scope of the project by client, practicing of awarding contract to the lowest bidder, lack of communication between the parties, owner's interference, failure in project and late payment for client.

Table 4:2 Client's Responsibility

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	RESPONSIBILITY IN PERCENTAGE		
		Client	Contractor	Shared
1	Frequent design changes	58.46	16.15	25.38
2	Change in the scope of the project	65.38	10	24.62
3	Practice of assigning contract to lowest bidder	83.85	6.15	10
4	Lack of communication between the parties	51.54	26.92	21.54
5	Owner Interference	81.54	6.15	12.31
6	Failures in project	55.38	16.15	28.46
7	Late payment from client (such as late progress payment)	82.31	1.54	16.15

Figure Fig: 4.7 below displays that the responsibility of these 7 factors out of 40 factors which came under the domain of Client.

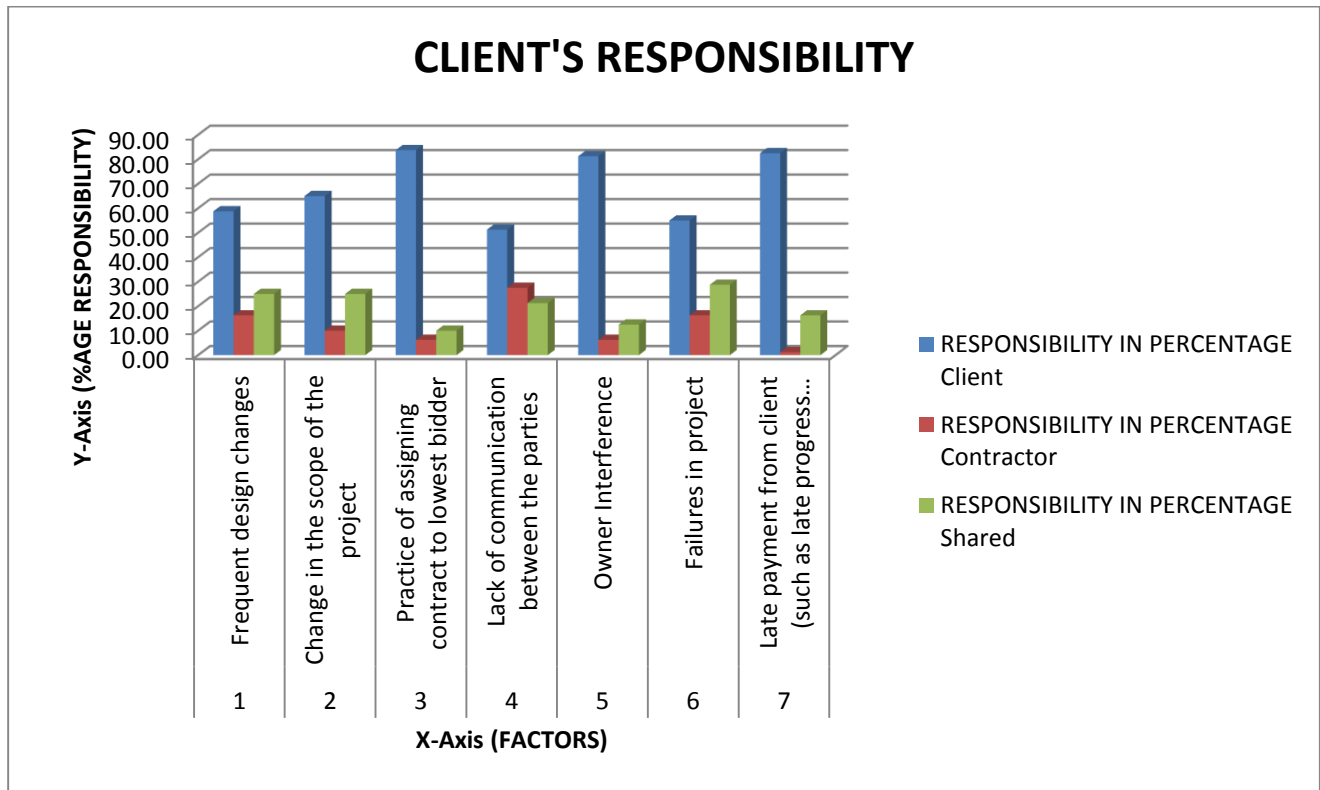


Figure 4:7 Client's Responsibility

Table 4.3 shows that 8 out of 40 factors came under the responsibility of both Contractor and client. Table 4.5 enlists the description of these 8 factors having more than 50% responses in favor of shared responsibility. This shows that Clients and Contractors are sometime both responsible for factors affecting cash flow management.

Table 4:3 Shared Responsibility

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	RESPONSIBILITY IN PERCENTAGE		
		Client	Contractor	Shared
1	Fluctuation in prices of material	22.31	15.38	62.31
2	Social and cultural impacts	24.62	10	65.38
3	Underestimating project duration resulting schedule delay	18.46	26.15	55.38
4	Incompetent Project team (designers and contractors)	15.38	28.46	56.15
5	Bad tendering strategy such as fill in the wrong information in the tender form	26.15	15.38	58.46
6	Problem with the foundation of the structure	20.00	27.69	52.31
7	Too much projects to handle at once	32.31	15.38	52.31
8	Delay in the processing of invoices by client/consultant	17.50	15.38	66.92

Figure 4.8 displays that the responsibilities of these 8 factors out of 40 which were shared with both the Contractor and the Client. These factors include Fluctuation in prices of material, Social and cultural impacts, Underestimating project duration resulting schedule delay, Incompetent Project team (designers and contractors), Bad tendering strategy such as fill in the wrong information in the tender form, Problem

with the foundation of the structure, Too much projects to handle at once and Delay in the processing of invoices by client/consultant.

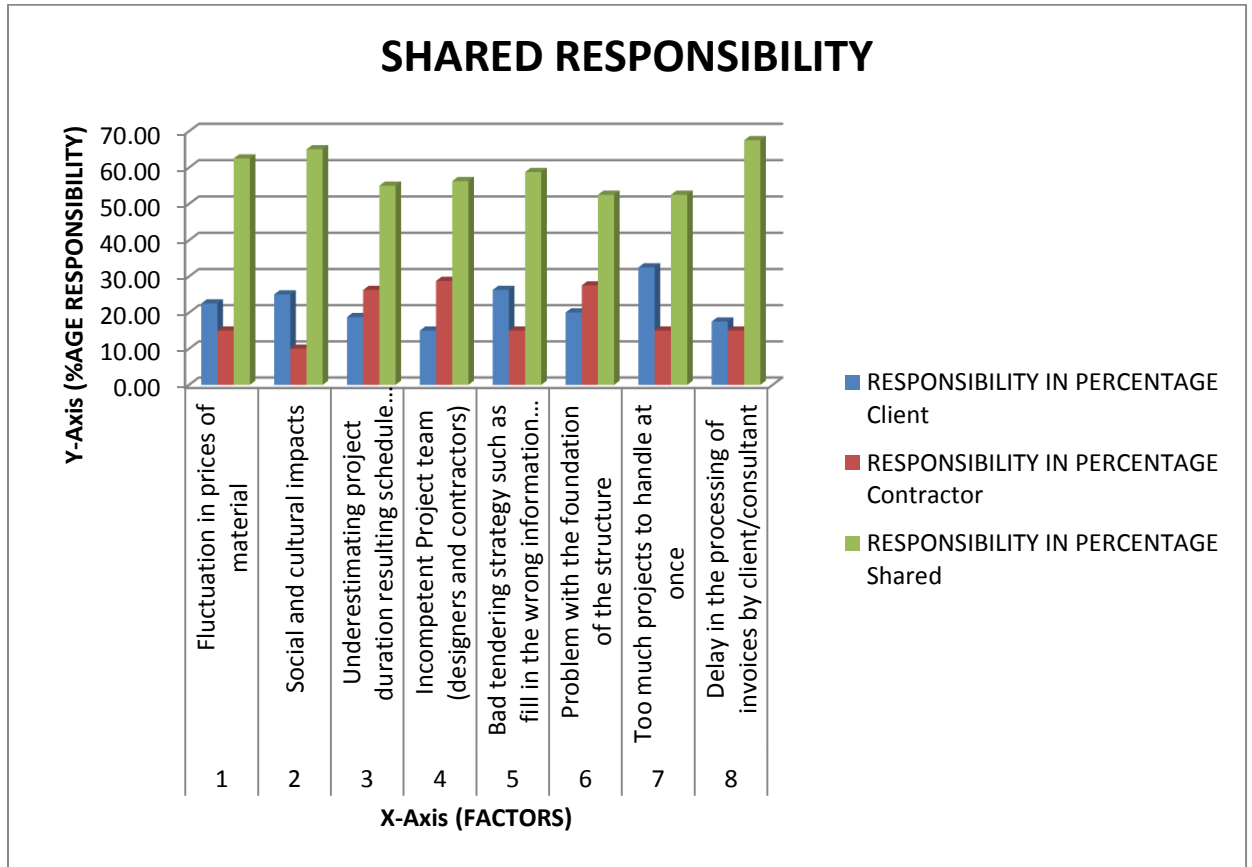


Figure 4:8 Shared Responsibility

Table 4.4 shows the list of factors for which the ultimate responsible party could not be found. These are the factors for which fifty percent responsibility was not achieved for any party. These factors include speed of decision making, Necessary variation of works, change in the interest rate and problem with the supplier.

Table 4:4 Unknown Responsibility

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	RESPONSIBILITY IN PERCENTAGE		
		Client	Contractor	Shared
1	Low speed of decisions making	12. 31	45. 38	42. 31
2	Necessary variation of works	40. 00	26. 25	33. 75
3	Change in the interest rate (such as from the bank) and inflation	37. 50	20. 00	34. 00
4	Problems with supplier (such as late delivery of materials)	17. 50	47. 50	35. 00

Figure: 4.9 below shows the graphical representation of the Table 4.4.

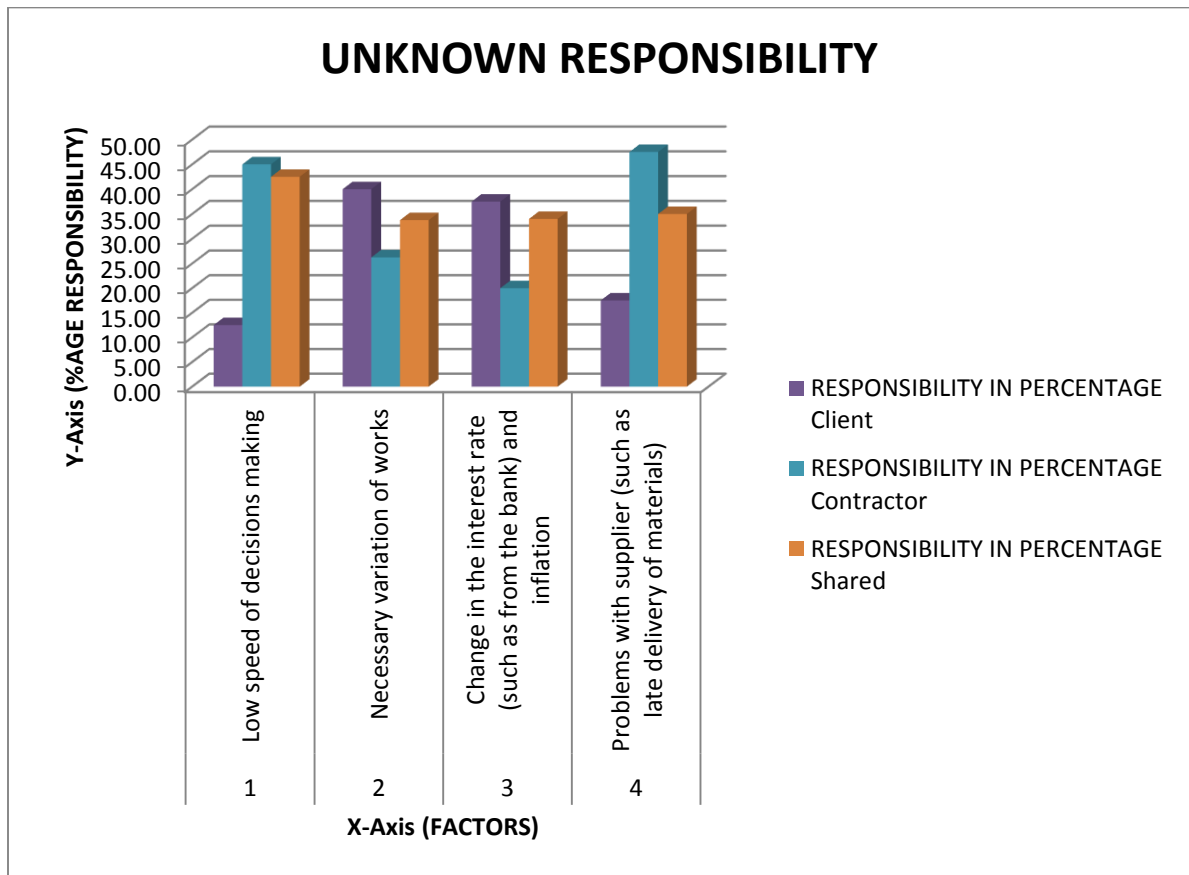


Figure 4:9 Unknown Responsibility

4.2.3 Effectiveness of Ways of Improving Cash Flow Management

The different ways of improving cash flow management that were already highlighted from literature review and discussion with the industry experts are incorporated in the questionnaire to find their effectiveness. Total 10 ways of improving cash flow management are incorporated in the questionnaire for which the respondents were required to give scoring on likert scale (1-5) (See Appendix I). The data collected from the filled questionnaires for this portion was entered and compiled in the excel sheet. Once the data was compiled, percentage scoring was calculated for each of the factor which identifies its effectiveness.

The factor with greater percentage score represents the higher effectiveness and vice versa. The percentage score is calculated using the following formula in Eq. 4.3 as already discussed in the previous chapter:

$$\% \text{ Age Score} = \frac{\sum W}{A \times N} \times 100 \dots\dots\dots (4.3)$$

Where “W” is the score obtained from each respondent, “A” is the maximum score which is “5” in this case and “N” is the total number of respondents 80 for this survey. The compiled data of all the 80 questionnaires is shown in the Table 4.7 which represents the responses of all the respondents, the total score obtained and the percentage score obtained by each of the ways for improving cash flow management. Once the percentage score was calculated, the ways of improving cash flow management were arranged in descending order with most effective way at the top and least effective at the bottom.

Table 4:5 Effectiveness of Ways of Improving Cash Flow Management

SR. NO.	WAYS OF IMPROVING CASH FLOW MANAGEMENT	Importance of ways					Total No. of Responses	Total Score	Relative Importance Index(RII)	%age Score	Rank
		1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree									
		1	2	3	4	5					
1	Constant monitoring of cash flow situation throughout the whole construction process	2	2	10	47	69	130	569	0. 8754	87. 54	1
2	Invoicing to be done well in time along with necessary documentation to process the invoice and strong follow up to get the invoices processed	4	4	11	50	61	130	550	0. 8462	84. 62	2
3	Better cash flow planning in the initial stage such as prepare an ideal scheduling and better work breakdown structures	1	7	14	49	59	130	548	0. 8431	84. 31	3
4	Increase accuracy in the tender stage such as filling in the Bill of Quantity with correct rates	3	11	17	41	58	130	530	0. 8154	81. 54	4
5	Collect necessary information beforehand such as contract review and understanding the scope of works	4	11	20	38	57	130	523	0. 8046	80. 46	5
6	Seek professional help such as from financial institution or any legal advisor.	2	12	23	38	55	130	522	0. 8031	80. 31	6
7	Building a good relationship with all the stakeholders of the project	9	15	23	35	48	130	488	0. 7508	75. 08	7
8	Deal with any defectives work early to avoid delay	14	13	26	33	44	130	470	0. 7231	72. 31	8
9	Avoid any project that is too risky	15	16	24	34	41	130	460	0. 7077	70. 77	9
10	Submission of any related documents such as insurance early during the pre-construction stage	16	21	28	25	40	130	442	0. 6800	68. 00	10

The data for Table 4.5 is also represented graphically in Fig. 4.10.

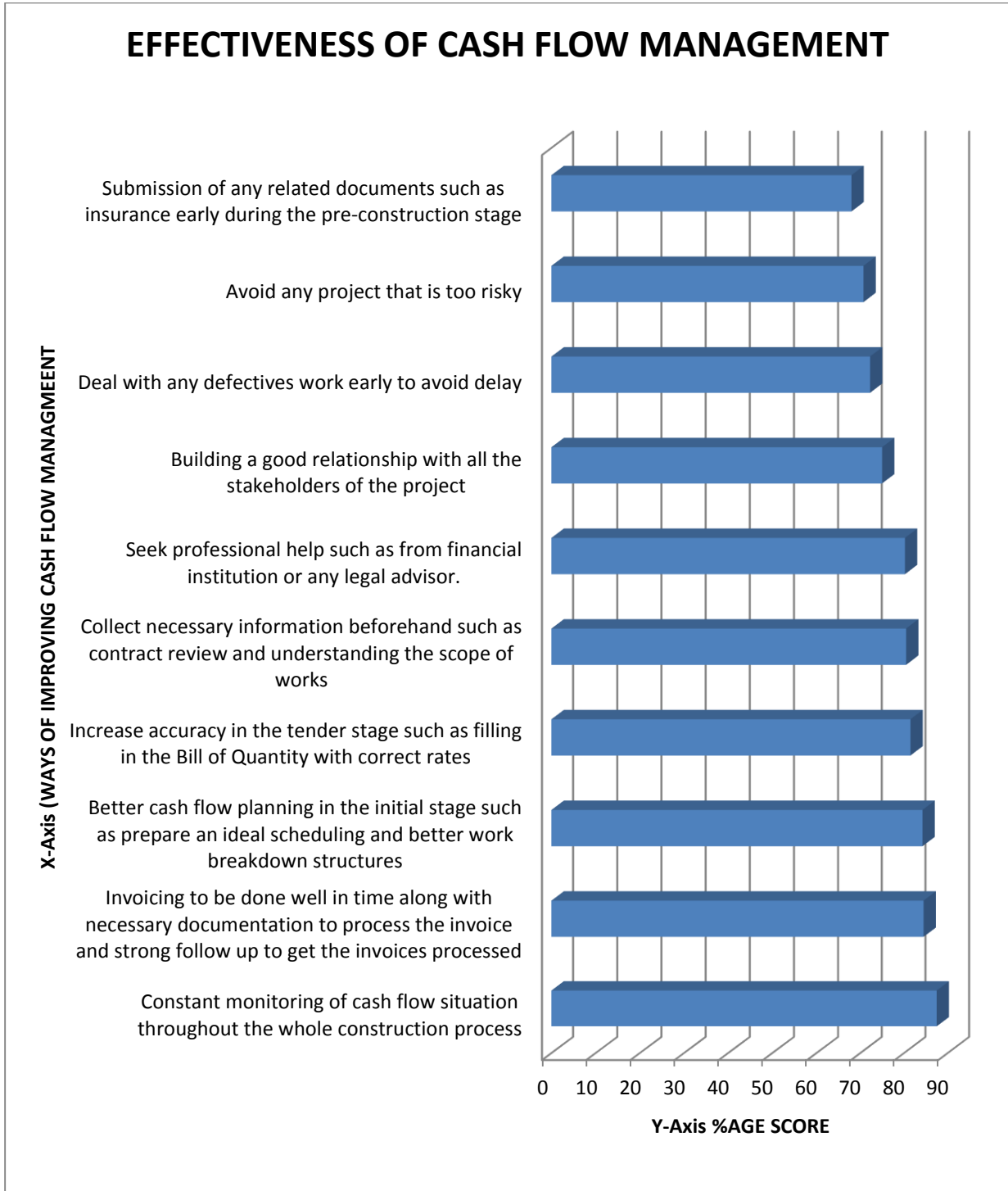


Figure 4:10 Effectiveness of Ways of Improving Cash Flow Management

4.3 SUMMARY

The chapter discussed the complete analysis process and results are presented. It presents the ranking of the factors affecting cash flow management on the basis of the survey data analyzed and found the ultimate responsible party for each of these factors under consideration. It has also summarized the ranking of ways of improving cash flow management techniques considered according to their effectiveness. The summary of this chapter is shown in fish bone diagram Fig: 4.11 at next page.

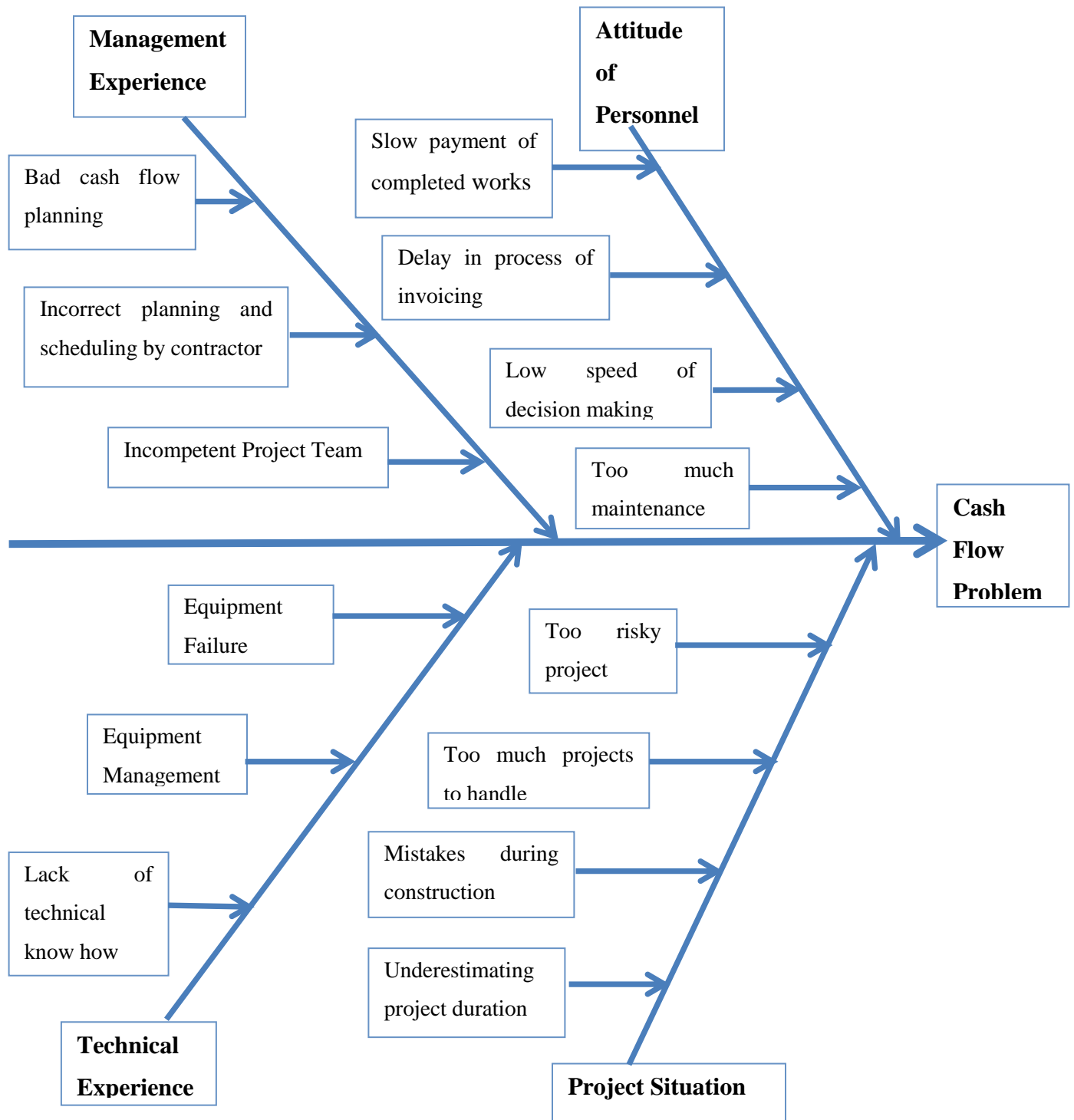


Figure 4:11 Fishbone Diagram of Factors Affecting Cash Flow Management

DISCUSSION

5.1 INTRODUCTION

The objective of this thesis was to gain insight into cash flow management issues in the context of Pakistani Construction industry. A number of issues were addressed such as, bad cash flow planning, slow payment of completed works, incorrect scheduling etc. This thesis tried to find out most important factors which can affect cash flow management and how cash flow management can be improved. In the following sections summarize the research presented in this thesis, consider the implication of the results and discuss its limitations and finally provide suggestions for future research.

5.2FACTORS AFFECTING CASH FLOW MANAGEMENT

This study addresses the factors affecting cash flow management in the construction industry of Pakistan. This is to mention here that this type of study is being conducted for the first time in the context of Pakistan, previous studies related to this topic were conducted in other developed and under developed countries such United States, United Kingdom, Thailand, Malaysia etc. Research methodology adopted in this study is similar to those as of previous studies in other regions such as

researches conducted by Aftab and Ismail in 2010, Razaki in 2009, Abdullah and Azis, in 2008.

In this study factors were identifying based on literature review, pilot surveys and interviews with industry experts of Pakistan. About 65% of the respondents were more than five years experienced and each respondent was a professional engineer. This thesis characterizes the most important factors which can affect cash flow management in the Construction industry of Pakistan. Many factors are highlighted on the basis of this study such as Improper Cash Flow Planning, Incorrect planning and scheduling, Late Payment from the Client, Contractor's Poor Site Management and Supervision, Incompetent Project Team, Slow Payment of the Completed Works, Delay in Construction, Delay in the Processing of Invoices, Poor Technical Performance, Mistakes During Construction etc. About 40 factors were considered in this study based on the literature review and researches previously conducted. Previous researches were also considered to find out the impact of this study in the context of Pakistan's Construction Industry.

This research shows that maximum problems occurring in cash flow management in construction projects in Pakistan are due to bad/incompetent cash flow planning by the contractor. Planning of the activities and cash flows associated with them is one of the most important phenomenon in the success of any construction project. If cash is not managed properly with the respective activities, it can cause delay and slow progress which ultimately effects project duration. It may also happen that bad cash flow planning causes cost overruns and higher risk of default.

This study also shows that incorrect planning can cause cash flow and financial difficulties, shortage of site workers and problems with the subcontractor. So a thorough study of project and contract documents is required by the contractor and considering different risk factors for preparation of accurate schedule which can be achievable to avoid time and cost overruns afterwards. The contractors tries to squeeze the schedule as much as possible at the bidding stage to get benefit out of it having lesser project completing time without realizing that it may not be practically achievable. It is also worth mentioning here that although the contractor is responsible for inaccurate schedule as he is preparing it but the client should also take full responsibility with the help of consultant to validate the schedule provided by the contractor help to make it as practical as possible so that it may be achievable.

This study also shows that maximum delays in the projects are due to the late payment from the client. If the contractor is unable to have timely payments from the client he will face problem to cater running finances and cannot pursue the project with a required pace. Moreover if payments are delayed from the client, contractor will delay the payment to his subcontractors who are responsible for most of activities, this ultimately causes project delay and cost overruns. Contractor's poor site management such as late compliance to regulatory bodies requirements, poor communication bridge with subcontractors and suppliers can significantly cause cash flow problems. Frequent changes of project personnel also lie in this category. Incompetent management of resources such as Equipment, workers and cash causes cash overruns.

There are some build ability issues also associated with these designs. So is the contractor is involved at the project design phase, will give rise to better design as the

suggestions of the party who is going to actually implement the project will be incorporated into design avoiding issues at the later stage. One other important fact is that contractors do not review the design thoroughly at the bidding stage and thus discrepancies are not cleared at that early stage. So although the responsibility of any defects in the design lies with the client but it is also the responsibility contractor to review the design thoroughly at the early stage so the defects can be removed and any delays in the later stage. Incompetency of project team means that project personnel lack the full understanding of the project details. Designer problem arises when they are less experienced and unable to understand the real time implications of the design. This causes technical difficulties on site. Incompetent contractor means that he has less experience of the project being handled or contractor's team member are not competent enough to handle the project.

5.3WAYS OF IMPROVING CASH FLOW MANAGEMENT

This study also discusses some ways of improving cash flow management in the construction industry of Pakistan. This is to mention here that this type of study is being conducted for the first time in the context of Pakistan, previous studies related to this topic were conducted in other developed and under developed countries such United States, United Kingdom, Thailand, Malaysia etc. Research methodology adopted in this study is similar to those as of previous studies in other regions such as researches conducted by Aftab and Ismail in 2010, Razaki, 2009, Abdullah and Azis, 2008.

In this study factors a list of ten ways of improving cash flow management were identified based on literature review, pilot surveys and interviews with industry experts of Pakistan. About 65% of the respondents were more than five years experienced and each respondent was a professional engineer. This study concludes most significant ways of improving cash flow management by ranking them. The order is constant monitoring of cash flow situation throughout the whole construction process, invoicing to be done well in time along with necessary documentation to process the invoice and strong follow up to get the invoices processed, better cash flow planning in the initial stage such as prepare an ideal scheduling and better work breakdown structures, increase accuracy in the tender stage such as filling in the Bill of Quantity with correct rates, increase accuracy in the tender stage such as filling in the bill of quantity with correct rates, collect necessary information beforehand such as contract review and understanding the scope of works etc.

Constant monitoring of cash flow will help to avoid double expense on single activity resulting from incorrect scheduling of activities. Cost overruns can also be controlled by this way. Constant monitoring of cash flow helps to keep the track of cash as well as the activities, therefore it is beneficial for both, project cost and project duration. Constant monitoring of cash flow can be done by distributing the project cost to different activities based on estimation and previous experiences. Distributing cost to different activities helps to efficiently control company's cash.

Timely invoicing helps to generate cash from the client and serves as fuel for activities in progress. Timely invoicing also requires that documentation should be done properly as most of the time invoices are delayed because of problems in

documentation. Proper documentation helps to keep track of the cash and prevents cost overruns. Most contractors rely on payments from client to continue the progress of their work, therefore timely invoicing helps to maintain the pace of the progress.

Planning is the key to success for everything. Likewise planning of activities, planning of cash flows should also be done. Cash flow planning helps to maintain the continuous supply of cash for activities in progress. Cash flow planning requires extensive knowledge of the project as well experience. Better cash flow planning helps to retain the control over the project duration. Most activities in a project are funded by running finances which require better cash flow management.

Accuracy in the tender stage is always very important especially when filing the bill of quantities. Filling in the wrong information such as the rate of the works will in result in the losses as the contractor is responsible for the additional cost which may occur. Correct rates written in the Bill of Quantity are important because they will be used in generating the work schedule especially when cash flow forecasting is to be done. Any error in the Bill of Quantity will affect the cash flow planning which in result causes disturbance in the cash flow forecasting. Therefore very precise and accurate filling of the Bid documents should be practiced.

Understanding complete scope of work is most important factor in efficient planning of the project. If scope of work is ambiguous, planning will be done with errors and flaws which will result in cost overrun and management difficulties. Contract is the one of the most important part of a project. Terms defined in the contract significantly affect planning and scheduling of activities as well as cost. Maximum effort should be made to gather project details which will help to avoid cost

overruns. By having this exercise many factors are identified which would otherwise have not been noticed, this will help in better cash flow management. Ultimately, problem in any section of a project causes cash flow problems and project delay.

5.4 SUMMARY

This chapter discussed the results of the analysis, it also explained how different factors which were included in this study affected the cash flow management. This chapter also tried to explain about different ways to improve the cash flow management based on the results of the analysis.

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

In this chapter the conclusion on the basis of this research study has been discussed. The initial research objectives have been reviewed and on the basis of this study, conclusions have been drawn for these objectives. The results have been discussed in detail for each objective and recommendations are provided for further study on the topic.

6.2 REVIEW OF OBJECTIVES

The four objectives of the study were as follows:

1. To identify the factors affecting cash flow management in the Construction Industry of Pakistan.
2. To prioritize factors affecting cash flow management after analysis.
3. To determine which party has the responsibility of the factors affecting cash flow management.
4. To determine ways to improve company's/project's cash flow management in the local construction industry.

The objectives are discussed one by one as to how they were achieved. The first objective regarding the identification of factors affecting cash flow management in the construction projects in Pakistan was achieved through thorough literature review. The factors involved in such projects were extracted from a number of research studies already carried out in the same field. This list was then compiled and discussions were made with the industry experts to identify only those factors specifically related to the construction projects in Pakistan. The final list was then incorporated in the questionnaire for the purpose of finding its relative importance and party responsible for each factor.

The second objective was to find the relative significance of each factor. As the final list of the factors affecting cash flow management was already prepared that was incorporated in the questionnaire to find relative significance of each. The respondents were required to give importance to each on the liker scale with “1” representing lowest significance and “5” for highest significance. The data for the entire questionnaire once analyzed, the relative significance of all the factors was found through percentage scoring method. The one with maximum percentage score as most significance and the one with lowest percentage score as least significance level.

The third objective was the identification of responsible party for each factor, the respondents were required to identify each category for its responsibility out of the three categories that are owner, contractor and shared responsibility. The category of the consultant was not incorporated in the questionnaire as he is acting as the client’s representative and the factors related to him as considered to as ultimately relating to the owner. On the basis of this the ultimate responsibility was identified through

questionnaires data analysis. In this way the significance of each factors and the party responsible for each factors were found.

The fourth objective was pertaining to the identification of the ways of improving cash flow management applied in these projects. The ways of improving cash flow management were mainly extracted from the study carried out in different regions of the world as already discussed and then these were also discussed with the industry experts for finalization of the list. They were incorporated in the questionnaire and the respondents were required to give scoring to them on the Likert scale, “1” for least effective management technique and “5” for the most effective technique. The data once analyzed, effectiveness of each management technique was found through the percentage scoring technique. The one getting highest percentage score as most effective and the one with lowest percentage score as the least effective management technique.

6.3 CONCLUSIONS

The data which was collected through the questionnaire based survey was collected and analyzed as already discussed to achieve the study objectives. On the basis of those results, conclusions were made which are discussed in detail as follows:

6.3.1 Significance of the Factors and their Responsibility

The significance of the factors was found using percentage scoring technique already described earlier in this paper. The one getting the highest percentage score has highest significance and the one with lowest percentage score has least significance. Total 40 factors affecting cash flow management were incorporated in the questionnaires which were then arranged in the order of reducing significance on the basis of the analysis results. The results regarding the top 10 most significant factors and the party ultimately responsible for those factors are discussed here.

6.3.1.1 Improper Cash Flow Planning

Improper cash flow planning topped the list by getting maximum percentage score of 87.23 percent response rate for its significance for which responsibility lies with the contractor. This shows that the maximum problems occurring in cash flow management in construction projects in Pakistan are due to bad/incompetent cash flow planning by the contractor. Planning of the activities and cash flows associated with them is one of the most important phenomenon in the success of any construction project. If cash is not managed properly with the respective activities, it can cause delay and slow progress which ultimately effects project duration. It may also happen that bad cash flow planning causes cost overruns and higher risk of default.

6.3.1.2 Incorrect Planning and Scheduling

Incorrect planning and scheduling by contractor, is the second most significant factor based on this study which can cause cash flow problems having responsibility

on the contractor and getting a score of 85.54 percent response rate. This can cause cash flow and financial difficulties, shortage of site workers and problems with the subcontractor. So a thorough study of project and contract documents is required by the contractor and considering different risk factors for preparation of accurate schedule which can be achievable to avoid time and cost overruns afterwards. The contractors tries to squeeze the schedule as much as possible at the bidding stage to get benefit out of it having lesser project completing time without realizing that it may not be practically achievable. It is also worth mentioning here that although the contractor is responsible for inaccurate schedule as he is preparing it but the client should also take full responsibility with the help of consultant to validate the schedule provided by the contractor help to make it as practical as possible so that it may be achievable.

6.3.1.3 Late Payment from the Client

Late payment from client (such as late processing of expected payments), is the third most significant factor which can cause cash flow problems during construction period, the responsibility of this particular factor lies with the clients and this particular factor attained a score of 82 percent in analysis of the all factors which were considered in this study which were deemed to influence the cash flow management. Maximum delays in the projects are due to the late payment from the client. If the contractor is unable to have timely payments from the client he will face problem to cater running finances and cannot pursue the project with a required pace. Moreover if payments are delayed from the client, contractor will delay the payment to his

subcontractors who are responsible for most of activities, this ultimately causes project delay and cost overruns.

6.3.1.4 Contractor's Poor Site Management and Supervision

Contractor's poor site management and supervision, is the fourth most significant factor which can cause cash flow problems having responsibility falling under contractor's domain and getting a score of 81.54 percent. Contractor's poor site management such as late compliance to regulatory bodies requirements, poor communication bridge with subcontractors and suppliers can significantly cause cash flow problems. Frequent changes of project personnel also lie in this category. Incompetent management of resources such as Equipment, workers and cash causes cash overruns.

6.3.1.5 Incompetent Project Team

Incompetent Project team (designers and contractors), comes at fifth place in the factors affecting cash flow management based on this study having responsibility on both contractors and clients, by getting a score of 81.23 percent. There are some build ability issues also associated with these designs. So is the contractor is involved at the project design phase, will give rise to better design as the suggestions of the party who is going to actually implement the project will be incorporated into design avoiding issues at the later stage. One other important fact is that contractors do not review the design thoroughly at the bidding stage and thus discrepancies are not cleared at that early stage. So although the responsibility of any defects in the design

lies with the client but it is also the responsibility contractor to review the design thoroughly at the early stage so the defects can be removed and any delays in the later stage. Incompetency of project team means that project personnel lack the full understanding of the project details. Designer problem arises when they are less experienced and unable to understand the real time implications of the design. This causes technical difficulties on site. Incompetent contractor means that he has less experience of the project being handled or contractor's team member are not competent enough to handle the project.

6.3.1.6 Slow Payment of the Completed Works

Slow payment of completed works, is placed at sixth place based on this study having responsibility on contractor's domain and getting a score of 79.69. It is often seen in the construction industry of Pakistan that contractors delay the payment of completed works to their subcontractors, this causes uncertainty in the lower level and a stage arises when the subcontractors stop doing further works. This causes delay in the progress of project and mismanagement of cash.

6.3.1.7 Delay in Construction

Delay in construction, is the seventh most significant factor based on this study which can affect cash flow management with responsibility falling under contractor's domain and getting a score of 79.54 percent. Delay in construction causes huge difficulties in meeting project optimum duration. Most common reason of delay in construction are material procurement delay, equipment failure, mismanagement of

resources and incorrect scheduling. Due to the delay in construction due to whatsoever reason time to complete project becomes lesser and to meet the delayed timelines, it often happens that schedules are overestimated which causes huge impact on project cost.

6.3.1.8 Delay in the Processing of Invoices

Delay in the processing of invoices by client/consultant, is the eighth most significant factor which can cause cash flow problems according to the results from this study, the responsibility of this factor lies on client's domain and getting a score of 78.62 percent. The timely processing of the invoices from the client is very important for the contractor to carry on his works on the project. In Pakistan clients are mostly unable to understand the importance of giving early payments to the contractor. Processing of invoices is very important for the contractor to maintain his running finances. Moreover periodic payments to the subcontractor also rely on the timely processing of contractor's invoices by the client.

6.3.1.9 Poor Technical Performance

Poor technical performance is the ninth most significant factor which can cause cash flow problem based on this study, the responsibility of this factor lies on the contractor and getting a score of 77.54 percent. Poor technical performance means lack of technical compatibility with the project being handled. This can be caused by equipment performance, machinery problems, site workers' poor technical knowledge and supervisor's inability to understand project drawings. Poor technical performance

causes delay in the project. Mistakes caused by the poor technical performance require remedial measures for correction which ultimately causes project cost overrun.

6.3.1.10 Mistakes During Construction

Mistakes during construction, is the tenth most significant factor which can cause cash flow problem during construction with the responsibility falling under contractor's domain and having a score of 76.77 percent. Mistakes during construction can be caused by the incorrect implication of design documents, incompetent project teams and due to unforeseen circumstances. Mistakes require remedial actions which ultimately causes cost overruns and cash flow problems.

6.3.2 Effectiveness of Ways of Improving

The effectiveness of factors was found using percentage scoring technique already described earlier in this paper. The one getting the highest percentage score has highest effectiveness and the one with lowest percentage score has least effectiveness. Total 10 ways of affecting cash flow management were incorporated in the questionnaires which were then arranged in the order of reducing effectiveness on the basis of the analysis results. The results regarding the top 5 most effective factors are discussed here.

6.3.2.1 Constant Monitoring of Cash Flow

Constant monitoring of cash flow situation comes at the top of the list stated in this research by getting a score of 87.54 percent. Constant monitoring of cash flow will

help to avoid double expense on single activity resulting from incorrect scheduling of activities. Cost overruns can also be controlled by this way. Constant monitoring of cash flow helps to keep the track of cash as well as the activities, therefore it is beneficial for both, project cost and project duration. Constant monitoring of cash flow can be done by distributing the project cost to different activities based on estimation and previous experiences. Distributing cost to different activities helps to efficiently control company's cash.

6.3.2.2 Invoicing to be Done Well in Time

Invoicing to be done well in time along with necessary documentation to process the invoice and strong follow up to get the invoices processed, is placed at second place base on the results from this study by getting a score of 84.62 percent. Timely invoicing helps to generate cash from the client and serves as fuel for activities in progress. Timely invoicing also requires that documentation should be done properly as most of the time invoices are delayed because of problems in documentation. Proper documentation helps to keep track of the cash and prevents cost overruns. Most contractors rely on payments from client to continue the progress of their work, therefore timely invoicing helps to maintain the pace of the progress.

6.3.2.3 Better Cash Flow Planning in the Initial Stage

Better cash flow planning in the initial stage such as prepare an ideal scheduling and better work breakdown structures, comes at third place in list of ways of improving cash flow management by getting a score of 84.31 percent. Planning is the key to success for everything. Likewise planning of activities, planning of cash

flows should also be done. Cash flow planning helps to maintain the continuous supply of cash for activities in progress. Cash flow planning requires extensive knowledge of the project as well experience. Better cash flow planning helps to retain the control over the project duration. Most activities in a project are funded by running finances which require better cash flow management.

6.3.2.4 Increase Accuracy in the Tender Stage

Increase accuracy in the tender stage such as filling in the Bill of Quantity with correct rates, comes at fourth place in the list of ways of improving cash flow management by getting a score of 81.54 percent. Accuracy in the tender stage is always very important especially when filing the bill of quantities. Filling in the wrong information such as the rate of the works will in result in the losses as the contractor is responsible for the additional cost which may occur. Correct rates written in the Bill of Quantity are important because they will be used in generating the work schedule especially when cash flow forecasting is to be done. Any error in the Bill of Quantity will affect the cash flow planning which in result causes disturbance in the cash flow forecasting. Therefore very precise and accurate filling of the Bid documents should be practiced.

6.3.2.5 Collect Necessary Information Beforehand

Collect necessary information beforehand such as contract review and understanding the scope of works, comes at fifth place based on this study by getting a score of 80.46 percent. It is always better to gather maximum information about the

project before entering into a contract. Understanding complete scope of work is most important factor in efficient planning of the project. If scope of work is ambiguous, planning will be done with errors and flaws which will result in cost overrun and management difficulties. Contract is the one of the most important part of a project. Terms defined in the contract significantly affect planning and scheduling of activities as well as cost. Maximum effort should be made to gather project details which will help to avoid cost overruns. By having this exercise many factors are identified which would otherwise have not been noticed, this will help in better cash flow management. Ultimately, problem in any section of a project causes cash flow problems and project delay.

6.4 IMPLICATION OF THE RESULTS

This study will help to streamline company's level cash flow management system by identifying most significant factors that can affect cash in a bad manner. Different ways addressed in this study can also be used to enhance company's level cash flows. This study will help to establish a baseline for future detailed research on the impact of each factor identified in this study. This study will also help to provide data for future research to conduct experiment on different ways of improving cash flow management.

6.5 LIMITATIONS OF THE STUDY

This study is purely based on the perception of construction industry experts in Pakistan. Since this type of study is being conducted for the first time in Pakistan, there is a lot room for improvement. However this study can help in focusing future objectives regarding the accuracy of results. Since it is questionnaire based study more accurate results can be found out by conducting experiments on the identified factors. By conducting experiments the impact of factors affecting cash flow management can become more visible and accurate.

This study provides the baseline for future research. Different cash flow models can also be used in Pakistan's construction industry for future research by considering the impact of factors highlighted in this thesis.

6.6 RECOMMENDATION AND SUGGESTIONS FOR FUTURE RESEARCH

Following are some recommendation for further study on this topic based on the construction industry of Pakistan.

1. This study has focused on the mutual response from contractor, client and consultant, a study can be done by focusing on individual party and comparison of perception can be made. This will further strengthen the results and conclusion.
2. A study can be made for the risks associated with the cash flow management and implementation of risk management techniques in managing cash flows.

3. This study discusses ways of improving cash flow management, a study can be made which can focus on impact of different techniques of better cash flow management and realistic implication of cash flow management improvement techniques.
4. A study can be made on the effectiveness of different cash flow computer model in the construction industry of Pakistan.
5. A study can be made to test different international cash flow management models in the context of Pakistan's construction industry.
6. Use of technology in managing cash flow can be a very informative topic in which research can be conducted.

6.7 SUMMARY

This chapter concludes the results of analysis made in chapter 4. Top ten factors based on the results of the analysis are explained here; moreover top five ways of improving cash flow management are also elaborated here. This chapter also describes limitations of the study based on the method for analysis adopted, however it also explains the implications of the results. The final part of this chapter includes the conclusion and recommendations for future research.

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COVER LETTER



Dear Respondent,

My name is Kashif Hussain and I am studying Master of Construction Engineering & Management at School of Civil and Environmental Engineering, National University of Science and Technology, Islamabad, Pakistan. I am inviting you to participate in a Survey which is part of an exciting study focusing Cash Flow Management in the construction industry of Pakistan.

Research Topic:

Cash flow management in the construction industry of Pakistan

Objective:

Cash is one of the most important resources of a construction company. Most of the construction companies fail due to the lack of liquidity for supporting every day activities rather than because of inadequate management of other resources. This study will help us to determine factors affecting cash flow management and ways of improving cash flow management.

Benefits:

1. To identify the factors affecting cash flow management in the Construction Industry of Pakistan.
2. To prioritize factors affecting cash flow management after analysis.
3. To determine which party has the responsibility for a particular factor affecting cash flow management.

4. To determine ways to improve company's/project's cash flow management in the local construction industry.

Confidentiality:

I assure you about the confidentiality of the information provided. The information received through this survey is going to be used as grouped data and will only be used in this particular study. Furthermore, your participation is a voluntary effort.

Consent of Research Participation:

Your consent to participate in this research will be indicated by completing and returning this questionnaire. Please detach this letter for your later reference. Your cooperation in participating in this research is deeply appreciated.

Structure of the Questionnaire:

This questionnaire is consisted of two sections. Section-1 involves general information about the respondent. Section-2 is for determining factors affecting cash flow management and ways of improving it. Types of answers required in the questionnaire are explained at each section. The respondent is required to provide their views/judgments about the questions asked.

Yours sincerely,

Kashif Hussain

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Survey Questionnaire for determining factors affecting cash flow management and ways of improving cash flow management in the Construction Industry of Pakistan

Section-1 Back Ground Information

Name of the respondent: _____

Question: 1. Number of years of experience in the construction industry?

Answer: Less than 5 More than 5 More than 10 More than 15

Question: 2. What is the name of your company?

Answer:

Question: 3. What is your designation in the company you are currently working?

Answer:

Question: 4. What is the nature of your company?

Answer: Client Consultant Contractor

Question: 5. Is Cash Flow Management being practiced in your organization?

Answer: Yes No

Question: 6. Number of Joint Ventures your organization has been involved?

Answer: Less than 5 More than 5 More than 10

End of Section-1

QUESTIONNAIRE

Section-2 Determining Factors affecting Cash Flow Management & ways of improving it

Factors affecting Cash Flow Management will be determined on the basis of their importance on a five points Likert scale. Similarly ways of improving CFM will also be determined on the basis of their importance in five point Likert scale.

2.1 Factors affecting CFM based on their importance

Please select the factors you think can affect CFM on the scale from 1 to 5.

Scale	Description	Detailed Description
1	Strongly Disagree	Highly unlikely to affect CFM but still needs to be monitored
2	Disagree	Cannot affect CFM based on the given information
3	Undecided	Do not have an idea
4	Agree	Can affect CFM based on the given information
5	Strongly Agree	Almost certain to affect the CFM

Please go to next page.

Please Tick/Click the appropriate

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	IMPORTANCE OF FACTORS					Responsibility		
		1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree							
		1	2	3	4	5	Contractor	Client	Consultant
1	Incorrect planning and scheduling by contractor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Fluctuation in prices of material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Frequent design changes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Unforeseen ground condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Shortages of material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Inadequate contractor experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Change in the scope of the project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Low speed of decisions making	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Cash flow and financial difficulties faced by contractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Contractor's poor site management and supervision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Practice of assigning contract to lowest bidder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Lack of communication between the parties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Shortage of site workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Delay in Material procurement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Owner Interference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Equipment availability and failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Labor productivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Mistakes during construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Social and cultural impacts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	IMPORTANCE OF FACTORS					Responsibility		
		1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree							
		1	2	3	4	5	Contractor	Client	Consultant
20	Underestimating project duration resulting schedule delay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Incompetent Project team (designers and contractors)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Poor technical performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Necessary variation of works	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Slow payment of completed works	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Improper cash flow planning in the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Bad tendering strategy such as fill in the wrong information in the tender form	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Change in the interest rate (such as from the bank) and inflation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Change of design from the client or any other parties such as architect and consultant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Delay in construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Problems due to sub-contractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Estimating error in the materials used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Failures in project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Late payment from client (such as late progress payment)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Delay in preparation of invoicing by the contractor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	Overheads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	Problems with supplier (such as late delivery of materials)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	Problem with the foundation of the structure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Too much maintenance on each projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39	Too much projects to handle at once	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40	Delay in the processing of invoices by client/consultant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.2 Ways of improving Cash Flow Management in the Construction Industry of Pakistan

Please select the ways of improving CFM on the scale from 1 to 5.

Scale	Description	Detailed Description
1	Strongly Disagree	Highly unlikely to result improvement in CFM
2	Disagree	Cannot result improvement in CFM based on the given information
3	Undecided	Do not have an idea
4	Agree	Can result improvement in CFM based on the given information
5	Strongly Agree	Almost certain to result improvement in the CFM

Please go to the next page.

Please Tick/Click the appropriate

SR. NO.	WAYS OF IMPROVING CASH FLOW MANAGEMENT	Importance of ways				
		1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree				
		1	2	3	4	5
1	Better cash flow planning in the initial stage such as prepare an ideal scheduling and better work breakdown structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Constant monitoring of cash flow situation throughout the whole construction process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Building a good relationship with all the stakeholders of the project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Collect necessary information beforehand such as contract review and understanding the scope of works	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Increase accuracy in the tender stage such as filling in the Bill of Quantity with correct rates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Submission of any related documents such as insurance early during the pre-construction stage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Avoid any project that is too risky	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Deal with any defectives work early to avoid delay	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Seek professional help such as from financial institution or any legal advisor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Invoicing to be done well in time along with necessary documentation to process the invoice and strong follow up to get the invoices processed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Table 1: Factor Ranking

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	IMPORTANCE OF FACTORS					Total No. of Responses	Total Score	Relative Importance Index(RII)	%age Score	Rank
		1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree									
		1	2	3	4	5					
1	Improper cash flow planning in the company	2	2	14	41	71	130	567	0.8723	87.23	1
2	Incorrect planning and scheduling by contractor	1	10	10	40	69	130	556	0.8554	85.54	2
3	Late payment from client (such as late progress payment)	4	10	15	41	60	130	533	0.8200	82.00	3
4	Contractor's poor site management and supervision	3	12	16	40	59	130	530	0.8154	81.54	4
5	Incompetent Project team (designers and contractors)	1	10	19	50	50	130	528	0.8123	81.23	5
6	Slow payment of completed works	2	14	19	44	51	130	518	0.7969	79.69	6
7	Delay in construction	4	16	12	45	53	130	517	0.7954	79.54	7
8	Delay in the processing of invoices by client/consultant	2	17	19	42	50	130	511	0.7862	78.62	8
9	Poor technical performance	2	12	24	43	49	130	515	0.7754	77.54	9
10	Mistakes during construction	6	13	22	44	45	130	499	0.7677	76.77	10

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	IMPORTANCE OF FACTORS					Total No. of Responses	Total Score	Relative Importance Index (RII)	%age Score	Rank
		1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree									
		1	2	3	4	5					
11	Cash flow and financial difficulties faced by contractors	6	15	20	45	44	130	496	0.7631	76.31	11
12	Inadequate contractor experience	5	14	29	41	41	130	489	0.7523	75.23	12
13	Estimating error in the materials used	4	21	22	43	40	130	484	0.7446	74.46	13
14	Underestimating project duration resulting schedule delay	7	18	24	42	39	130	478	0.7354	73.54	14
15	Low speed of decisions making	4	17	32	43	34	130	476	0.7323	73.23	15
16	Bad tendering strategy such as fill in the wrong information in the tender form	4	20	28	45	33	130	473	0.7277	72.77	16
17	Fluctuation in prices of material	1	21	35	42	31	130	471	0.7246	72.46	17
18	Lack of communication between the parties	5	22	28	40	35	130	468	0.7200	72.00	18
19	Overheads	2	25	31	38	34	130	467	0.7185	71.85	19
20	Unforeseen ground condition	1	25	31	44	29	130	465	0.7154	71.54	20
21	Delay in preparation of invoicing by the contractor	3	25	27	46	29	130	463	0.7123	71.23	21

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	IMPORTANCE OF FACTORS					Total No. of Responses	Total Score	Relative Importance Index(RII)	%age Score	Rank
		1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree									
		1	2	3	4	5					
22	Problems due to sub-contractors	2	26	28	46	28	130	462	0.7108	71.08	22
23	Change in the scope of the project	1	30	24	48	27	130	460	0.7077	70.77	23
24	Labor productivity	2	30	25	47	26	130	455	0.7000	70.00	24
25	Frequent design changes	2	32	28	43	25	130	447	0.6877	68.77	25
26	Change of design from the client or any other parties such as architect and consultant	3	30	31	42	24	130	444	0.6831	68.31	26
27	Owner Interference	3	32	31	40	24	130	440	0.6769	67.69	27
28	Equipment availability and failure	4	32	31	40	23	130	436	0.6708	67.08	28
29	Too much projects to handle at once	5	31	32	39	23	130	434	0.6677	66.77	29
30	Failures in project	7	30	33	38	22	130	428	0.6585	65.85	30
31	Too much maintenance on each projects	9	29	34	36	22	130	423	0.6508	65.08	31
32	Problems with supplier (such as late delivery of materials)	10	28	34	37	21	130	421	0.6477	64.77	32

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	IMPORTANCE OF FACTORS					Total No. of Responses	Total Score	Relative Importance Index(RII)	%age Score	Rank
		1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree, 5= Strongly Agree									
		1	2	3	4	5					
33	Necessary variation of works	11	26	36	37	20	130	419	0.6446	64.46	33
34	Change in the interest rate (such as from the bank) and inflation	11	35	32	32	20	130	405	0.6231	62.31	34
35	Practice of assigning contract to lowest bidder	12	35	30	34	19	130	403	0.6200	62.00	35
36	Delay in Material procurement	11	37	30	34	18	130	401	0.6169	61.69	36
37	Shortages of material	17	34	30	32	17	130	388	0.5969	59.69	37
38	Shortage of site workers	17	35	31	31	16	130	384	0.5908	59.08	38
39	Social and cultural impacts	18	35	34	29	14	130	376	0.5785	57.85	39
40	Problem with the foundation of the structure	18	38	35	25	14	130	369	0.5677	56.77	40

Table 2, Responsibility of the factors affecting cash flow management

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	NUMBER OF RESPONDENTS			RESPONSIBILITY IN PERCENTAGE		
		Client	Contractor	Shared	Client	Contractor	Shared
1	Incorrect planning and scheduling by contractor	0	122	8	0.00	93.85	6.15
2	Fluctuation in prices of material	29	20	81	22.31	15.38	62.31
3	Frequent design changes	76	21	33	58.46	16.15	25.38
4	Unforeseen ground condition	16	107	7	12.31	82.31	5.38
5	Shortages of material	36	72	22	27.69	55.38	16.92
6	Inadequate contractor experience	11	100	19	8.46	76.92	14.62
7	Change in the scope of the project	85	13	32	65.38	10.00	24.62
8	Low speed of decisions making	16	59	55	12.31	45.38	42.31
9	Cash flow and financial difficulties faced by contractors	36	70	24	27.69	53.85	18.46
10	Contractor's poor site management and supervision	23	72	35	17.69	55.38	26.92
11	Practice of assigning contract to lowest bidder	109	8	13	83.85	6.15	10.00
12	Lack of communication between the parties	67	35	28	51.54	26.92	21.54
13	Shortage of site workers	5	90	35	3.85	69.23	26.92
14	Delay in Material procurement	18	93	19	13.85	71.54	14.62
15	Owner Interference	106	8	16	81.54	6.15	12.31
16	Equipment availability and failure	7	98	35	5.00	70.00	25.00
17	Labor productivity	3	80	47	2.31	61.54	36.15
18	Mistakes during construction	19	73	38	14.62	56.15	29.23
19	Social and cultural impacts	32	13	85	24.62	10.00	65.38
20	Underestimating project duration resulting schedule delay	24	34	72	18.46	26.15	55.38
21	Incompetent Project team (designers and contractors)	20	37	73	15.38	28.46	56.15
22	Poor technical performance	20	80	30	15.38	61.54	23.08
23	Necessary variation of works	0	34	44	0.00	43.59	56.41
24	Slow payment of completed works	0	116	14	0.00	89.23	10.77
25	Improper cash flow planning in the company	3	106	21	2.31	81.54	16.15

SR. NO.	FACTORS AFFECTING CASH FLOW MANAGEMENT	NUMBER OF RESPONDENTS			RESPONSIBILITY IN PERCENTAGE		
		Client	Contractor	Shared	Client	Contractor	Shared
26	Bad tendering strategy such as fill in the wrong information in the tender form	34	20	76	26.15	15.38	58.46
27	Change in the interest rate (such as from the bank) and inflation	54	26	50	41.54	20.00	38.46
28	Change of design from the client or any other parties such as architect and consultant	19	72	39	14.62	55.38	30.00
29	Delay in construction	18	83	29	13.85	63.85	22.31
30	Problems due to sub-contractors	20	83	27	15.38	63.85	20.77
31	Estimating error in the materials used	8	112	10	6.15	86.15	7.69
32	Failures in project	72	21	37	55.38	16.15	28.46
33	Late payment from client (such as late progress payment)	107	2	21	82.31	1.54	16.15
34	Delay in preparation of invoicing by the contractor	3	106	21	2.31	81.54	16.15
35	Overheads	3	99	28	2.31	76.15	21.54
36	Problems with supplier (such as late delivery of materials)	23	62	45	17.69	47.69	34.62
37	Problem with the foundation of the structure	26	36	68	20.00	27.69	52.31
38	Too much maintenance on each projects	20	73	37	15.38	56.15	28.46
39	Too much projects to handle at once	42	20	68	32.31	15.38	52.31
40	Delay in the processing of invoices by client/consultant	23	20	87	17.69	15.38	66.92