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DEDICATED TO MY BELOVED PARENTS WHO AT EVERY STAGE OF THEIR LIFE SACRIFICED AND ENCOURAGED ME FOR MY WELL-BEING AND PROGRESS

ABSTRACT

Cost Escalation refers to a rise in prices that causes the purchasing power of a nation to fall. Escalation is a normal economic development as long as the annual percentage remains low; once the percentage rises over a predetermined level, it is considered as inflation crisis. The term “Escalation " once referred to increases in the money supply (monetary inflation); however, economic debates about the relationship between money supply and price levels have led to its primary use today in describing price Escalation. Economists generally agree that high rates of Escalation are caused by an excessive growth of the money supply and this trend is expected to continue in the near future due to competition for resources and skilled workers, as well as continued strong growth and excess work available.

De-escalation may be attributed to fluctuations in real demand for goods and services, or changes in available supplies such as during scarcities, as well as to growth in the money supply. However, the consensus view is that a long sustained period of escalation is caused by money supply growing faster than the rate of economic growth.

The study starts with an overview of inflation in Pakistan with its trends in recent past. Causes and impacts of this increase in cost in construction projects have been discussed. Factors causing construction cost escalation has been highlighted through literature review. Methods for measuring the construction cost escalation in international bidding documents and Pakistan engineering council have been highlighted and discussed in the research .Most appropriate method for the measurement is recommended on the basis of comparisons of 02 formulas currently used in Pakistan by collecting data from construction sites of Pakistan.

Survey was carried out regarding the factors affecting the construction cost escalation in Pakistan and issues in providing the provision of cost escalation in construction projects and findings were mentioned on the basis of graphical analysis.

Finally a framework has been developed showing the perspective of all concerned in managing construction cost escalation.

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LIST OF ABBREVIATIONS

PEC	Pakistan Engineering Council
FIDIC	Fédération Internationale Des Ingénieurs-Conseils
AGC	Associated General Contractors
VDOT	Virgina department of transportation
FDOT	Florida department of transportation
PTET	Pakistan telecom tower
ISE	Islamabad stock exchange tower
BEOE	Bureau of emigration & overseas employment
PPI	Producer price index
CPI	Consumer price index
SPI	Sensitive price index
WPI	Wholesale price index
MFR	Minimum fluctuation rate
GDP	Gross duty product
ECI	Employment cost index
IMF	International mutual fund

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CHAPTER NO 1

INTRODUCTION

1.1 Introduction and Background.

Cost Escalation is defined as “increase in prices of materials which decreases the purchasing power of the nation”. As long as the annual percentage remains low Escalation is in its normal economic growth; and when it crosses the threshold, it is called inflation crisis in that country. Escalation can also be defined as to rise in the money supply 1]; however, when discussing about escalation, the main thing to be addressed is to describe relationship between money supply and price level. Escalation is also defined as a decline in the real value of money—a loss of purchasing power in the medium of exchange which is also the monetary unit of account. When the general price level increases, each unit of currency buys fewer goods and services. A chief measure of general price-level escalation is the general inflation rate, which is the percentage change in a general price index, normally the CPI, over time. Escalation can cause adverse effects on the economy. For example, uncertainty about future escalation may discourage investment and saving. High Escalation leads to hostages of goods if consumers begin hoarding out of concern that prices will rise in the future.

Economists generally agree that excessive growth of money supply causes high escalation. De-escalation may be attributed to fluctuations in real demand for goods and services, or changes in available supplies such as during scarcities, as well as to growth in the money supply. However, the consensus view is that a long sustained period of escalation is caused by money supply growing faster than the rate of economic growth. Today, most economists favor a low steady rate of inflation.

De-escalation may reduce the severity of economic recessions by enabling the labor market to adjust more quickly in a downturn, and reducing the risk that a liquidity trap prevents monetary policy from stabilizing the economy. The task of keeping the rate of inflation low and stable is usually given to monetary authorities. Generally, these monetary authorities are the central banks that control the size of the money supply through the setting of interest rates, through open market operations, and through the setting of banking reserve requirements.

Cost escalation can also be defined as variation in cost of materials during a certain time period [2]. Cost escalation is very similar to inflation/deflations except of the fact that cost escalation refers to increase or decrease in the prices of specific materials however reason for both are same .Cost escalation is not due to the changes in the supply of money, it is general inflation related to the money supply. Cost escalation occurred due to various factors and reasons including change of technology, practices and other factors related to a specific good or services in country.

1.2 PROBLEM STATEMENT

Construction cost escalation is very unpredictable and likely to increase in the upcoming future due to strong growth and excess work available. This is also due to the completion of skilled workers and resources. There becomes the huge vagueness and apprehension among the Clients obtaining high bids in which more price has been forecasted by the bidders for future inflation. Clients are facing problems as bids are high than the projected budgets ultimately it made them stop their project in the hope that these prices will decrease in the up coming future.

“This paper refers to the detailed study in evaluating factors affecting Construction Cost escalation, comparison of precision between Factor Based/ Quantity based formula and recommending framework for controlling Construction Cost Escalation.”

The Main purpose for the comparison of factor/quantity based formula is to resolve the disputes among the Client and Contractors regarding the measurement of Escalation caused during the Project. Mostly there is difference of opinion among the authorities that factor based formula doesn’t covers the actual adjustable amount as compare to Actual Based formula which covers the actual amount.

This concern has been highlighted in this research paper by calculating the escalation by both formulas.

1.3 OBJECTIVE OF RESEARCH

The main objective of this study is to determine and analyze the main factors causing Construction Cost Escalation in construction projects in Pakistan, how to manage this escalation, recommending ways to address these factors and most precise method of measurement. Following are the specific objectives:

- To identify the factors affecting construction cost escalation in construction projects.
- To identify the key issues in providing the provision of Construction cost escalation in contract documents.
- To identify the appropriate method of calculating escalation.
- To identify whether the Contractor or the Employer has fully been compensated.
- To study the method of escalation normally used in Pakistan.
- To study the impacts of construction cost Escalation.
- To study the effect of escalation on project cost.
- To study how delays are related with escalation.
- To study the Concept of escalation in FIDIC, PEC, and International bidding document.
- Developing framework for managing construction cost escalation.

1.4 RESEARCH METHDOLOGY

A logical research methodology has been adopted starting from exploring the background of subject, thorough literature review, data collection , questionnaire design, analysis of data collected and finally establishing the recommendations and conclusions.
The reasons to select this topic for the research were established.

- Studying of the existing literature on construction industry in different countries of the world was carried out.
- Collecting literature, data from different construction sites in Pakistan.
- Analyzing Critical factors affecting the construction cost escalation in construction projects.
- Studying the escalation trends in construction projects of Pakistan.
- Analyzing different ways to address cost escalation.
- Design of questionnaire on issues in providing the provision of Construction cost escalation in contract documents.
- Design of a questionnaire on the basis of different factors causing cost escalation.
- Getting feedback from executives of different departments on determined factors of Cost Escalation in construction projects in Pakistan.
- Getting feedback from executives of different departments on the provision of cost escalation in construction projects in Pakistan.
- Establishing the severity impact of each factor by ranging the severity impact of Cost Escalation factors determined by mean value of impact collected from projects data and executive's opinions and then ranking each factor from 1 to 10.

- Suggesting different ways of how to mange cost escalation based on the analysis of response from different executives.

- Suggesting most appropriate method of measurement of Escalation

- Developing framework for managing construction cost escalation.

1.5 SIGNIFICANCE OF RESEARCH

Usually Construction projects are very long for the period of several months to years and are executed as a pre confirmed contract amount and agreement. There is always a risk of changing in the prices of materials either towards increasing or decreasing during the life cycle of the project.

Purpose of this study is to analyze the key factors affecting cost escalation and suggesting some good policies and a precise method in measuring escalation to improve the price escalation system.

Research/Thesis Organization has been shown in Figure 1-1.

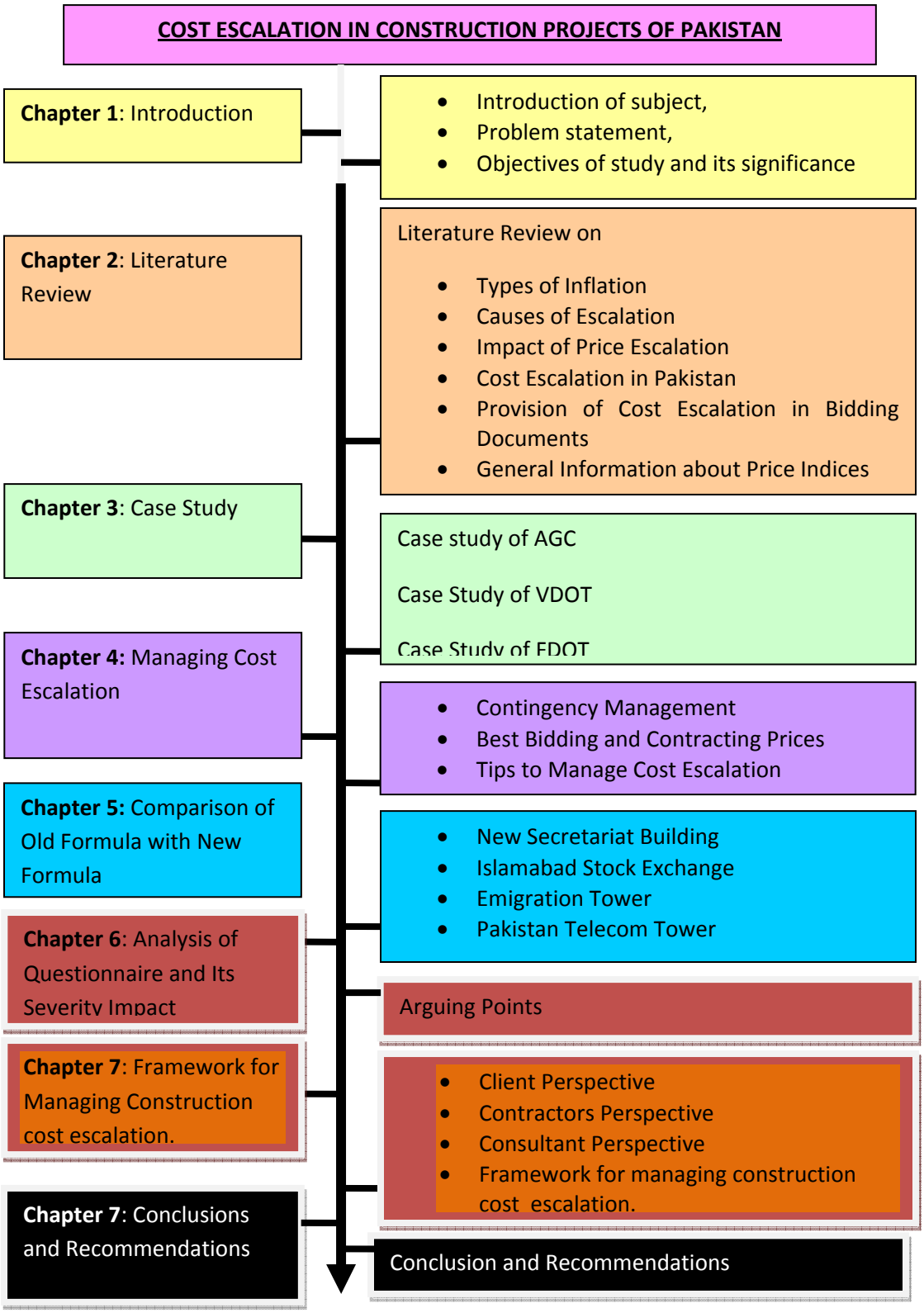

FIG 1-1: RESEARCH/THESIS ORGANIZATION

CHAPTER NO 2

LITERATURE REVIEW

Construction cost escalation is very unpredictable and likely to increase in the upcoming future due to strong growth and excess work available. This is also due to the completion of skilled workers and resources. There becomes the huge vagueness and apprehension among the Clients obtaining high bids in which more price has been forecasted by the bidders for future inflation. Clients are facing problems as bids are high than the projected budgets ultimately it made them stop their project in the hope that these prices will decrease in the up coming future.

To ensure sufficient funds for final budget and schedule, it has become very difficult for the client to manage constriction cost escalation [3].The Output Gap and Consumer price inflation has been shown in figure 2-1.

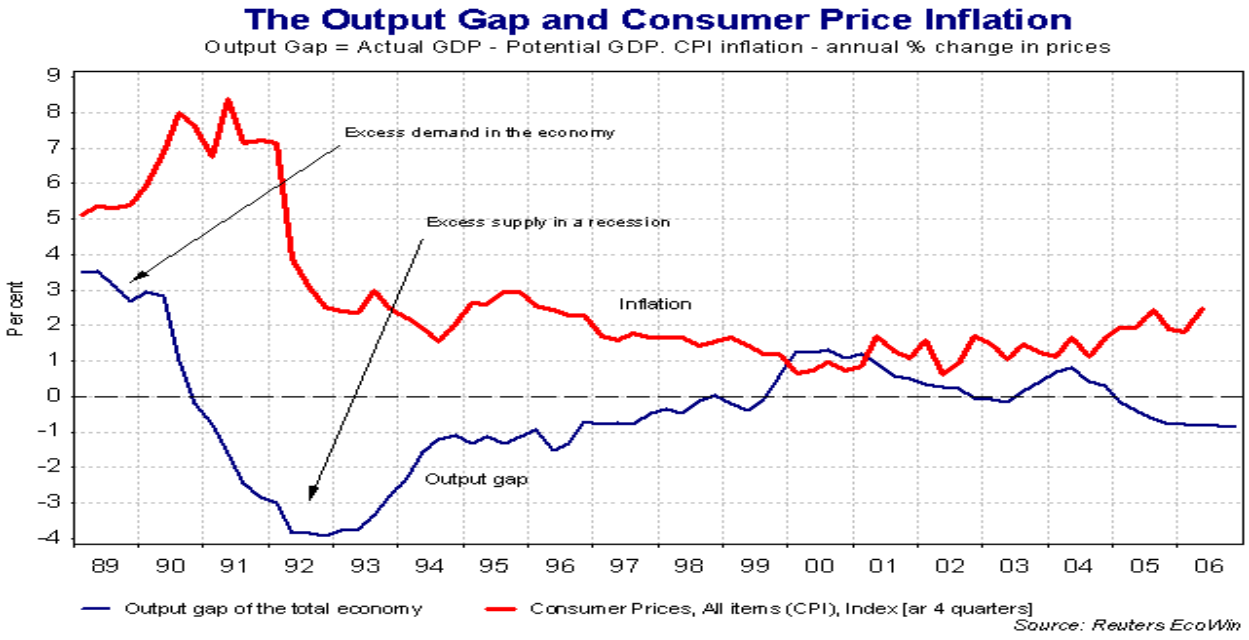

FIG 2-1: THE OUTPUT GAP AND CONSUMER PRICE INFLATION

2.1 Inflation Types

There are five types of price inflation.

Demand-Pull

Demand Pull is one of the significant type of inflation. It occurs when the total demand exceeds the available supply resulting high prices in market. In the past this type has been the ordinary and most serious. It has been created in wars because demand of materials and manpower grows rapidly. In amalgamation with demand-pull, there are other escalations which also occurred.

Cost-push Escalation

The title proposed the reason costs of construction increase, and force up the prices of materials. Unit costs of production have been raised due to increase in salary of labor and other staff which ultimately increases the prices. It is ordinary to the Demand-pull escalation. It happened both in amalgamation and individually.

Pricing power Escalation:

Another type of escalation is administered price escalation. Boost in prices to increase their profit margins result in pricing power escalation. It never happened usually in slumped period. It occurred due to the boast up in the economy and with more sales. It can be defined as oligopolistic escalation as it oligopolies which make their own prices and increase them at the time as required.

Sectoral Escalation

4th type is called sectoral escalation. This escalation occurs in combination with other three factors making increase in the prices and creating inflation, and target the industry on which all other industries depends.

I.e. if industries of Oil/steel forces up prices inflation become more extensive, although it originated in 01 basic sector.

Built-in Escalation

It is made by “adaptive expectations” connected to the "price/wage spiral" due to involvement of workers increasing their wages which ultimately pass high costs on the part of consumers. This has also happened in the past and is seen as “hangover inflation”.

2.2 Causes of Escalation

There are many reasons of construction cost escalation which includes both local and global factors and construction market which makes it prone to construction cost escalation. [34]

The increase in the prices of construction materials begins in 2003-2004 with very high changes in the steel market. Prior to that, these prices were at stable levels for the last twenty years. In year 2001, construction market experienced little escalation. In the period between December 2000-dec 2001,” (PPI) for construction materials showed no alteration, and the cumulative PPI fell into (1.6%), however consumer price index increase to only 1.6%”
During the year 2002 and 2003, the price escalation is same. [35] In 2004, prices of steel have changed drastically, and the impact echoes vide construction market. [36]

1. “Excess Money Printing”

   “Increase in the prices of material occurs when more money is printed by government to handle bad situations due to which prices increases at high pace to cope with surplus currency in which because of high demands, prices increases”

2. “High Production Cost”

   “Hifh production costs are one of the main factors which ultimately increase the price of product. For example, if there is rise in the prices of raw materials, it will increase the unit cost on the production of that item which in return increases the price of that final product to maintain their profit margins. Increases in the wages of works have indirect affect on the costs paid by the Customer for a certain product.

3. “International Lending and National Debts”

   “International lending and national debts also creates inflation. Nations lends money to cover all the crises of the country which ends in taking the prices of materials at high levels. In times of inflation when government has to deal with variations in import/export level, there is a deep drop of exchange rate”

4. Federal Taxes

   “Another reason for Inflation is the taxes imposed by the government on the daily used products. Due to these taxes imposed by Government, the suppliers increase the prices of products and burden is on the consumers and also these prices never come down even if the taxes were reduced.”

   For example, an increase in fuel duties, VAT or increase in variety of those items on which VAT is applicable. These taxes are imposed on suppliers who can opt to pass on the burden of the tax onto consumers.

5. “High Monetary Expansion”

   “The supply of money is increasing every year but the supply of goods/services is not growing due to which, prices are rising”

6. “Natural Disasters”

   “Due to natural disasters like floods, rains and earthquakes the level of production is minimized and there is increase in demand which ultimately increases the prices of goods.”

   Natural calamities in the last few years affected the supply side and demand side pressures. [37] Hurricanes also affected the means of transportation for construction materials. [38]

7. “Consumption Habits”

   “The people in Pakistan are extravagant and demand high standard of living which has a demonstration effect in Pakistan which ultimately increases the prices of Goods/services”

"Devaluation"

"Devaluation brings increase in prices due to rise in the prices of imports. After devaluation prices increases and people begin to hold stocks. Price level rise due to increase in the general demand"

8. "Congestion in Construction"

"The most important factor affecting the escalation is construction congestion. Construction activity has been in its peak with the current annual growth rate around Four % per annum resulting in high demand for Construction materials"

9. Schedule

"In periods of very high cost escalation, project durations have a important impact on the total construction cost of a project. Delays in a project increase the costs in following 02 ways. Firstly it increases the impact of escalation. 2nd is emphasize on the whole staff to increase the pace of project. All of these can have a marked effect on the construction cost. "

In a $100 billion project, a month delay adds an additional 1 to 2 Billion
Dollars

10. Global Demand

The global demand for commodities is greater than any prior time in history.

11. Energy Costs

The costs of oil, natural gas, coal, and electricity are major components of construction cost. They are expected to continue to rise substantially. For last 04 years years, fuel prices have increases radically high.

"In the period of May 2005-2006, prices of diesel have increased to 40% having big impact on running cost of the equipment and distributing materials"

Furthermore increase in the prices of crude oil prices transforms in high cost of oil products. Many local refineries minimized the manufacturing of oil products and switched over to a lighter crude oil. [33]

“Inflation has a huge impact on those construction projects which are under progress and have fixed prices. In these projects as prices are fixed, contractor will only get the same money as already agreed in the Contract and there is no provision for adjustment. All the contractors who are entering into the fixed price projects shall include the contingencies cost in their bids. There are few owners who use the provision of escalation in their contracts; mostly there is not the part of Contract. Like “means”, there are also other building construction manuals which includes charts and tables for the estimation of inflation factor in”

“A cost estimate is made with current prices of materials, labor and equipments. If a project is delayed from a year to other during a budget processes, it cost should be adjusted. Such adjustment is a modification for predicted increase in prices. Cost estimates for the construction projects are adjusted due to the inflation factors by applying it at the mid-point of construction. These adjustments can be done by the use of charts, tables and other data available in the construction manuals such as “Means”. Comparison a project with other project must be in same dollar base as mentioned in the “Means”.

2.3 "Impact of Cost Escalation"

Impact of cost escalation on construction industry has been multi-fold. Uncertainty has been developed among the contractors due to these dramatic changes in prices of materials. On a mega project, 02 companies have been declared bankruptcy. [4] Other impacts include damaged or destroyed construction businesses.

2.3.1 Delayed or Cancelled Projects

Material price escalation has made the builders to rethink the "numbers" important for private development valuable. The results of price escalation includes the delayed of projects, decrease in the scope of the project or termination of projects which is also common in public construction division. Projects which are funded by the public sector / Government face big problems due to increases in project cost due to escalation. In many cases when project funded by government, an approval was accorded and time bids were obtained for construction projects, suddenly an increase in the prices of material makes the bids beyond the approved ones and enters into a problem in which they search out some other ways either to get them hold until enough fund is available or they cancel the project due to non availability of additional money..[5]

An American company named "Water and Sewer authority" had planned to put up biggest egg-shaped digesters which were later stopped due to sudden increase in prices of materials. They got a high bid of (three hundred and six million dollar) which was 64 percent more than the estimated budget by that department. [6] One billion dollar of highway construction has been differed due high prices of asphalt, concrete, steel for the next 03 years. [7]

2.3.2 Lack of Firm Price Quotes

Generally Contractor were able to take quotations from the supplier of respective materials for long periods up to 3 months but now there is so unpredictability in the prices of materials that supplier didn't give quotes fore than 15 days. In New York some of the "vendors are providing quotations for the matter of some hours only" [8] In a result carried out through a survey, 80 percent of contractors decreases the time period of their bids due to market volatility.[9]

2.3.3 Less Bidders

Due to the market volatility and high risk of escalation in the prices of materials, there are very less bids being obtained from the market. Contractor avoids entering in the agreement where there is risk for loss due to inflation of materials. Bidders for highway projects have been reduced due to increased prices of highway materials. [10] Client faces problems as they get only one bidder instead of more bidders. [11]

2.3.4 High Costs

Those projects which are not held up due to prices increases of materials results in the high project cost. There is always a threat of price escalation the Owners, Contractors and suppliers and the absence of construction cost escalation clauses in contract agreement takes the project to higher costs as compared to the budgeted.

2.3.5 Miss Handling of Construction Materials

An incident happened in America for stealing copper wires. [12].This has created fear among the Contractors. Increase in the prices of materials ultimately increases all the other products linked directly or indirectly with that escalated item. Systems which are particularly affected by the high prices of copper are mechanical and electrical systems. [13]

2.4 COST ESCALATION IN PAKISTAN

Historical Trends

1970s: "1970 the era of huge structural amendments and vagueness, the role of price raises prospects was quite obvious. People judged anticipated increase while making their optimization verdicts"

1980s: "In 1980s average inflation was low **(7.2 per cent).** Main factor behind it are depreciation in exchange rates and loan by private sectors. De-nationalization grown the private sector as a result of which private sector borrowing increased"

1990s: In 1990s, the mainstream liberalization policies picked up momentum. Frequent changes in the government, inconsistent policies, nuclear explosion and other dramatic political and economic developments put upward pressure on prices. Average inflation rate increased to **9.6 percent**. Increase in wheat procurement prices, government and private sector borrowings, exchange rate depreciation and adaptive expectations were the main factors behind the surge in inflation rate.

DURING 2000'S

The inflation rate with 5.7 percent in 1998-1999, was reduced to 3.1 percent by 2002-2003 which was the lowest in the last three decades. This was supported by strict fiscal discipline, the lower monetization of the budget shortfall, an output recovery, a decrease in duties, taxes, and appreciation of exchange rate.

The country had very low levels of food inflation due to plentiful supply both in local and international market during that period.

During the first 02 years (2000-2001/2002-2003) overall inflation averaged 3.7% .As already mentioned that the decline in overall inflation owe heavily to low food inflation (3.1%) compared to non-food inflation, as non food inflation averaged 4.3% during the last 03 years.

2.5 Escalation Factors in Pakistan

(a) "Supply-side shocks"

"It can cause variations in the prices of food or oils which ultimately affect on escalation. Often it can be at much extreme where it becomes unable to counter it with monetary policy"

(b) "Bigger domestic requirements"

"Increased domestic demand made a space which increases the prices of materials. Growth and inflation depends on country financial ability. If the possible production of the country is increasing to covers or to meet the demands then there is possibility of high growth without an increase in prices .There is also possibility of potential output more than actual output and more capacity is available for demand force but both the output

meets then there is possibility of increased growth with increase in prices. There is always fear of high price increase without any increase in growth due to increased demand with no productive capacity which created a big impact on the economy of the country."

(c) "Increase in net imports"

"Increase in net imports also increases the prices of materials"

(d) Rising trade deficit

The expectations effect is very important since there is a danger that the current high rate of inflation can get locked into expectations of inflation. People expect higher salaries to compensate for expected increase in prices, speculation in asset prices increases, credit meant for manufacturing sector diverts to real estate and stock markets, and hoarders, profit and rent seekers become active in expectation of high price in the future. All this can have devastating effect for the prices.

(e) Fiscal policy remained expansionary

In the last few years fiscal plan has stayed expansionary. Expansionary fiscal policy fuels local needs and pressure has been put on the existing account insufficiency. Investment-saving gap which is to be financed externally has been widened through it. Filling this gap by financing the money shortfall by creating money adds to inflationary pressures. A serious factor for price increase is the loan taken by Government from Banks.

(f) "Expansionary monetary policy"

"Another factor which highly contributes to the cost escalation of materials is the increased growth of money supply. Excessive growth of money has unfavorable impacts "

(g) "Rising import prices"

"Rising import prices is an important factor causing escalation in Pakistan. An upward pressure on price level is also generated by the depreciating exchange rate. Raise in

prices of materials makes our imports costlier which ultimately has impact on cost of production"

(h) "Indirect taxes"

"It is the main cause of inflation in Pakistan. The indirect taxes like sales tax and excise duties increase the prices goods. Direct taxes reduce income and have anti-inflationary effect"

2.6 SENARIO OF INFLATION IN PAKISTAN 2008

Inflation in Pakistan jumps to 25 percent. CPI in the country soared 25 percent from a year earlier after gaining 23.9 percent in September 2008.

"Pakistan has to lift interest rates to get bailout if International mutual fund insists on the same conditions as with Iceland and Ukraine. Higher borrowing costs may not bring inflation down soon as other conditions attached to an IMF loan would likely include higher energy prices, economists said".

"The time when inflation actually starts to recede may be pushed forward further"

"Even though fuel prices are currently decreasing, there are other items which are increasing as per an agreement with the International mutual fund."

"State Bank of Pakistan was under pressure to bring price inflation under control amid a blowout in the nation's balance of payments and a 31%t drop in the rupee this year, which has driven up import costs. The domestic currency reached a record low of 83.55 per dollar on 17 October, 2008."

"The nation's foreign exchange reserves have decrease to $3.71 billion on 25 October from $14.2 billion a year ago; raising concern that Pakistan might not be able to pay its $3 billion debt servicing costs due in the coming year"

"Petrol prices in Pakistan were cut by 6 percent, the seventh change in eight months, after a decline in crude oil prices in the international market. Conditions attached to an IMF loan would include an increase in the central bank's benchmark interest rate to 15 percent from 13 percent, as well as a 31 percent rise in tariffs on electricity and other utilities, the newspaper reported. Pakistan is also seeking funds from lenders such as the World Bank and the Asian Development Bank and donor countries included in the "Friends of Pakistan" group to help stabilize its

economy. The country's credit rating was lowered by **Standard and Poor's** (S&P) and **Moody's Investors Service** in October on concern the nation won't be able to pay its overseas debt because of eroding foreign reserves. The country ended its last IMF program in 2004. "Pakistan faces severe pressure from the external side, the fiscal side, the monetary side, economic growth and politics," Elena Okorotchenko, head of Asian sovereign ratings at S&P"

Meanwhile, "data posted on the website of the Federal Bureau of Statistics showed the country's trade deficit narrowed by 2.9% as exports rose faster than imports. The trade gap fell to $1.9 billion in the fourth month of the fiscal year that started on 1 July, from $2 billion a year ago. Overseas sales climbed 10.2% to $1.52 billion, while imports surged 2.5% to $3.5 billion, according to the data. The trade gap widened 33.3% to $7.5 billion, from $5.6 billion a year ago. Exports in the four months rose 16.6% to $6.7 billion and imports climbed 24.8% to $14.3 billion."

Inflation Rates based on (SPI), (CPI) and (WPI) are shown in Table 2-1.

Period	Sensitive price index	Consumer price index	Wholesale price index
1991-92	10.540	10.5800	9.840
1992-93	10.710	9.830	7.360
1993-94	11.790	11.270	11.400
1994-95	15.010	13.020	16.000
1995-96	10.710	10.790	11.100
1996-97	12.450	11.800	13.010
1997-98	7.350	7.810	6.580
1998-99	6.440	5.740	6.350
1999-00	1.830	3.580	1.770
2000-01	4.840	4.410	6.210
2001-02	3.370	3.540	2.080
2002-03	3.580	3.100	5.570
2003-04	6.830	4.570	7.910
2004-05	11.550	9.280	6.750
2005-06	7.020	7.9200	10.100
2006-07	10.820	7.770	6.940

Table: 2-1 **Annual Inflation Rates of Pakistan**

2.7 PROVISION OF COST ESCALATION IN INTERNATIONAL BIDDING DOCUMENTS

(A) WORLD BANK BIDDING DOCUMENT[14]

(B) FIDIC

(A) Provision in World Bank Document[14]

World Bank document provides the following formula for the adjustment of escalation in case of materials specified in the Contract document:

$$P1=Po\ (a+bL_1/Lo+cM_1/Mo)-Po$$

$$(a+b+c) = 1$$

where

P_1 = Adjustable price to be given to Contractor

P_o = Base Price

a = Fixed ratio showing overheads covered in Contract

b = % of labor component

c = % of material component

L_0, L_1 = Lo and L1 are the current and base prices of labor component consumed in that month

M_0, M_1 = Mo and M1 are the current and base prices of material component consumed in that month

Base Rate = 30 days before the submission of the bids.

"The party can invoke the aforesaid formula with below conditions"

(1) Price adjustment is not admissible "beyond the original delivery dates unless specified in the extension letter. In the period of delay at the end on Contractor, no price is allowed and Contractor is responsible for that. Owner reserves the right to minimize the prices subject to adjustment."

(2) If the currency of indices doesn't match with that of currency of Contract Price, then a correction factor is applied for the adjustment"

(3) No price adjustment shall be payable as advance payment to the Contractor.

(B) Provision in FIDIC[15]

FIDIC states that there shall be added or deducted from the Contract price such sums in respect of rise or fall in the cost of labor and materials or any other matters affecting the cost of execution of the works as may be determined in accordance with conditions of that country dealing the contracts.[15]

"If, after the date 28 days prior to the latest date for submission of tenders for the Contract there occur in the country in which the Works are being or are to be executed changes to any National or State Statute, Ordinance, Decree or other Law or any regulation or bye-law of any local or other duly constituted authority, or the introduction of any such State Statute, Ordinance, Decree, Law, regulation or bye-law which causes additional or reduced cost to the Contractor, other than under Sub-Clause 70.1, in the execution of the Contract, such additional or reduced cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be added to or deducted from the Contract Price and the Engineer shall notify the Contractor accordingly, with a copy to the Employer."

2.8 PROVISION OF COST ESCALATION IN PAKISTAN (PEC BIDDING DOCUMENT)

Increase or Decrease of Cost

"The amount which has been paid to the contractor due to the increase or decrease in the prices of specified materials then that price shall be adjusted in actual works". [16]

(a) "Other Changes in Cost"

"Compensation against every increase or decrease in the prices of materials is not paid to the contractor and its provision is not mentioned in the Contract, prices covered in the bill of quantities shall be deemed to cover all the risks for any increase or decrease in the prices of materials."

"Price Adjustment Formula "

(New Formula/Factor based)

"Below given formula is used for the adjustment of prices"

Pn= A +bLn/Lo + c Mn/Mo + d En/Eo + ----------

"Pn is the factor which multiplied with the amount of work done for the month for which adjustment is made."

"A is a constant"

"b, c, d, ,e etc., are weightings of Diesel ,Cement ,labor, and steel etc."

"Ln,Mn and En are the current prices of materials consumed in that month

"Lo, Mo, Eo, etc., are the base prices of materials.

(Old Formula/Actual Based)

Difference of base rates with current rates are paid or deducted as escalation or de-escalation. However labor factor is calculated by below given formula.

"N = [(C/Y) x B x Q] + [(C/Z) x A x Q]"

"Q = labour Component of items rate =25%"

"A= Ratio of skilled labour=75%"

"N= Increase in labour wages "

"B= Ratio of unskilled labour=25% "

"Y= Basic wages, benefits and allowances of unskilled labour "

"Z= Basic wages,of skilled labour"

"C= Increase"

(a) Price index and weightings sources

"Price index sources are those which will be mentioned in the Appendix C to bid, however if the sources are different then those mentioned in the appendix C to bid then the Contractor shall submit the sourced and weight ages along with the bid and shall accord approval of same from the Engineer.

(b) Base and Current rates for adjustment

"The base price of material shall be those prices which are existing on the day twenty days before bids opening and current rates of materials are those which are prevailing on the day which is 28 days before that date for which that adjustment has been claimed. On the un-availability of current rates due un published bulletin or any other cause, the Contractor is entitled to for that increase or decrease on provisional rates as decided by the Engineer and same shall be re-adjusted on the availability of current rates."

(c) Adjustment made upon expiry of Contract

"If the whole works are not completed in its stipulated time period then after that escalation or de-escalation was made with less price rates either that prevailing in time period of Contract for that adjustment or the current rates at that time giving favor to the employer. However if Client has provided extension to the contractor then this aforesaid condition will apply after the expiry of that completion date."

(d) Weight ages

"The weight ages of factors listed in the Appendix-C to Bid are subject to adjustment if Engineers feels that they are not reasonable or applicable for that specified work. A variation order shall be made for such kinds of adjustments."

2.9 GENERAL INFORMATION ABOUT PRICE INDICES

.A research done by OECD, 1994 (a) [21], 1996[22], 1994 (b) [23] & EUROSTAT, 1995[24], 1996) [25] pointed out that the different indices came to check the change in the output of materials. It cannot be checked with one building statistics. They include many series of submissions which includes deflation in national accounts works. Many tools are used for measuring price changes. I.e. Consumer price index, producer price indices, price indices for goods and services. Indices consist of Consumer price index, producer price indices and BCI and are published by bureau

statistical department .A better understanding will be made through detailed investigation of calculation methods of these indices. [18]

Carli was the 1st index developed for the measurement of effects on Europe purchasing power of money by the discovery of America [45].An index which is used to adjust cost of those projects which are similar in nature but with different time periods is called inflation index. The oldest inflation index currently used by engineers is engineering news record [46].

Many techniques are used for the calculation of index as per their type and coverage. Index calculation methods with the index types are the easiest way. State Statistics Institute Turkey 2002 describes the below indices [19]:

- ("locality/Time Index")
- ("Variable/Constant Index")
- ("Compound/Simple Index")

Rational alteration pointed out by statistical variable with respect to the region or any location. Is called location index [19]

However time index is same as location except the fact that it is with respect to time. Indices based on time series are constant and variable. The indices obtained by illustrating total set of the indices as % of average of various definite time is Constant-based index. The constant period does not change [19]. Variable-based index is obtained by comparing current period with previous period. Simple index is used for one materials and compound is used for more materials.

2.9.1 "Price Index"

Price index measures the changing prices of materials with the passage of time. Names of price indices are as per their market at the place of monitoring. CPI, PPI, EPI, IPI are examples for these indices. For finding the structure of a country or getting any economic decision, price indices are required. These are also required to establish the purchasing power, finding the cost, establishing the retail prices of materials, confirming the socio-economic condition, finding the conjuncture and for taking future verdicts. computation of cost index required following variables.

- "Goods/services baskets"
- "Base weight"

- "Base rates"
- "Current rates"

"Goods/ services Baskets"

This is the list focused periodically to calculate the indices. It is very difficult to notice all prices therefore basket of good or service is specified for a specific good or service.

"Weight"

Share gained with respect to the values of good and service as compare to total basket is defined as weight and is needed for the calculation of the index. Types of weights are

Constant weight: Constant weight can be defined as the weight of material not affected by month or season.

Variable Weight: Variable weight can be defined as the weight not affected by seasons.

"Base year price"

Base year price can be defined as the price used for the computation of price index in twelve months of the base year.

"Current/Existing Price"

It can be defined as the present cost of material used to calculate the price indices. It is adjusted periodically because they changes with the change of time due to new technologies or more innovations which ultimately changes the consumer behavior. Certain materials have been replaced with new ones and some loose their importance in production. Internationally it has been advised to adjust indices after every five years [19].

2.9.2 Construction Price Index

The changes in output of the activities which cant be verified by the building statistics is verified by bureau statistical department for CPI. [CPI, OECD, 1994 (a) [21], 1996[22], 1994 (b) [23] & EUROSTAT, 1995[24], 1996)] [25]. The Statistics Directorate of the OECD (1994 (a)[21], 1996[22],

1994 (b))[23] pointed that aforesaid index is used in leasing contracts ,sales contract for buildings and as a origin for indexation for insurance purposes .It can also be used for gross fixed capital formation in residential projects. CPI does not provide any information on the existing cost of any construction activity instead it is used for tracking the changes in the cost of construction. Some concerned faced problems pertaining to the project. [29]

1. Construction projects are mixed; every single project is a different one.
2. Construction contracts got complex and lengthy specifications.
3. It is necessary to mutually agree on base price of materials used for calculation of escalation.
4. The contract price contains a major non-quantified when there is a single contractor involved. [26].

It can be used for 02 different reasons

1. Depreciation of existing expenditure in construction to give approximation of expenses at same cost.
2. Part of escalation

They force diverse necessities in 02 ways:

- For de-escalation, an evaluation of construction output time by time must be done. Contract signing time is required for analyzing the inflation .An inflation price index should be entered in agreed contract price when it is agreed.

- Fixed base approximation of expenses at existing prices requires a current based index for deflation. However a fixed-base index is essential for fixed-base index and to give an indicator of alterations in mutually agreed prices of materials.

CPI gives actions of alterations in costs of inputs/outputs of construction work. But terms varies country to country. Addition/Elimination of new things like transport costs have a considerable

variation. Information required for collection of construction price indices are derived from different Contractors. An important part that affects the collection of construction price indices is that no single contractor has completed a project alone. Numbers of contractor firms are involved in the execution of the project and have a big role in the completion of project. The owner invites construction contracting firms to execute any project. Work need to be done is called “work category” and end result/output is the product”. For the execution of the work, the prices are either the prices paid by the construction contractor required for the execution of work or the those prices which are given by the Owner for the work which has to be done. CPI may be defined as

- Prices which contractor pay for execution of project
- the price of executed work received the Client
- The selling price paid by the owner or the purchaser.

The collection and development for CPI and PPI for construction activity is a very difficult procedure. Its worth depends on understanding the index use and nature of the construction with its locality. Study concludes that

- Construction carried out all over the country;
- Construction practices for similar nature of Construction.

- Types of Organizations undertaken the execution of construction work

- Managerial preparations for building maintenance

- Managerial preparations for government approval of individual construction projects.

- Selection of models such as constructed buildings, completed project and the quantity of models are dependant on the range of construction activity.
- Specification of different activities for that model projects.

- Within each trade area, selection of components is based on both coverage of significant materials and money value

- Making specifications for components.

- Selection of a sub-sample of contractors including their sub-contractor from the area from prices is collected. A significant part is to find out a contractor who is currently involved in the execution of project and can give quotes..

- Getting reports taken time to time as a sample from the Contractor based on the current prices. Prices can be collected either by mails or telephones. The price of equipments (Mechanical and Electrical) can be furnished by their manufacturers

- Estimation of price indices for construction by multiplying the current prices with base prices.

- Growth and execution of index review process to amend the Performa of model projects.

2.9.3 Consumer Price Index (CPI)

The measure of price variation of materials with respect to the time is called Consumer Price Index.CPI imitate only the price movements by keeping the special consideration for the quality and quantity variation of material. The Statistics Directorate concludes that Consumer prices indices compute changes with respect to time in average cost of materials.
CPI has various uses some of which are here under:

- Estimation of price increase in macro-economic logic along with its comparison with different countries.

- Evaluating economic policy
- Modification of costs.
- Purification of \data from price increase
- Pointer for the national accounting
- Pointer for cost scrutiny
- direction of the commercial services
- Pointer for retail price

In turkey, all consumption expenses were covered by 2003 base year CPI. No differentiation is applied whether the income groups of the population or the geography regions.

2.9.4 Producer Price Index (PPI)

It is the measures of price differences of cost of those materials which have been manufactured for that country in a certain time period and those products are for the domestic sale. Producer price is defined as the selling price of material in the country including all taxes. First selling price of the materials is monitored for PPI. Prices pertaining to the agricultural sector are called Prices Earned by the Producer and pertaining to industrial sector taken from the producer companies. PPI is also defined as computation of average movements of prices which has been taken commodity producers. Generally Producer price index doesn't include the costs of transport, commercial overheads and consumption taxes. Generally PPI is computed by the total turnover of a firm

.

The PPI currently used was taken by getting the cost of materials from the firm of country either producing directly or from the whole sale people which include taxes and profits of wholesalers. [19]. PPI is very common because of the measure of price difference during time of production

against CPI which is measure of price difference during period of consumption. Also it provides harmony and enables comparison with world wide indexes. The basic difference is of the units where the prices are collected. From the wholesale selling spots in addition to the producers, the prices for PPI are collected. Prices of the wholesale goods include both VAT and similar taxes. For the producer price indices, the basic point for PPI is to take prices form producers which are the domestic selling prices which doesn't include VAT and the similar taxes.

PPI has various uses some of which are hereunder

- Evaluation of the economic policies
- Alteration in Cost.
- Manufacturing and production calculations.
- Accounting measurements
- Indicator for cost scrutiny
- Investment verdicts

2.10 EFFECT OF ESCALATION ON PROJECT COST

"Amount of a product or service in the market which includes all the margins, profits and overheads of manufacturer or supplier' is defined as price. It can also be defined as "amount given by the customer for the product or service"

Construction work estimates are made in a definite time and prices are only valid for those dates because of frequent changes in the prices of materials due to 02 main reasons

- Increase and decrease in the prices of materials
- relationship of Supply and demand of materials

Effect to escalation on the overall economy of the country is at macro level. Cost escalation is expressed as "large money chasing too fewer goods" demand itself being ineffectual except the capacity to purchase is also present. For basic demand and supply it can have important affect on construction prices

- "Steel prices have been forced up due to excessive demand in china"
- "on specific components like lift equipments in which supply is not adequate to fulfill the peak demand."
- "On trades"
- "prices of tenders which are localized or regionalized and differs with the nature of work"

Old Estimates requires readjustment to current price levels to make accurate. An adjustment due to change of design or change in scope must be made. A thorough working of estimate statistics is required which must be existing or current to make them realistic. In view of the records available when the original estimate was made, this adjustment factor can be assessed. Other type of cost assessment required is of forward projecting scheme prices either tender date or

further in time to the completion date. They are desired to prepare cash flows and to provide financial necessities. Estimating this assessment must be based on trending, general economic and market factors emerging in future.

The cost increases being observed in the construction industry are obviously due to increased demand for construction inputs as reconstruction activities get under way. Such increases are to be expected irrespective of whether the new construction activities are funded by domestic or foreign sources. However, these cost increases have a major bearing on the degree to which the reconstruction effort can be financed by available (or pledged) foreign funds.

CHAPTER NO 3

CASE STUDY

3.1 A CASE STUDY OF (AGC) ASSOCIATED GENERAL CONTRACTORS OF AMERICA

A Deceleration was made in 2004 due to the dramatic prices in construction materials I.e. Steel during the year 2003-2004. Due to that resolution, the "AGC Contract Documents Committee made an amendment to the associated general contractors of America contractor's agreement" In that modification, method for calculation of construction cost escalation and the materials on which escalation has to be paid have been specified.

AGC price adjustment provision are categorized here under

• Price Escalation/De-escalation

"This tells about the clauses regarding escalation and de-escalation of materials."

• Allocated items.

"It refers to materials which have been mentioned in the contract as a provision."

• Base Prices.

"The clause mandates the all concerned mutually agreed on the fixed base prices as well as method for measuring construction cost escalation."

• No Allocated Method

"The clause allows that all the concerned may agree on a method to be used for the measurement of escalation. No method has been inforced."

• Contract Addendum.

"The amendment is to be made as per provision mentioned in the original authorized document."

• Notice.

"The clause allows all the concerned to get informed regarding the price escalation provisions and also indicates that price escalation shall be claimed with in 30 days."

• "Authenticity of prices increase "

"The requesting party must ensure the authenticity of material price increase."

• "No over Heads"

"Overheads and profits are not included in cost escalation."

• "Minimum Limits"

"This includes the minimum limit up to which risks for price escalation will be shared by Contractor and over which is bared by the Client."

• "Additional Time"

"It tells us about the extension in time due to the hype in the prices of materials on which there is no default at the end of Contractor. "

AGC approach also concludes that" Nonresidential construction is in a period of transition from nearly universal expansion in 2007 to much more selective growth.05 types of projects are expected to grow in 2008 i.e. Energy, Power, communication, hospital. Other strongly grew categories in 2007 will slow 2008 and in 2009 because projects that started last year are completed and not replaced by new ones. Overall nonresidential spending is likely to increase by 4-8 percent as compared to 16 percent in 2007. And 15-20 percent drop in residential spending as compare to 18 percent in 2007 will bring down total construction spending by 2-6 percent as compared to 03 percent fall in 2007.These changes will contribute to changes in materials costs. Copper, Steel and diesel prices are expected to increase fast.

In 2008 "the construction Producer price index is expected to increase up to 6 to 8% as compared to 4.5 % in 2007 and Consumer Price Index rises to 2.5 to 3.5 % as compared to 4.1 % in 2007. Alike difference is expected in future. In spite of more nonresidential

activity in 2007, contractors were able to find enough workers. Wages rose at about 3.6 % and the overall private sector 3.7 % although nonresidential construction wages reaches to 4.4 percent for first-year union settlements. In 2008, the leading nonresidential categories will require skilled workers. As a result, wage increases may rise to the 4.5 to 5.5 % range in 2008 in spite of the hold up in overall activity and to 5 to 6 % in 2009, when residential work begins to compete again for some specialties".

3.2 CASE STUDY REPORTED BY (VDOT) VIRGINIA DEPARTMENT OF TRANSPORTATION

A Construction cost adjustment method for steel has been implemented by Virginia Department of Transportation in 2004 [28]. This formula for escalation or de-escalation of steel is in briefed in detail by Virginia Department of Transportation. [29]"
VDOT price adjustment provision are categorized here under

• "Early purchase"
"This indicates that material such as steel shall be procured as early as possible to avoid the risk of price increase."

• "Specification of items"
"Steel items shall be properly labeled and stored so that it can be easily identified in case of audit or verification"

• "Authenticity of Bid Prices"
"Contractor shall submit the quotations of materials within 15 days of time date of award of Contract, required for the steel price adjustment"

• "Mean Cost credentials"

"The document provided by executor before the award of Contract shall be enough to complete a Virginia Department of Transportation form developing the mean cost/lb for the suitable steel bid item"

• "Attestation for bidding documents"

"Certification from the Contractor is required certifying that all the documents are Original and are used for this purpose only"

• "Material Price Escalation"

"On the account of handling, storage and fixing of materials, No escalation will be granted"

• "Upper/Lower Escalation Limits"

"Minimum Limit is 10% and maximum is up to 60 % of the base price of the steel item."

• "Definition of Controlling Price Indexes"

"Statistical Bureau of Labor Producers Price Index has been specified for the price escalation each group of steel item with a mean of 02 indexes"

• "Excluded Delay Damages"

"Delay on the account of shortage of steel is admissible however cost of equipment or any other over head is not accepted."

3.3 CASE STUDY REPORTED BY FLORIDA DEPARTMENT OF TRANSPORTATION

The Florida Department of transportation takes different approach to price escalation. They provide specification for price escalation for the material like fuel and bitumen used in highways construction.

Price adjustment provision are categorized here under

• "Contract Time Period"

"Projects for the period more than one year or having five thousand tons of asphalt concrete is eligible for escalation."

• "Cost escalation-De-escalation"

"It indicates the escalation and de-escalation of the prices of materials."

• "Indices Based"

"Cost adjustments depend on the deviation from the (API) of bituminous item. The FDOT determine the API for every month by taking mean of the quotations"

• "Monthly adjustment"

"The current API is compared with API of bidding month on monthly basis by FDOT and adjustment is made when current API deviate more than 5 percent of the API bidding month"

• "Compulsory modifications"

"Asphalt price index based price adjustment is obligator and there is no option for the Contractor either to accept it or reject it and also there is no notice required for it." [30]

"There are many price escalation provisions under consideration. A Department of Highway Administration 31] gives useful ways to address this price escalation and has much information regarding the material cost escalation."

CHAPTER NO 4

BEST PRACTICE IN MANAGING COST ESCALATION

"There are numbers of factors which are affecting construction cost escalation and those factors added a very less amount in the total cost of the project when these factors get combined they became a significant force behind the increasing costs of materials and construction of any project. [32] There are many methods to cope with construction cost escalation. They required new understanding and approaching towards construction techniques. There are many factors contributing to escalation, managing escalation requires a diversity of strategies. Many of the strategies will demand new ways of approaching construction design and procurement.

4.1 Contingency Management

In most construction budgets, there is an allowance for contingencies or unexpected costs during construction. The amount of contingency is based on historical experience and the expected difficulty of a particular project. For example, we make estimates for cost in five different areas:

Design development changes
Schedule adjustments
General administration changes
Differing site conditions
Third party requirements, such as permitting

Using these tools, along with detailed pre-construction planning and sub management, we can accurately forecast the budget within 5%. In conclusion, we predict that cost pressure on materials is the primary element driving cost escalation.

4.2 Bidding and Contracting Practices

Contractor uses multiple Ways to avoid risks of price escalation even if they didn't negotiate on Price escalation clauses with Client. There are several methods to control price escalation risks at their own end by Contractor. The following are the strategies which contractor should adopt for pricing

- Provide bids and proposals within a specified period of time when permissible
- Obtain fix prices from the suppliers for a specific period of time.
- Early purchase of materials to be used later on in the project.
- Don't enter into the agreement if mutual understanding was not made regarding escalation.

Contractor if concerned about material price escalation, the best approach is often an open, good-faith dialogue with the involved parties rather to involve in any arguments or legal obligations.

4.3 TIPS TO MANAGE COST ESCALATION

(1) Recognition

It is important to make it clear that has become a threat for the execution of new construction projects. Most of the Clients were of the view that construction cost escalation will stable and will not increase in the future, however they should

- **Recognize Future increase in prices**

  Owners must recognize that prices will usually not come down to their low prices rather they will raise in future with an annual rate of twelve percent. In past it has been moving at almost same level but has been increasing since last 02 years.

- **Recognize bid market**

  With high the pace of construction, demand of skill workers also increases but its growth didn't increase which didn't attract much bidders who are supposed to be complicated whether due to difficulty of the design, regulatory requirements, the

location or client status. Those who bids will bid higher costs which will be difficult for the owner. It concludes that prices neither depend on material nor labour.

- **Recognize bid volatility**

  Cost of materials will continue to fluctuate in upcoming market. Depending on the availability of type of work and its amount, interests of bidders will get change with time. This means that bidding will become volatile in future. Recently, extraordinarily changes in the risk landscape are the major change in the construction industry.

(2) Cost Risk provision

The main reason for increase or the most significant escalator in the existing market is poor risk allocation. Conventional bidding practices become difficult for those who can't counter fluctuations in cost. Project owners need to change thinking in order to control this construction cost escalation and reduces the chances of future raise in prices. One who has to take risk will be charged with a best. When risk is at the end of Contractor, high bids will be the results to cope with that future risks and then material supplier will made materials prices high to avoid risks. Owners must share risk in order to avoid price escalation in future as owner can able to handle it.

"Project owners should"

- Use fluctuation clauses in which prices will be adjustment with time as per their current rates.

- Early purchase of materials to avoid price escalation of materials.
- There should be a margin of float in the project schedule as due to shortage of materials and current market conditions, there could be un expected delay in the project schedule.

- Bid awarding period should be decreased to accommodate the shorter price locks of materials.

- Biding process of unimportant items should be delayed so as to get close values compared to actual amount when they are required.

- Sub-Contractors should also be negotiated along with the contractors.

“Client should adopt the following to absorb risk for the Engineers”

• Avoid redesigning. There should be limit for the change in the original design by the Clients and re-design shall be avoided to control the cost escalation.

• Identify and forecast the escalation in the design phase of the project and incorporate changes accordingly in design.

“Client must think at program level to”

• **Development of risk management procedures and program-wise hidden cost .**Firstly it is required to indentify the nature of risks involved and then all staff or team members must ensure that they well understands the type of risks and are able to deal with it.

• **Project achievement**. The project achievement lies in the completion of project not in how well it meets the program. It is more suitable to provide more high quality complete project rather more insufficient projects.

• **Keen to unsuccessful.** Boundaries shall be widened up to what is considered to be a normal practice. Every project has its own nature or type of risks. Usually projects are designed to low budget despite of larger risk contingency.

Project owner should make it clear to all specialties regarding budgetary constraints, the affect of any sort of delay or modification on the total project cost. This requires a commitment of owner who should have leadership qualities, freedom of action to meet objectives.

(3) **Cost Control**

Cost management is a fundamental tool for managing construction price inflation which includes cost model with usual checking and suitable risk with time. Good information and communication provides successful cost planning. In order to reduce cost risks, owner and its team must assess all risk factors and profiles, analyze them, recognize the level of possible loss level for each product and find out how to get control on each factor "By developing /making the format for main quantities for estimates, cost models can be developed. After development of cost models, they are discussed and review with the all concerned like designers and client staff to discuss he scope of work keeping in view the available funds."The project will not proceed until and unless consent of all the concerned have been taken and possible solutions of how to address these risks involved in the project. "

(4) Go through the past escalation rates.

Go through the market study and understands the current/existing scenario of cost escalation, identify the factors which have effect on escalation and then on the basis on this data, forecast the escalation for near future.

(5) Recognize the escalation allowance on annual basis

Blanket escalation allowances are more appropriate than those which give weight to the possibility of escalation changing from one to another year.

(6) Renew the cost estimate at regular basis

This allows the rates to be re adjusted to reflect current pricing at the adjusted base date.

(7) Adjust escalation on annual basis with current escalation rates and re-forecast escalation

With revisiting escalation and verifying the budget for long duration projects, high level decisions can be performed with greater certainty in order to maintain the budget. It can avoid embarrassing budget shortfalls down the track.

(8) Share Risk between Contractor and Client.

Risk for escalation is always there whether separate provision is provide or anticipated in budgets. More money is added in the bid amount to cope with more risks. To avoid the addition of more costs, the involved risk should be shared .Applying standard cost index on the mutually agreement with contractor and client is a simple method.

(9) Allowance in Contract agreement

Generally contingencies cost have been included in the bidding price of any project by the Contractors to avoid the risks. Absent a construction cost escalation clause chain of contract privities, unseen bid contingencies would be there and risks due to these contingencies would be double

1. Is the bid contingency enough due to huge increase in the prices of materials?

2. Will the bidding price high enough for the client considering the bid contingency sufficient?

A good approach is to provide the provision of price escalation clauses in the contract agreement. That provision will specify the allowance for material price increases and ultimately bids would be high enough as well as there will increases number of bidders. There are many deviations on the classification of these contingencies allowance. This provision makes the contractor to cover the unexpected or sudden change in the prices of materials and any change in the prices will be covered under the Contract as per that allowance. The benefit at the end of client, and if the contract covers the utmost price raise obtainable to executor, is the capability of client to plan for construction cost escalation and the assurance for not exceeding the established amount.

(10) "Value Engineering" for alternate items

Clients and executors have been forced to find out some other materials due to high cost of copper. Other substitute materials include S.S pipes or polyethylene but they are also oil based products which have trends for higher prices. There were ideas regarding introducing aluminum wire instead of copper however they have their own issues pertaining to the contractual risks or not ample experience with substitute materials. [39]

(11) Early Material Purchases

Early purchasing of construction materials minimizes the risks for price escalation in future. Early buying of material required the project scope documents illustrating all the requirements to do.

(12) In Time Material supply assurance

A supplier in Norwalk has provided the innovative technique to address the construction cost escalation as they offer copper to the executors before their acceptance by the Client. That supplier will supply the material for the project even if they are not the sub-contractor. [40] Early contract agreement with Client is required for locking the prices of materials with suppliers.

(13) Early inclusion of all concerned executors

All the specialty contractors (structure, finishing, lift, Hvac, gas, electrical) must be involved in the early stages of the project to avoid any kind of escalation risks. All these concerned contractors must participate in the design process of the project so that any requirement needed for the execution of project must be incorporated at that design stage and all the concerned will have a good command on the scope of project. For example, Concrete contractor is well aware of the market and monitors the pricing trends in the market for cement, sand, aggregates so involving them at early stage will be helpful for the project as they can provide their recommendations and better anticipates the prices in market. Same is case for steel. [41]

(14) Provision for Surcharges

Provisions for surcharges must be included in the Contract agreement. Some contract provide the provision for fuel costs and but provision of other surcharges required for the execution of project must be included in the Agreement.

(15) Provision for Force Majeure

Provision of force majeure in the contract agreement is not enough to address the affect of construction cost escalation .T is quite easy to expand the prospect of this clause instead of including the new escalation clauses. Some force majeure provisions in the contract document allows the contractor to claim for the extension of time due to unavailability of material or any other delay caused by the sudden increase of prices. Adjustment of time and money has been provided under the clause for force majeure due to the inflation in market. However in most cases force majeure provision in contract document give relaxation to the contractor only for sudden or unexpected conditions [42] and it would be difficult to say that price inflation is an unexpected situation.

(16) Partnerships with supplier by buying more quantity of material

Another way to avoid the material price increase is to buy the large quantity of material in one time to be used on project. This will give better prices of materials in one time. This is more recommendable when materials have to be used for more than one project. Good working relations with suppliers have can also be developed through bulk purchases. Better pricing by supplier is possible on assurance of more future business by the Contractor.

(17) Provision for Construction cost escalation

All the adjustment made in the contract document regarding the provision of escalation is to manage the price increase and share the risks among the stakeholders. The format and types of these provisions vary from agreement to agreement. In some cases, escalation is measured by the comparing the actual change with respect to the bid amount however some different price indices for the measurement of price escalation.

4.4 GUIDELINES FOR ESCALATION PROVISION

- **Create the base price**

The items on which escalation has to be paid shall be properly specified in the Contract. Also specify whether it refers a certain quantity or volume. Mention the month and year for base selling price; this time period is known as the base period. Also inform the duration till it remains in effect.

- **Choose a suitable index or indexes.**

"The Finished Goods Price Index best indicate the general trend of inflation for goods sold in primary markets. The PPI for finished goods is more suitable for users who want to exclude the affects of unstable movements in food prices.

"The Crude Materials Price Index / intermediate price index best indicate price trends for semi finished or raw materials in general"

All the concerned contractors often try to inflate the base price by a single Producer price index series. Users prefer to inflate by government statistical sites. Often in some Contracts in case of costs of major materials and supplies, cost are escalated with one or more PPI's, and costs of labor are escalated through other BLS series such as the ECI(Employment cost index). In these circumstances the escalation clause should specify the % weight given to each index in measuring the total escalation amount.

"Contracting parties should choose an index showing the cost of more products or services instead of single product."

Sometimes indices must be chosen as "substitutes to measure change in the prices of materials or products."

- **Properly state the index along with its source.**

Index and its identifying code shall be mentioned in the escalation.

The Producer Price Index is not a single index rather it refers to family of indexes gathered by statistical bureau". A definite index shall be provided in the contract.

Source of index must be mentioned in clause. Producer Price Indexes the major official BLS source of PPI.

Contracting parties should not cite appendix as they get change with time period. BLS sources are recommendable to secondary sources like government publications.

- **Specify indices to be used.**

Generally "seasonally adjusted indices are not suitable as price adjustment proposed to capture actual price change and contracting parties normally would not remove seasonal price movements from their adjustment calculations."

- **Mention period of price adjustment.**

There should be mentioned in the escalation clause whether the Contractor should claim for escalation on annual basis, monthly basis or at the expiration of Contract.

Those projects enter into the disputes on which there isn't mentioned any clause regarding the period for claiming the escalation.

Provide missing data.

Rarely any given PPI may be unavailable for a particular time period because "price information was not supplied by a sufficient number of survey respondents to meet BLS publication standards." "Highly detailed indices are more prone to this problem than indices for broader groupings."

"Index is enduringly terminated sometimes due to decline in product market because of periodic resembling. Provision for contracting parties to renegotiate a successor index may be given in escalation clauses "

Avoid locking indices

"Parties should follow the standard of instructions by measuring % variations of those indices specified on the given base period in effect when the contract escalation is carried out. Wide-ranged base period variations in the Producer price index system is a normal routine but rare.

CHAPTER NO 5

COMPARISON OF ACTUAL BASED AND FACTOR BASED FORMULA IN MEASURING COST ESCALATION.

Escalation has been measured with two formulas both indicated by Pakistan Engineering Council. Earlier (Old Formula) was used to calculate the Cost escalation however in recent time; PEC has replaced the Old formula with new formula.

Below given are the comparisons of both methods used in various projects to calculate the Cost escalation.

5.1 NEW SECRETARIAT BLOCK[43]

Salient Features

1	Project	Construction of New Secretariat Block at Constitution Avenue, Islamabad
2	Contract Amount	Rs. 1,883,925,929/-
3	Client	Pakistan Public Works Department (Pak PWD), Islamabad
4	Consultant	National Engineering Services Pakistan (Pvt.) Ltd.
5	Company	Interhom Pvt. Limited, Lahore
6	Date of Commencement	June 19, 2007
7	Completion Date	June 14, 2010
8	Completion Period	36 Months
9	Maintenance Period	12 Months

Table 5-1 Salient Features of Secretariat Building

Specified Method in PEC Contract Document

Factor Based Formula (New Formula)

Pn= A +bLn/Lo + c Mn/Mo + d En/Eo + ----------

"Pn is the factor which multiplied with the amount of work done for the month for

which adjustment is made."

"A is a constant"

"b, c, d, ,e etc., are weightings of Diesel ,Cement ,labor, and steel etc."

"Ln,Mn and En are the current prices of materials consumed in that month

"Lo, Mo, Eo, etc., are the base prices of materials.

ESCALATION ITEM

- Cement (Based Monthly Statistical Bulletin)
- Reinforced Steel (Based Monthly Statistical Bulletin)
- Labor (Based Monthly Statistical Bulletin)
- High Speed Diesel (Pakistan State Oil Gazette)

BASE RATES [43]

- Cement Rs 255/BAG
- Reinforced Steel Rs 38250/Ton
- Labour Rs 275/day
- High Speed Diesel Rs 37.73/liter

Cumulative and Monthly comparison of Escalation with Actual/Factor based formula on Secretariat project has been shown in Fig 5-1 and Fig 5-2 respectively.

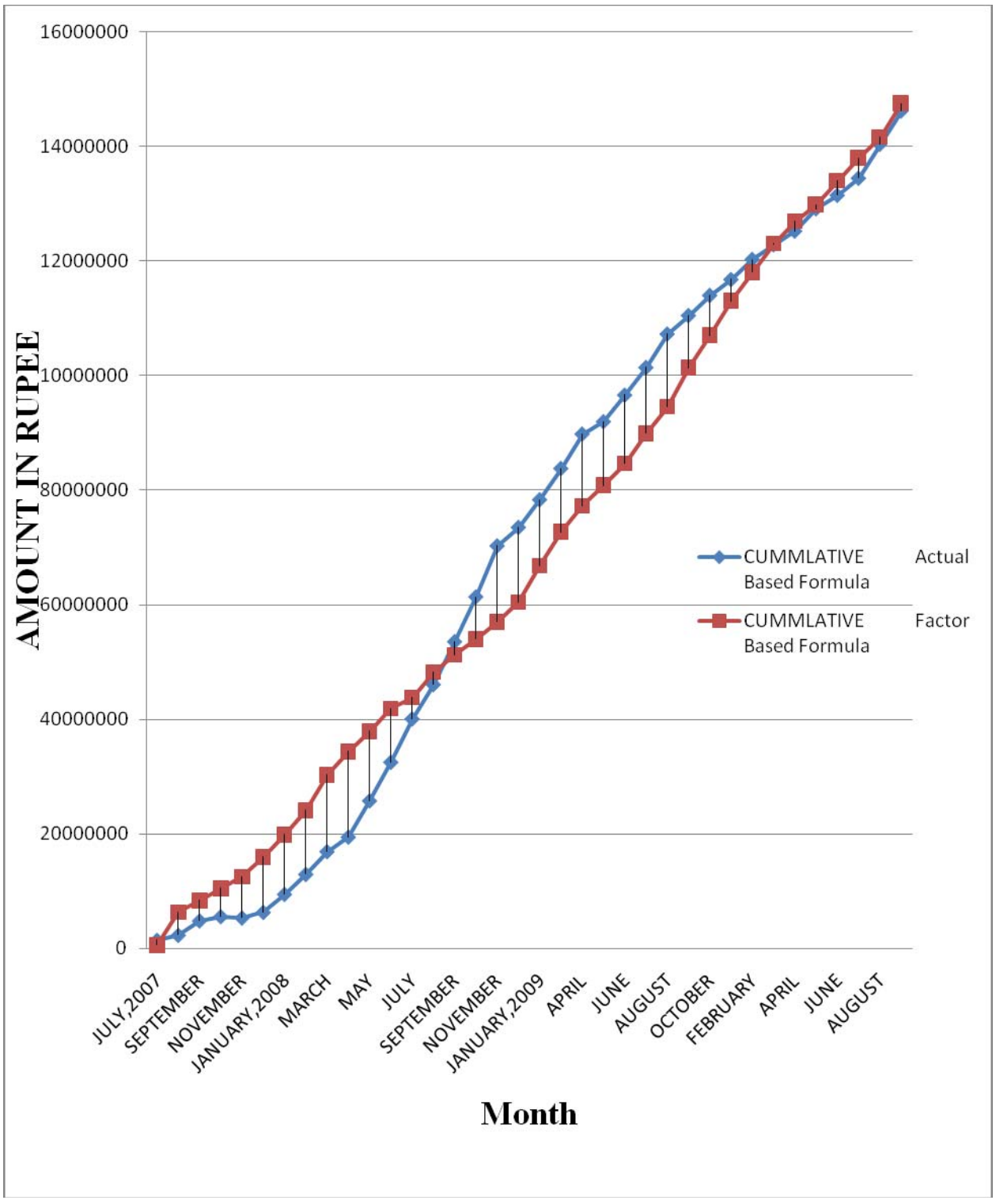

FIGURE 5-1 CUMULATIVE COMPARISON OF ACTUAL/FACTOR BASED FORMULA

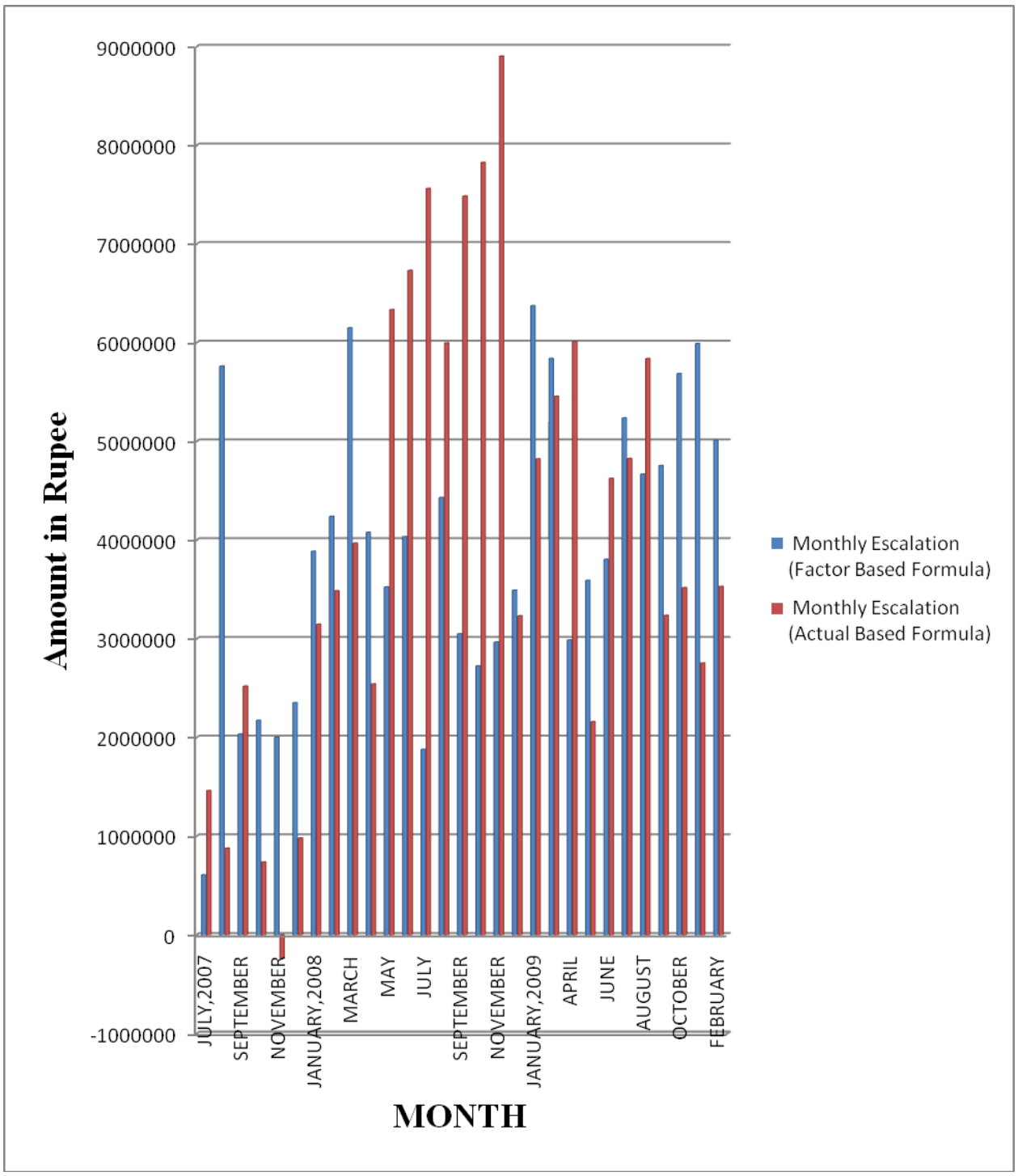

FIGURE 5-2 MONTHLY COMPARISON OF ACTUAL/FACTOR BASED FORMULA

5.2 PAKISTAN TELECOM TOWER PROJECT

Salient Features [45]

1	Project	Construction of Telecom tower Islamabad
2	Contract Amount	Rs. 1,160,767,676.00
3	Client	Pakistan Telecom.
4	Consultant	National Engineering Services Pakistan (Pvt.) Ltd.
5	Company	M.s Izhar
6	Date of Commencement	October 01, 2007
7	Completion Date	September 27, 2010
8	Completion Period	36 Months
9	Maintenance Period	12 Months

Table 5-2 Salient Features of PTET Building

Specified Method in PEC Contract Document

Factor Based Formula (New Formula)

$$\{\text{“ } Pn = A + b\frac{Ln}{Lo} + c\frac{Mn}{Mo} + d\frac{En}{Eo} + \ldots\text{”}\}$$

ESCALATION ITEM

- Cement (Based Monthly Statistical Bulletin)
- Reinforced Steel (Based Monthly Statistical Bulletin)
- Labor (Based Monthly Statistical Bulletin)
- High Speed Diesel (Pakistan State Oil Gazette)

BASE RATES [45]

- Cement Rs 242.5/BAG
- Reinforced Steel Rs 43000/Ton
- Labour Rs 275
- High Speed Diesel Rs 37.80/liter

Cumulative and Monthly comparison of Escalation with Actual/Factor based formula on PTET project has been shown in Fig 5-3 and Fig 5-4 respectively.

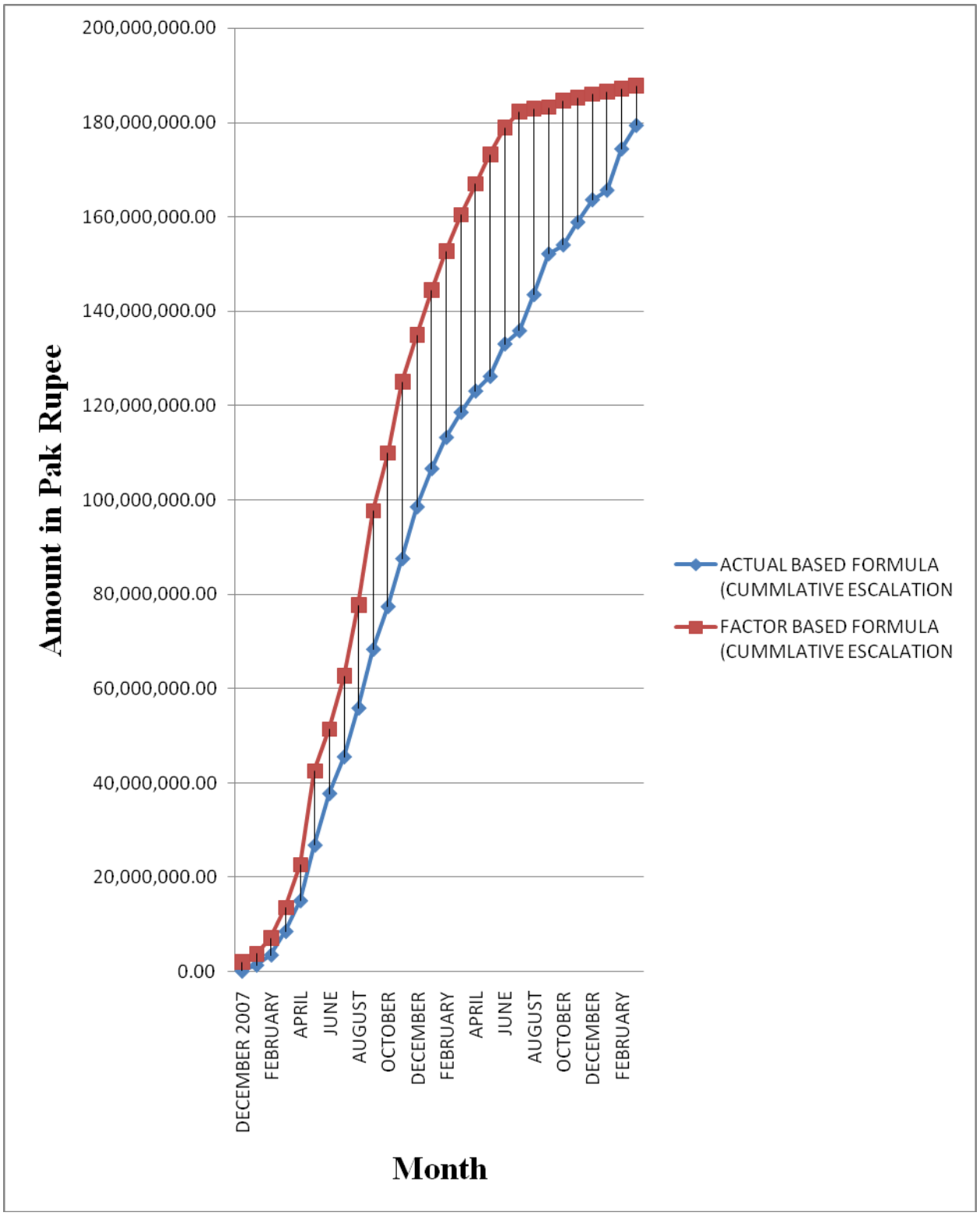

FIGURE 5-3 CUMULATIVE COMPARISON OF ACTUAL/FACTOR BASED FORMULA

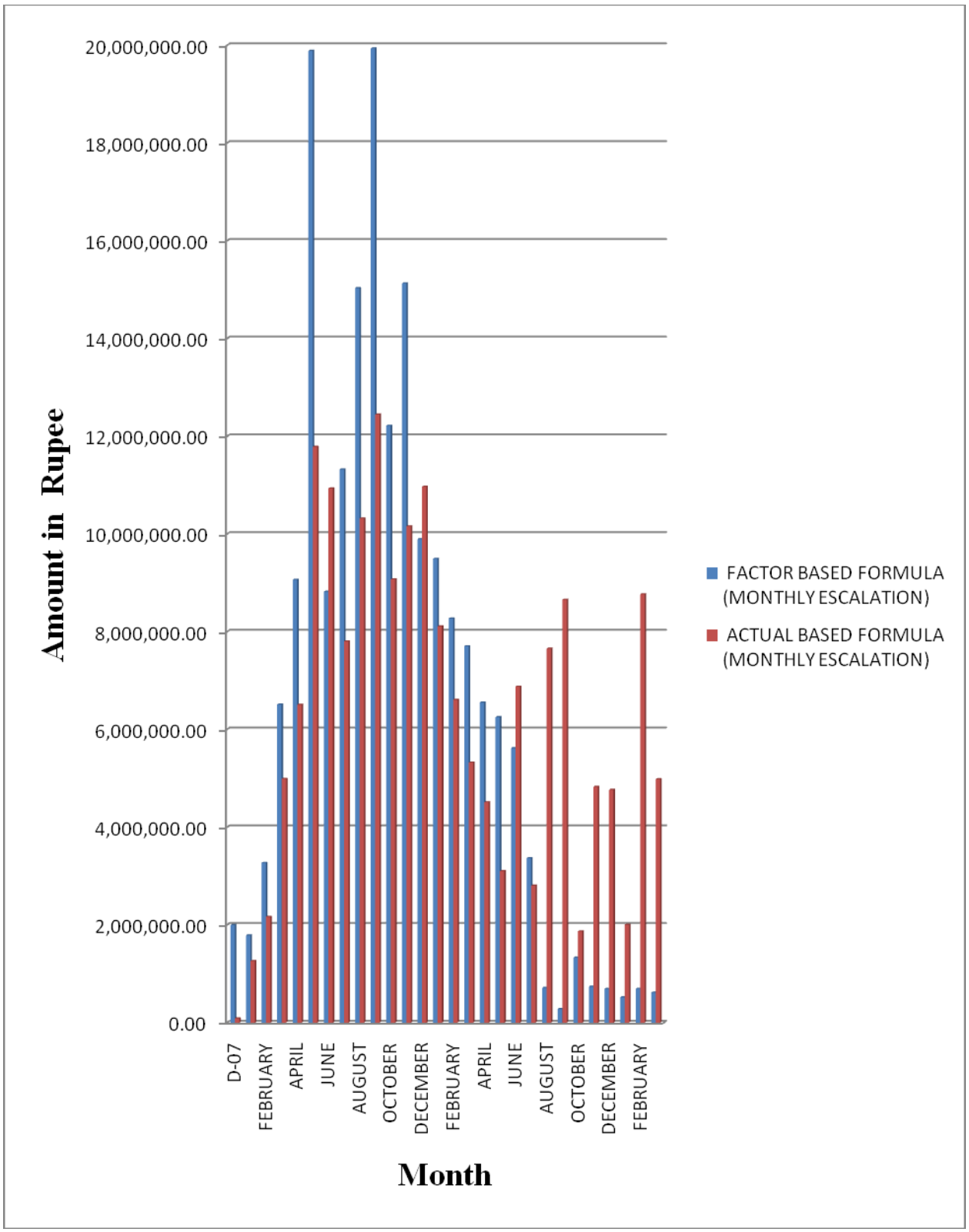

FIGURE 5-4 MONTHLY COMPARISON OF ACTUAL/FACTOR BASED

FORMULA

5.3 ISLAMABAD STOCK EXCHANGE TOWER PROJECT

Salient Features [46]

1	Project	Construction of Islamabad Stoc Exchange towers
2	Contract Amount	Rs. 02 Billion
3	Client	Islamabad Stock Exchange
4	Consultant	National Engineering Services Pakistan (Pvt.) Ltd.
5	Company	Habib Rafiqe
6	Date of Commencement	April , 2006
7	Completion Date	November, 2008
8	Completion Period	30 Months
9	Maintenance Period	12 Months

Table 5-3 Salient Features of Stock exchange Building

Specified Method in PEC Contract Document

Actual Based Formula(Old Formula)

"**N = [(C/Y) x B x Q] + [(C/Z) x A x Q]"**

Where

"Q = labour Component of items rate =25%"

"A= Ratio of skilled labour"

"B= Ratio of unskilled labour"

"Y= Basic wages, benefits and allowances of unskilled labour"

"Z= Basic wages, benefits and allowances of skilled labour"

"C= Increase as determined on the basis of Monthly Statistical Bulletin"

"N= Increase in labour wages"

ESCALATION ITEM

- Cement (Based Monthly Statistical Bulletin)
- Reinforced Steel (Based Monthly Statistical Bulletin)
- Labor (Based Monthly Statistical Bulletin)
- High Speed Diesel (Pakistan State Oil Gazette)

BASE RATES [46]

- Cement Rs 300/BAG
- Reinforced Steel Rs 33250/Ton
- Labour Rs 200/DAY
- High Speed Diesel Rs 37.18/liter

Cumulative and Monthly comparison of Escalation with Actual/Factor based formula on ISE project has been shown in Fig 5-5 and Fig 5-6 respectively.

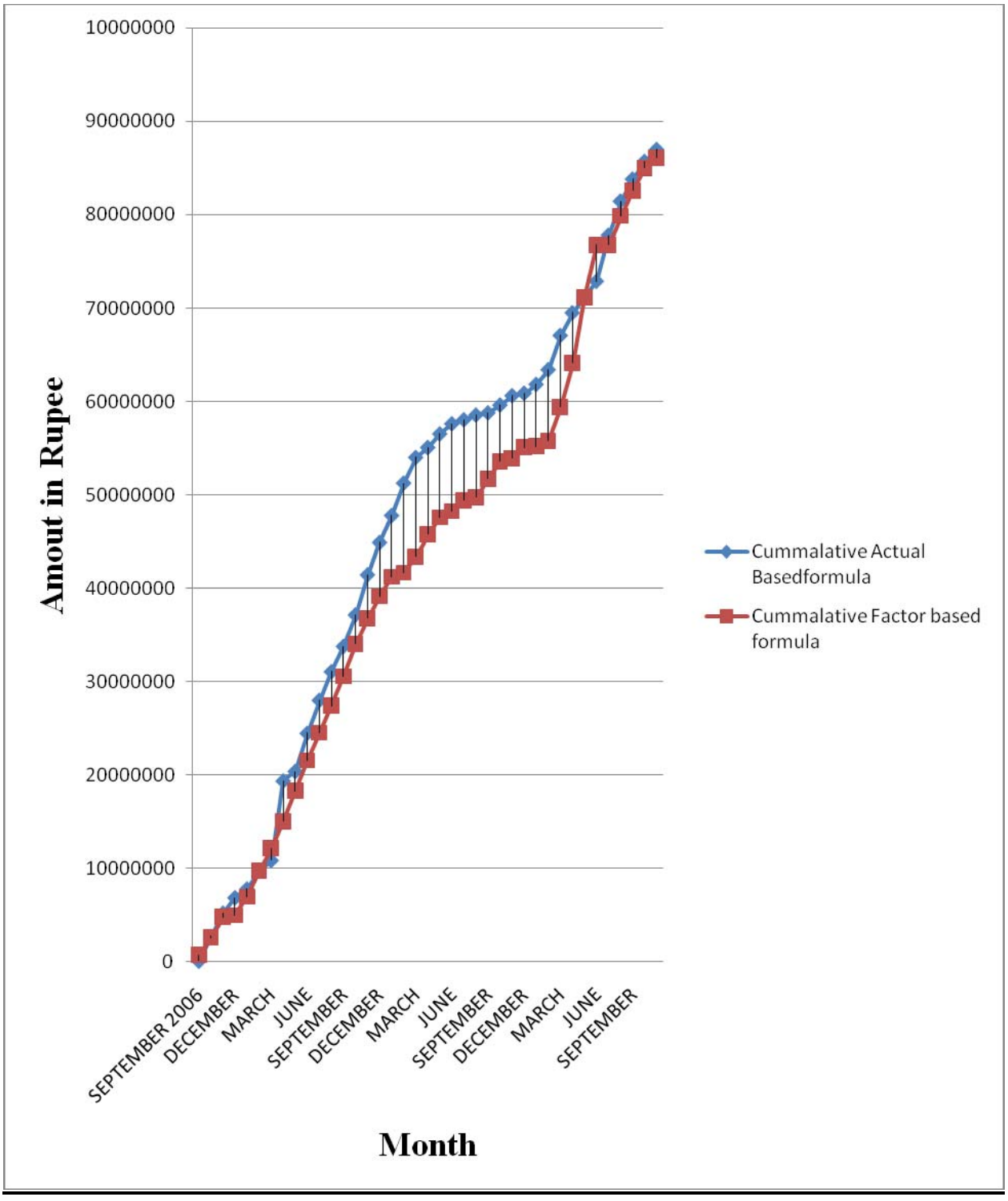

FIGURE 5-5 CUMULATIVE COMPARISON OF ACTUAL/FACTOR BASED FORMULA

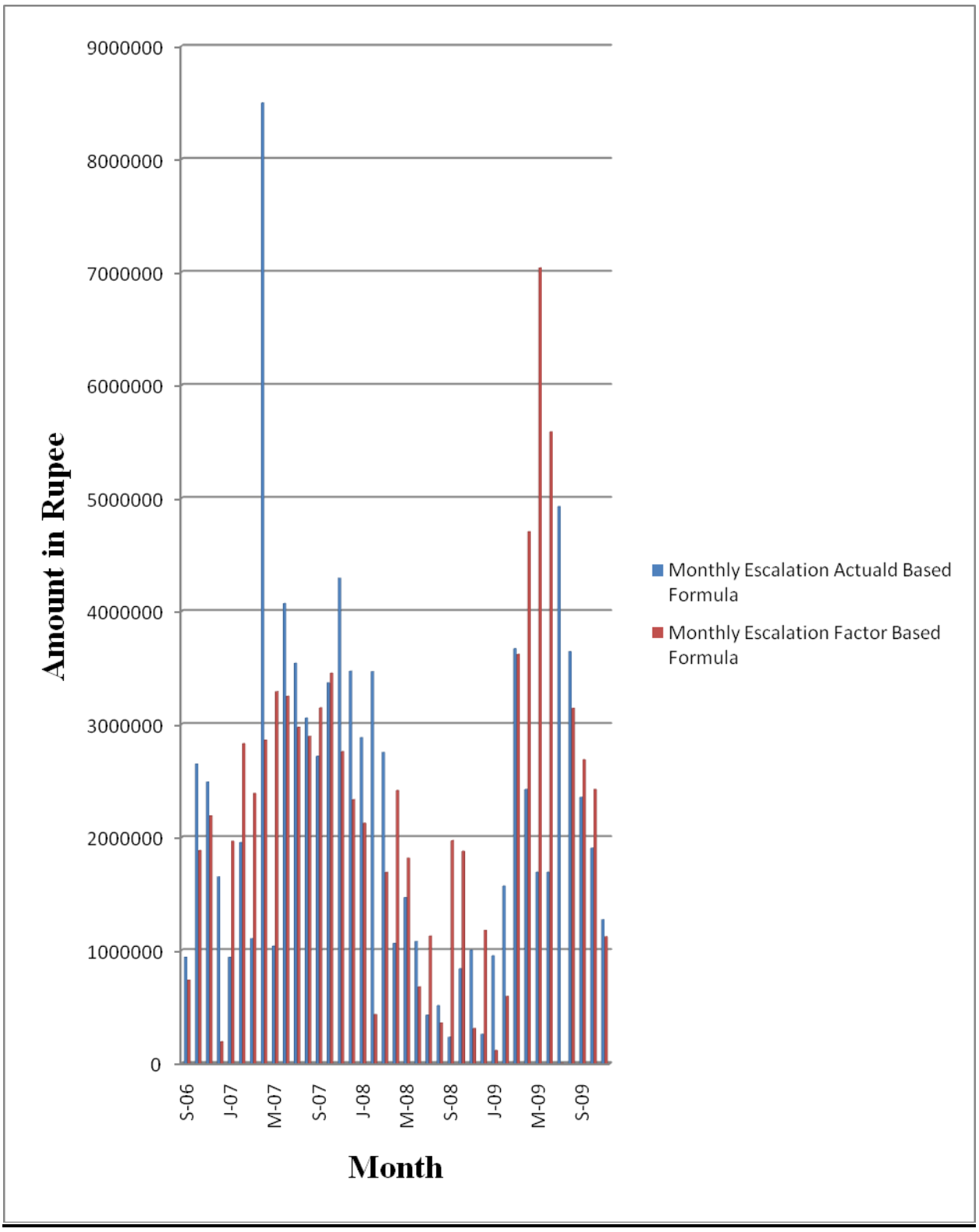

FIGURE 5-6 MONTHLY COMPARISON OF ACTUAL/FACTOR BASED FORMULA

5.4 BUREAU OF EMIGRATION TOWER PROJECT

Salient Features [44]

Description	Construction of Emigration Tower at Mauve Area G-8/1 Islamabad (Contract # 030/30/CW/09)
Client	Bureau of Emigration & Overseas Employment Islamabad (Govt. of Pakistan)
Project Manager	Pakistan Real State Investment & Management Company (Pvt) Ltd. PRIMACO
Consultant	National Engineering Services Pakistan (Pvt) Limited. (NESPAK)
Contractor	M/S Guarantee Engineers
Location of Plot	Plot # 10, Mauve Area, G-8/1 Islamabad.
Plot Dimension	120’ x 280’ = 33,600 sft
Contract Price	Rs. 595,789,272.00
Commencement Date	20 March, 2009
Completion Date	21 March, 2011
Total Construction Area including Parking	168,000 sft

Specified Method in PEC Contract Document

Factor Based Formula

$$\{\text{“ } Pn = A + b\frac{Ln}{Lo} + c\frac{Mn}{Mo} + d\frac{En}{Eo} + \ldots\text{”}\}$$

ESCALATION ITEM

- Cement (Based Monthly Statistical Bulletin)
- Reinforced Steel (Based Monthly Statistical Bulletin)
- Labor (Based Monthly Statistical Bulletin)
- High Speed Diesel (Pakistan State Oil Gazette)

BASE RATES [44]

- Cement Rs 380/BAG
- Reinforced Steel Rs 59500/Ton
- Labour Rs 275/DAY
- High Speed Diesel Rs 64.14/liter

Cumulative and Monthly comparison of Escalation with Actual/Factor based formula on BEOE project has been shown in Fig 5-7 and Fig 5-8 respectively.

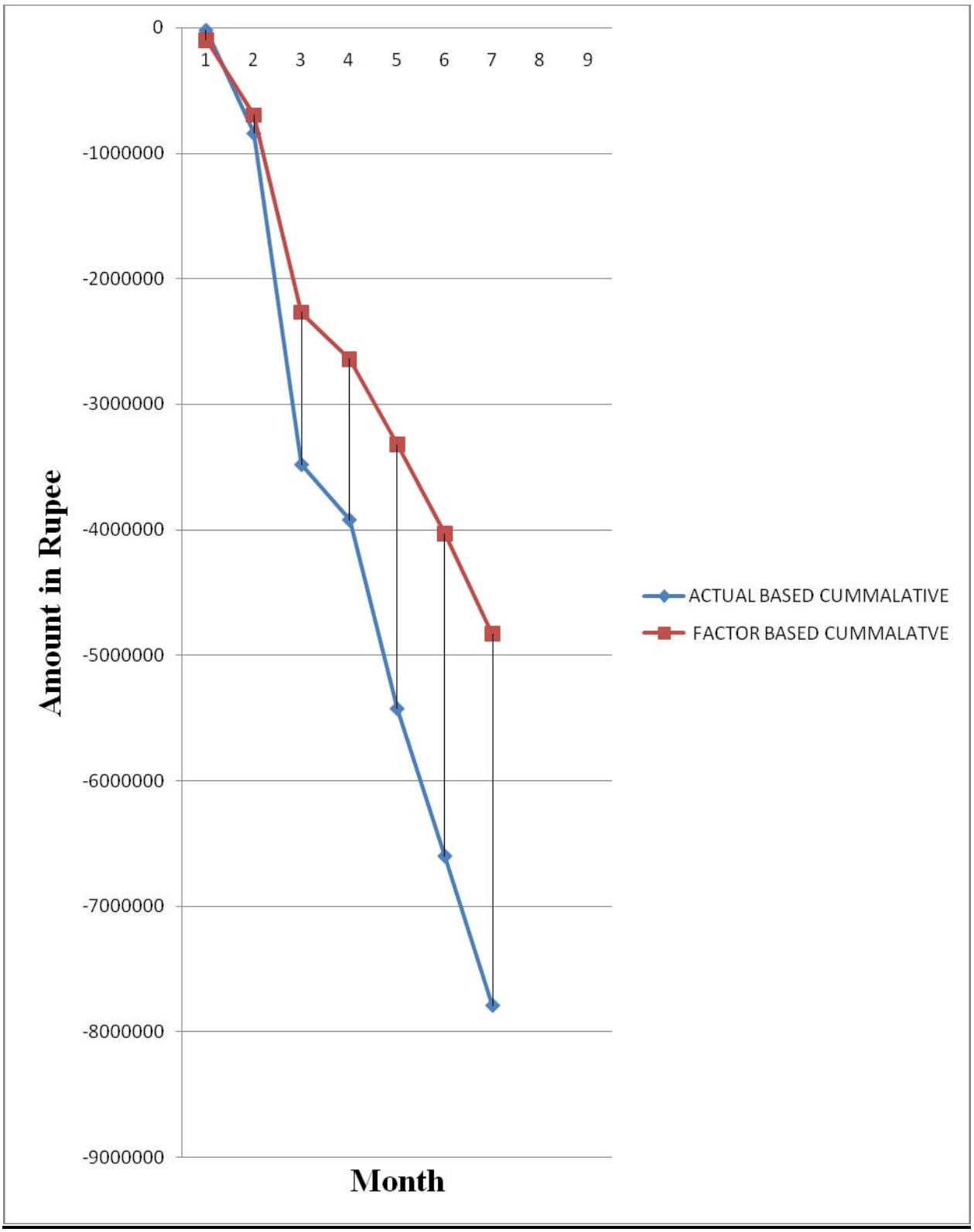

FIGURE 5-7 CUMULATIVE COMPARISON OF ACTUAL/FACTOR BASED FORMULA

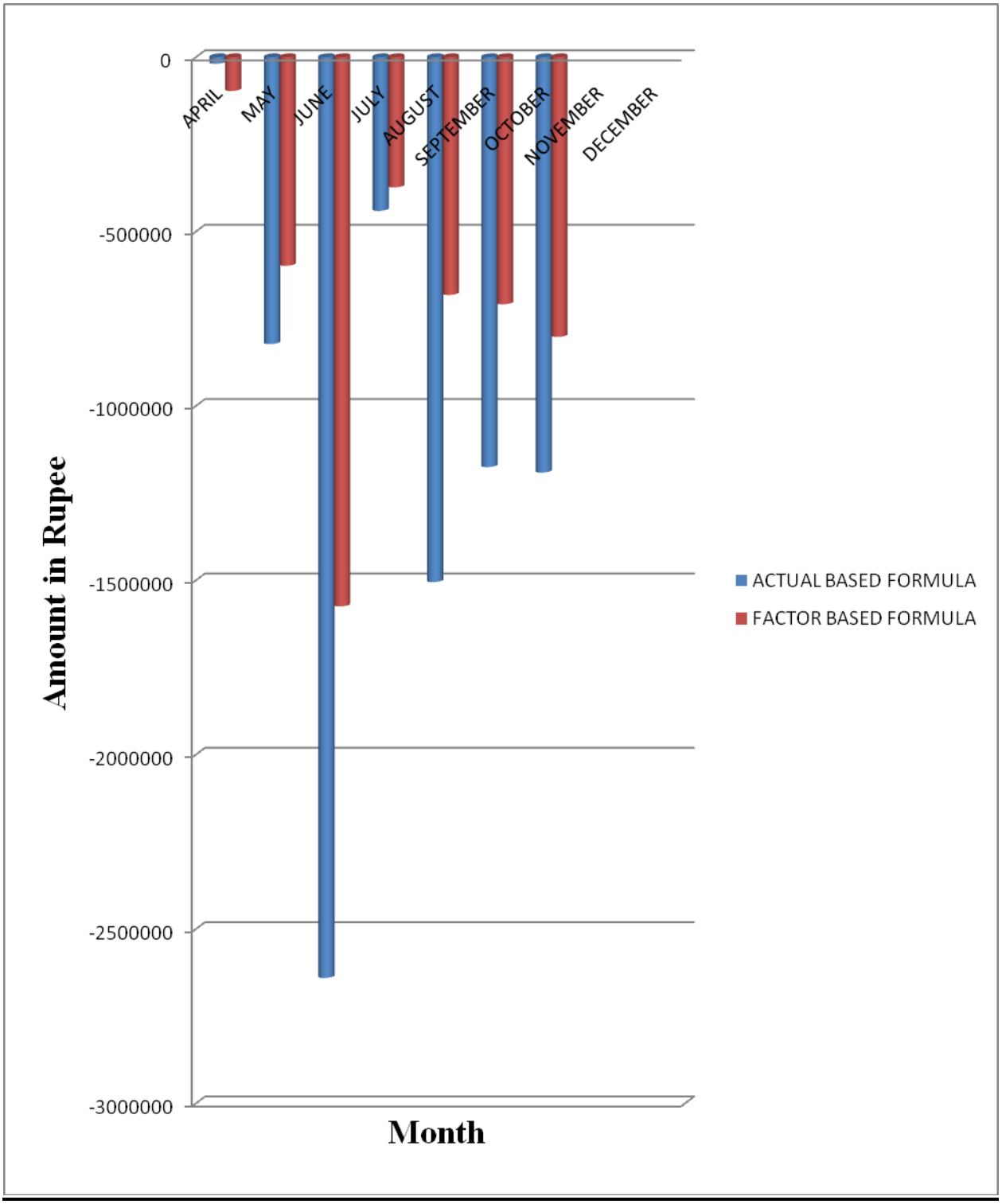

FIGURE 5-8 MONTHLY COMPARISON OF ACTUAL/FACTOR BASED FORMULA

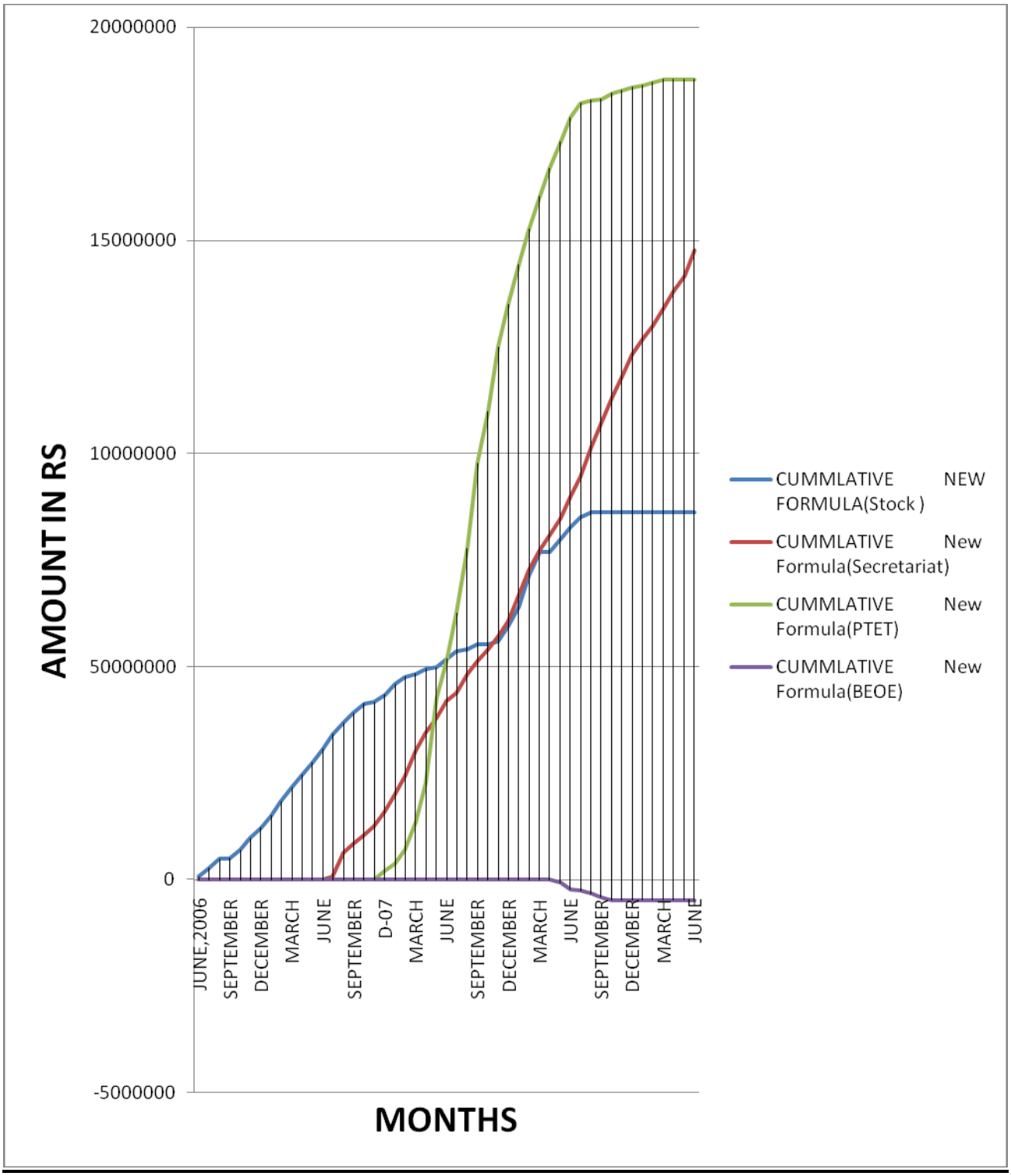

FIGURE 5-9 CUMULATIVE ESCALATION OF ALL PROJECTS WITH FACTOR BASED (NEW) FORMULA

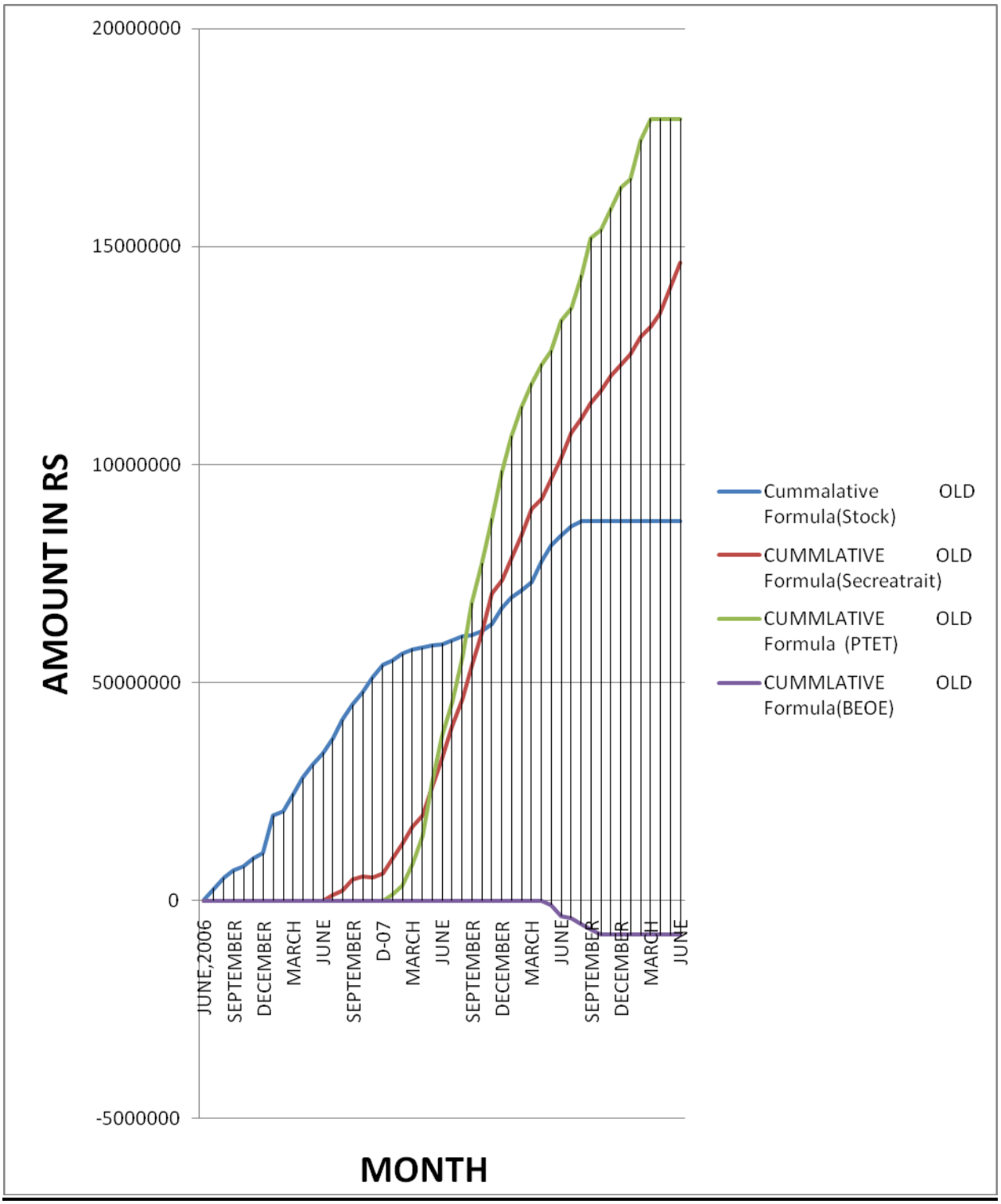

FIGURE 5-10 CUMULATIVE ESCALATION OF ALL PROJECTS WITH ACTUAL BASED (OLD) FORMULA

CONCLUSION OF COMPARISON BETWEEN ACTUAL QUANTITY BASED FORMULA AND FACTOR BASED FORMULA.

- Actual Quantity based formula applies an increase/decrease to the actual quantities of Cement, steel etc, however factor based formula applies a uniform factor to the material in each month either used or not.

- It is easy to calculate escalation from factor based formula however in case of actual based formula more working is required and hence it is time consuming job.

- Overall total escalation is almost same in both cases.

- No re-working is required in actual quantity based formula however factor based formula requires re-working as factor has been changed at the end of project when the total quantity of each item has been finalized.

- Cost escalation is different with in same time period.

- Monthly Cost escalation is different however cumulative remains same.

CHAPTER NO 6

ANALYSIS OF QUESTIONNAIRE AND ITS SEVERITY IMPACT

6.1 Provision in Contract

There are many arguing points for the provisions for construction cost escalation,

- "Level for Min Fluctuation rate"
- "Initial Date in calculation of the price change"
- " fluctuation rate calculation method"

Main items for the argument came out through the discussions with all concerned professionals are here under

- What is considered as the minimum level of fluctuation rate and minimum time period into which contractor can request for that escalation? Also what are the requirements needed for request of construction cost escalation?

- Which is considered as the most appropriate index for the calculation of Minimum level of fluctuation rate
    a) "The consumer's price index, (CPR)"
    b) "The construction cost index (CCI)"
    c) "Mean profit of construction companies"

- The most realistic and useful method for the calculation of construction cost escalation?

    a) "Factor Based Formula(New)"
    b) "Actual Quantity based Formula(Old)"

- Should the contract price be adjusted due to the escalation beyond the minimum level or the executor has to cope with it at their own end?

- Which should be taken reference for the base rate?
    a) “Date of completion of Design”
    b) “Date of bid opening (Bidding)”
    c) “Date of signing the contract”

- What is more appropriate for reference for the adjustment of price escalation whether the planned/scheduled work or actual work being done?

- Should overhead and profit be included when adjustment was made for price escalation?

The outcomes of respondents have been mentioned in Table 6-1.

ARGUING POINTS

- **Indicator to determine the MFR (minimum fluctuation rate)**

There should a definite minimum level of fluctuation rate for in providing the provision for escalation. It makes the contractor/executor to ask for a cost escalation. The options that were discussed with all the professionals includes the following

1) “Bulletin Rate “
2) “Market Rate”
3) “Mean profit rate of construction firms”

However, most of them were of the view that Bulletin rate is more suitable as it has a definite system and it provides you the rate of every item actually being in Market.
However some suggested that Market Rate as more favorable as in their point of view Market rates are the actual Rates being used in the Market.

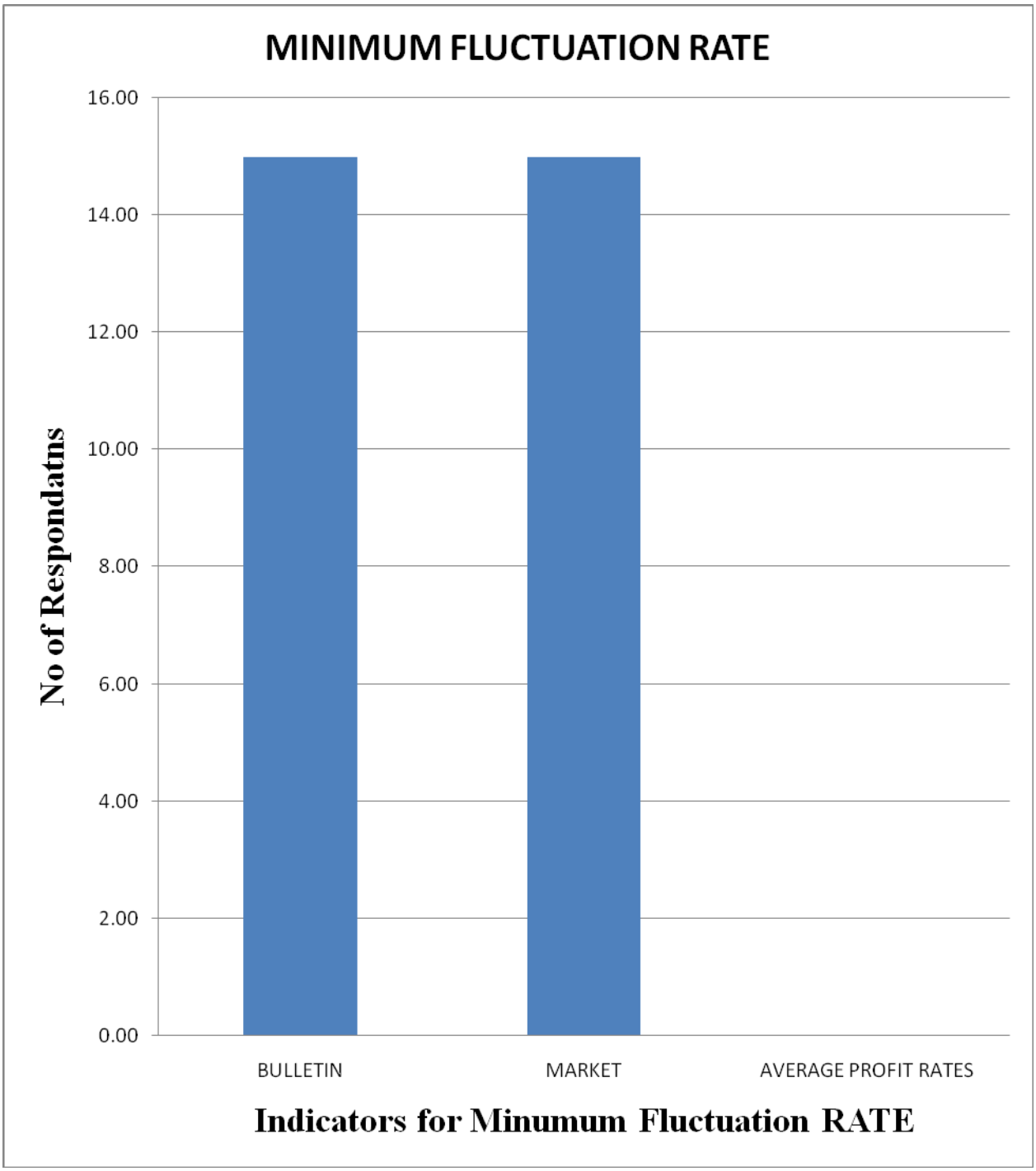

FIGURE 6-1 GRAPHICAL REPRESENTATION FOR MINIMUM FLUCTUATION RATE

- **Optimum level minimum fluctuation rate that enables to request the price escalation**

There are different provisions regarding the limit for escalation like in Korea, Contract amount is adjustment after the amount increases beyond 5 % of budgeted cost due to escalation. Japan predetermined the limits less than 1.5 % and adjusts the amount when it reaches 1.5 % or more. Philippines predetermined the limits up to ten % and amount is adjusted after that. However FIDIC doesn't provide any limit for the escalation and contractor is entitled for claim for any item whether increased or decreased. Any limit agreed by both Client and contractor shall be mentioned in Appendix to Tender.

The options that were discussed with all the professionals includes the following

1) 5 %
2) 10%
3) 3%
4) No limit

However, most experts indicated 3% is more appropriate as it will set a mark point upto which Contractor has to counter itself all the Increase in Cost.

However some suggested there should be No Limit as Contractor should have right to Claim any Increase cause during the project period.

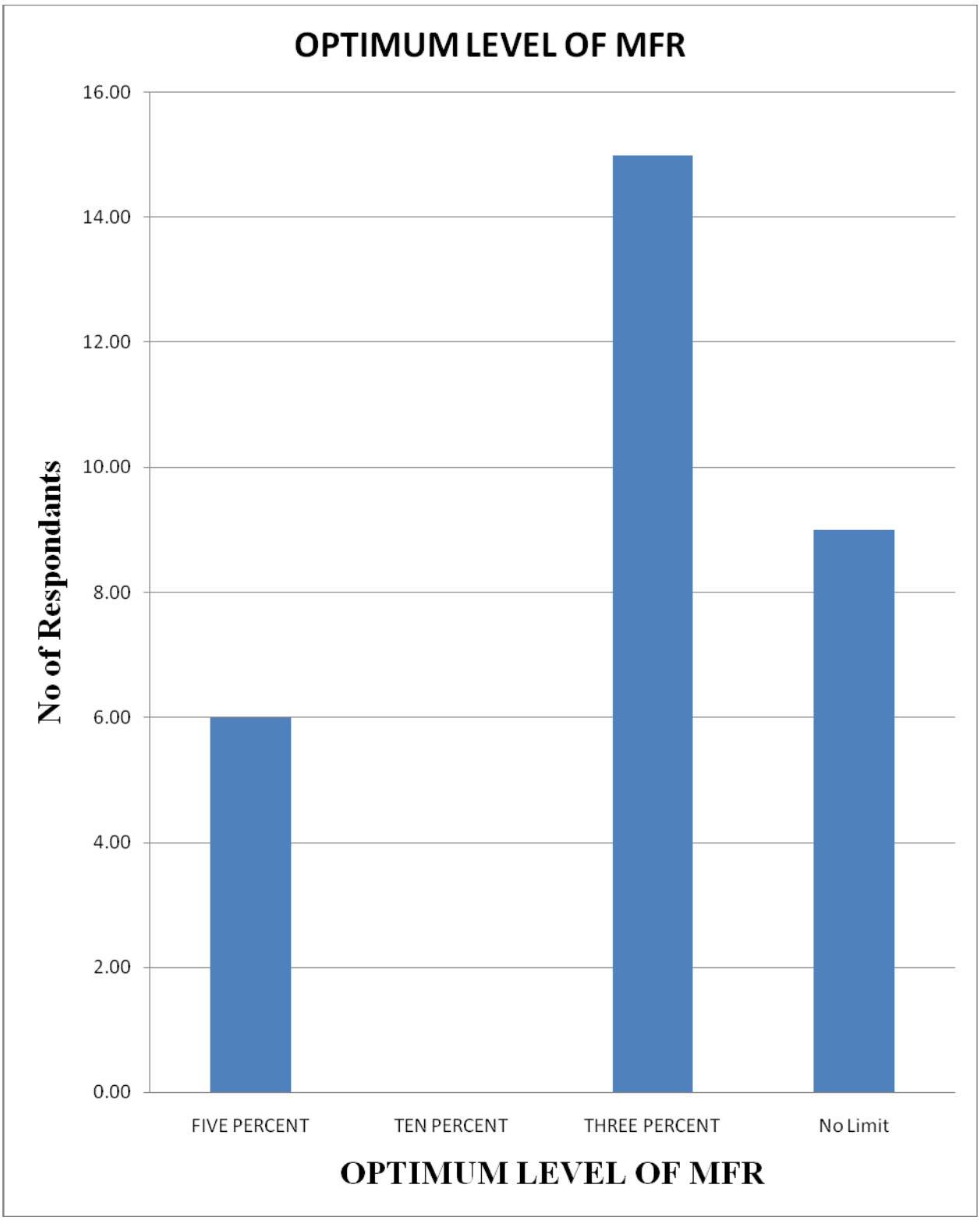

FIGURE 6-2 GRAPHICAL REPRESENTATION QUESTIONNAIRE FOR OPTIMUM LEVEL OF MFR

- **Initial date in reckoning the price fluctuation**

Comparison of base date with the current date is required when measuring the fluctuation in the prices of materials. However, increase or decrease in the prices could occur after the construction cost has been finalized. Duration between the bidding date and contract signing date is generally 2-3 months. However duration between design completion date and bid opening date is long in turn key projects. Consequently, some prefer bid opening date than date of signing of Contract. In the meantime, option for informal and consensual contracts is there which are that can be legalized just by agreeable between the concerned. (Cha, 2004). Contracts made by the mere approval of all the concerned without entering any external source to fix any compulsion is called Informal and consensual contracts" after the approval of final successful bidder and award of contract the contract becomes valid and active however on the refusal of bidder to enter into the Contract, that bid is seized by the Client and in the same way we can say a bid announcement as an 'offer' and bidding as 'acceptance' and hence understood that an actual contract was accomplished earlier than the of signing of contract.

Price adjustment was made from the date of signing of contract in Korea, Philippine, and Japan In FIDIC ,the reference used for the base rate is the date 28 days before the date of bidding.

The alternatives that were pointed in the discussion with respondents were following three items:

1) Design Completion Date
2) Bidding Date
3) Contract Signing Date

90% of the people pointed that date of bidding was more appropriate however 10% were of the view that it should be date when contract was signed.

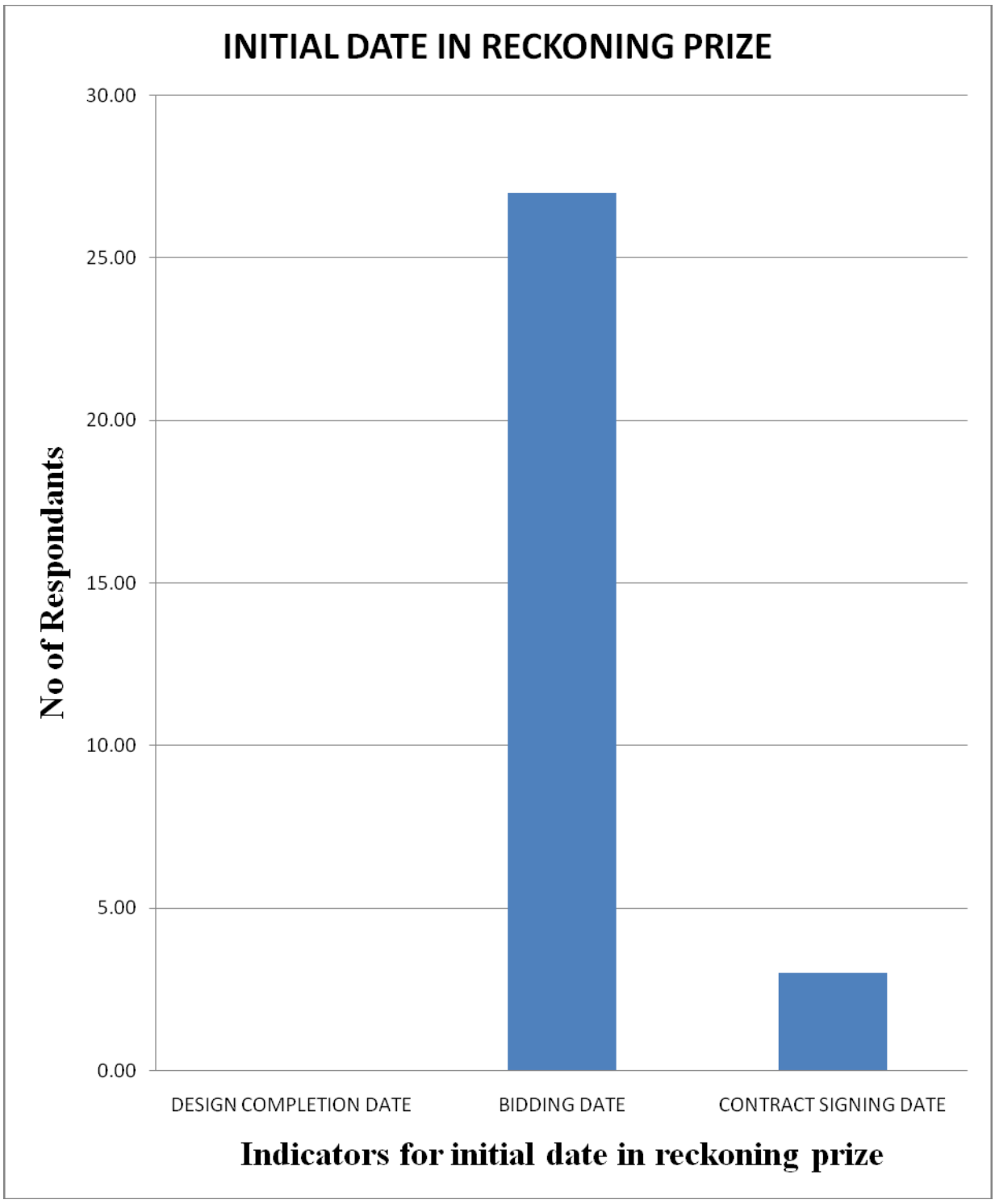

FIGURE 6-3 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR RECKONING INITIAL DATE

- **Method for the measurement of Price Escalation**

Two formulas are frequently used in Pakistan.

1) Factor Based Formula
2) Actual Quantity Based Formula

80 % of experts indicated actual quantity base formula is more appropriate as it gives the actual quantity used during that month and in this scenario Contractor can claim actual payment being made.

However 20 % of people suggested Factor based formula should be used as they think that calculating the quantity of every item id quite difficult and in factor based formula only factors are applied and it’s an easy method.

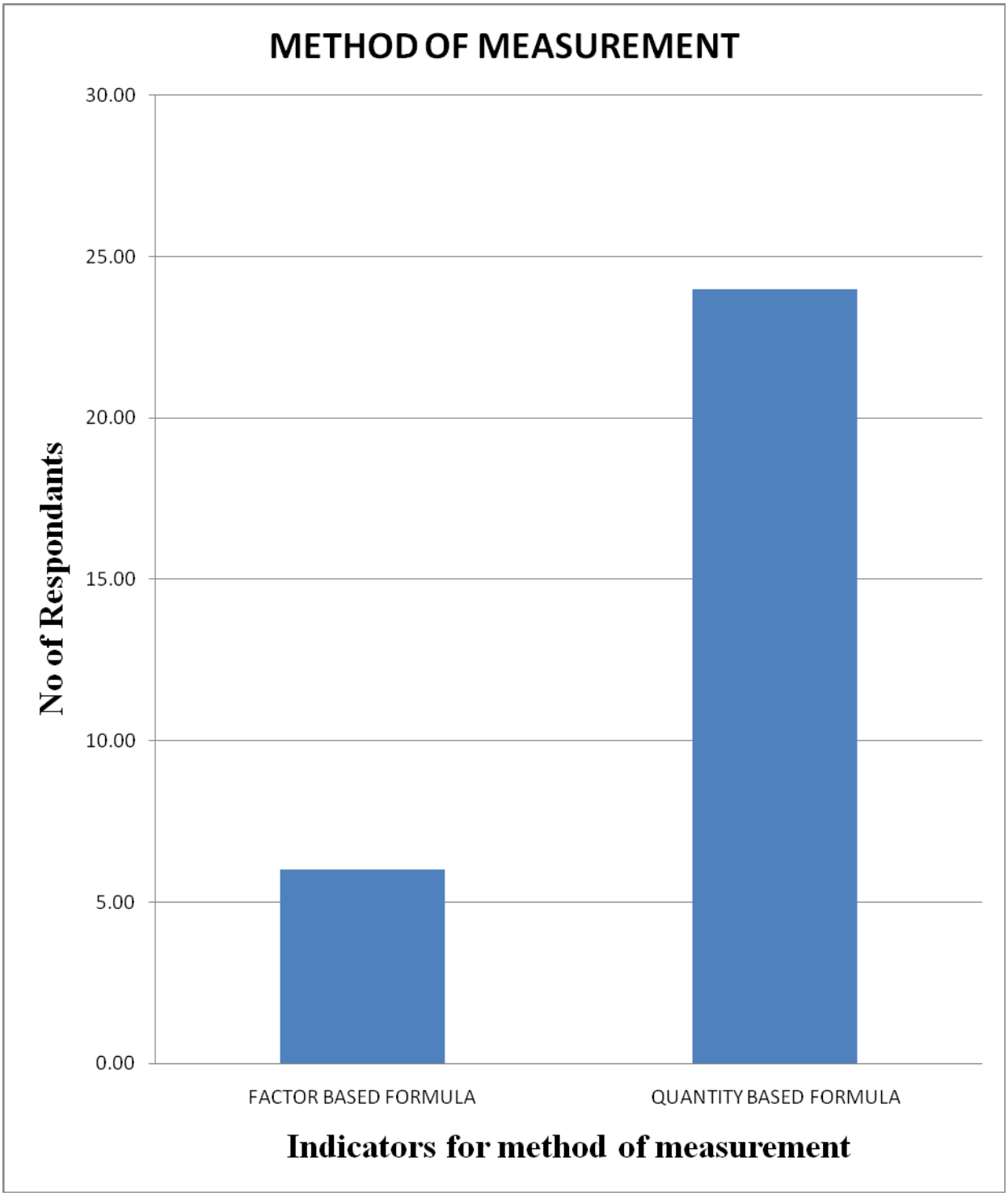

FIGURE 6-4 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR METHOD OF MEASUREMENT

- **Specifying the technique to measure the rate of fluctuation in a contract agreement**

The dispute that normally arises that if there is necessary to specify the method of measuring cost escalation.

However all the respondents were of the view that it is necessary to indicate the method as in other case it will create dispute among the parties.

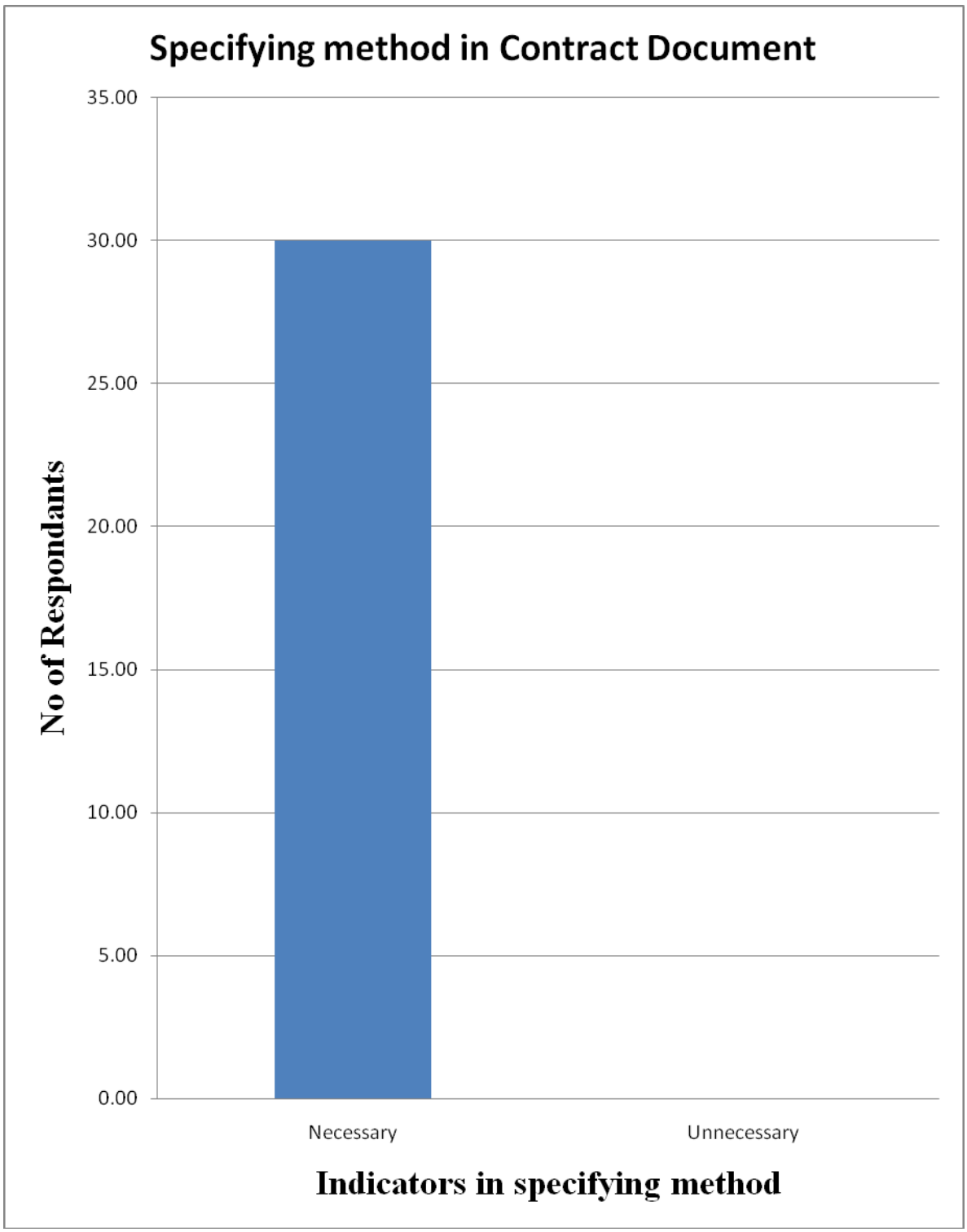

FIGURE 6-5 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE IN SPECIFYING METHOD

- **Minimum elapsed period**

When providing the provision for escalation in contract agreement, minimum elapsed time period should be provided which allows the contractor to request for claim.

FIDIC provides the minimum elapsed time period of a month however any other change in this time period has been provided in the Appendix to Tender. Korea provides this period as ninety days, Philippines give six months and one year is for Japan instead of some amount of escalation for some allocated materials with in that year.

Alternatives suggested in the discussion with respondents are here under

1) 30 Days
2) 60 Days
3) 90 Days
4) 120 Days
5) 180 Days
6) One Year

However all the respondents were of the view that minimum elapsed period should be One Month.

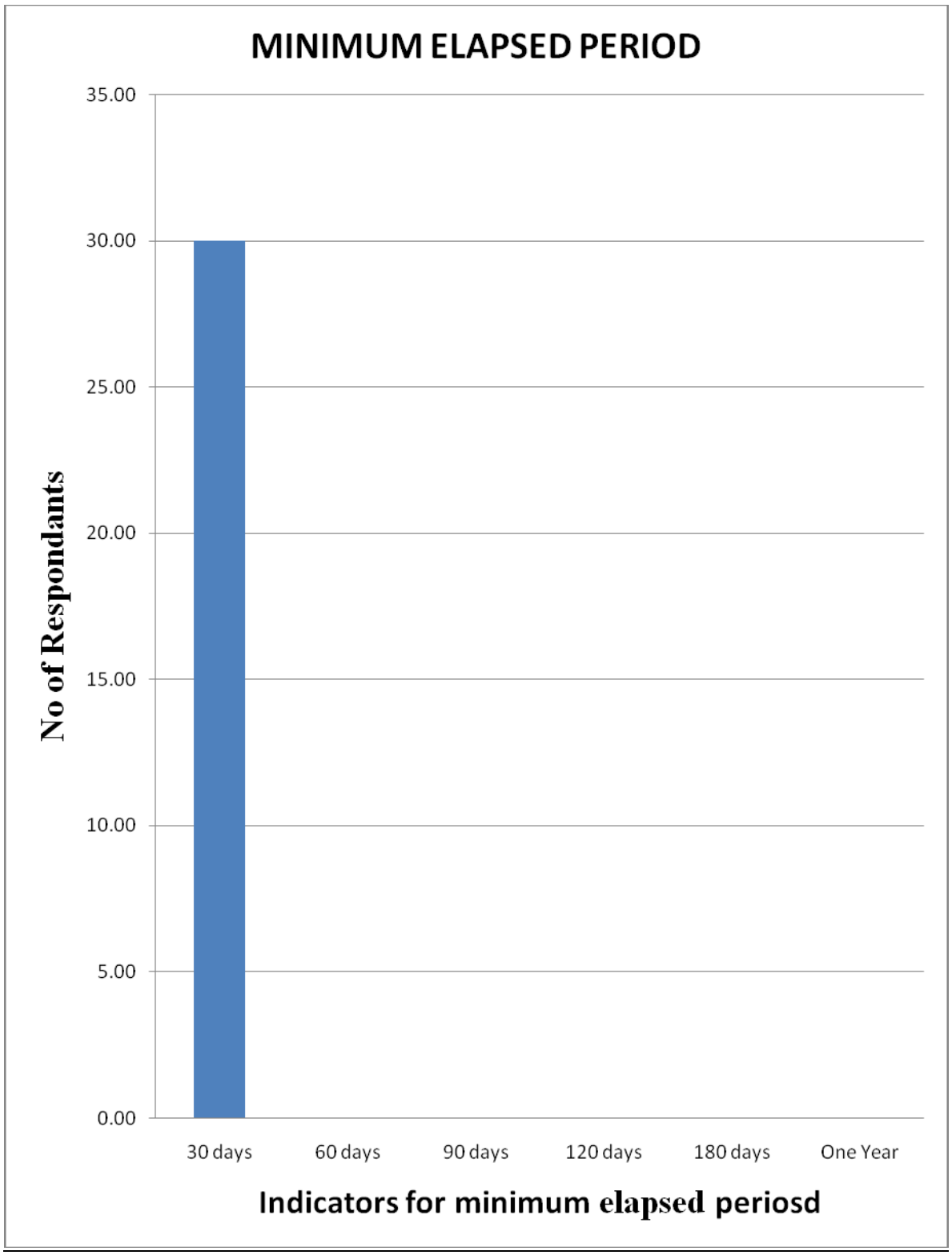

FIGURE 6-6 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR MINIMUM ELAPSED PERIOD

- **“Rate of progress ”**

Some major countries like Korea, “the completed work before the date of inflations was not considered but if there is delay on the account of client or any due to any force majeure then adjustment on this account is admissible.”
In some cases like in Philippine ,” if the project is behind schedule and certain activity or work includes the material on which escalation is allowed, then escalation for that work is allowed but with those rates applicable in the period on which this work was planned to be or actually to be completed.”

The alternatives that were suggested with respondents were following three items:

1) Actual Progress
2) Scheduled Progress

However 90 % of the respondents were of the view that actual progress shall be considered while giving the escalation because if the pace of work is not as per schedule then it will enter into dispute as how much to pay the increased cost.

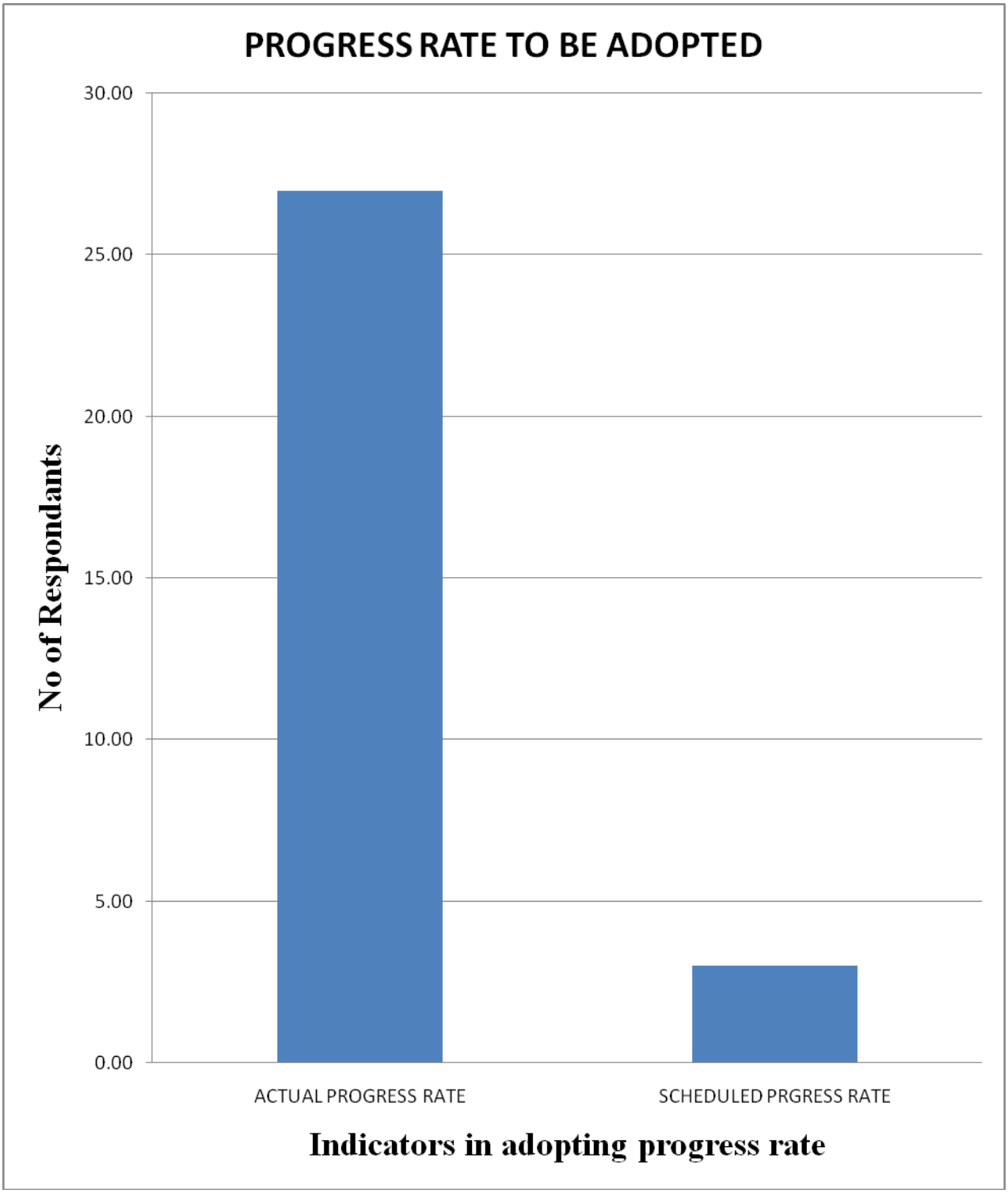

FIGURE 6-7 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE IN ADOPTING PROGRESS RATE

- **Overhead and profit in construction price escalation**

When giving the cost escalation in construction projects, there are arguments as whether to include overhead and profit or not. FIDIC suggest no overheads in case of price escalation.

However all the respondents were of the view that no overhead should be paid on escalated items as it is only the compensation cost of the price of material increased during that period.

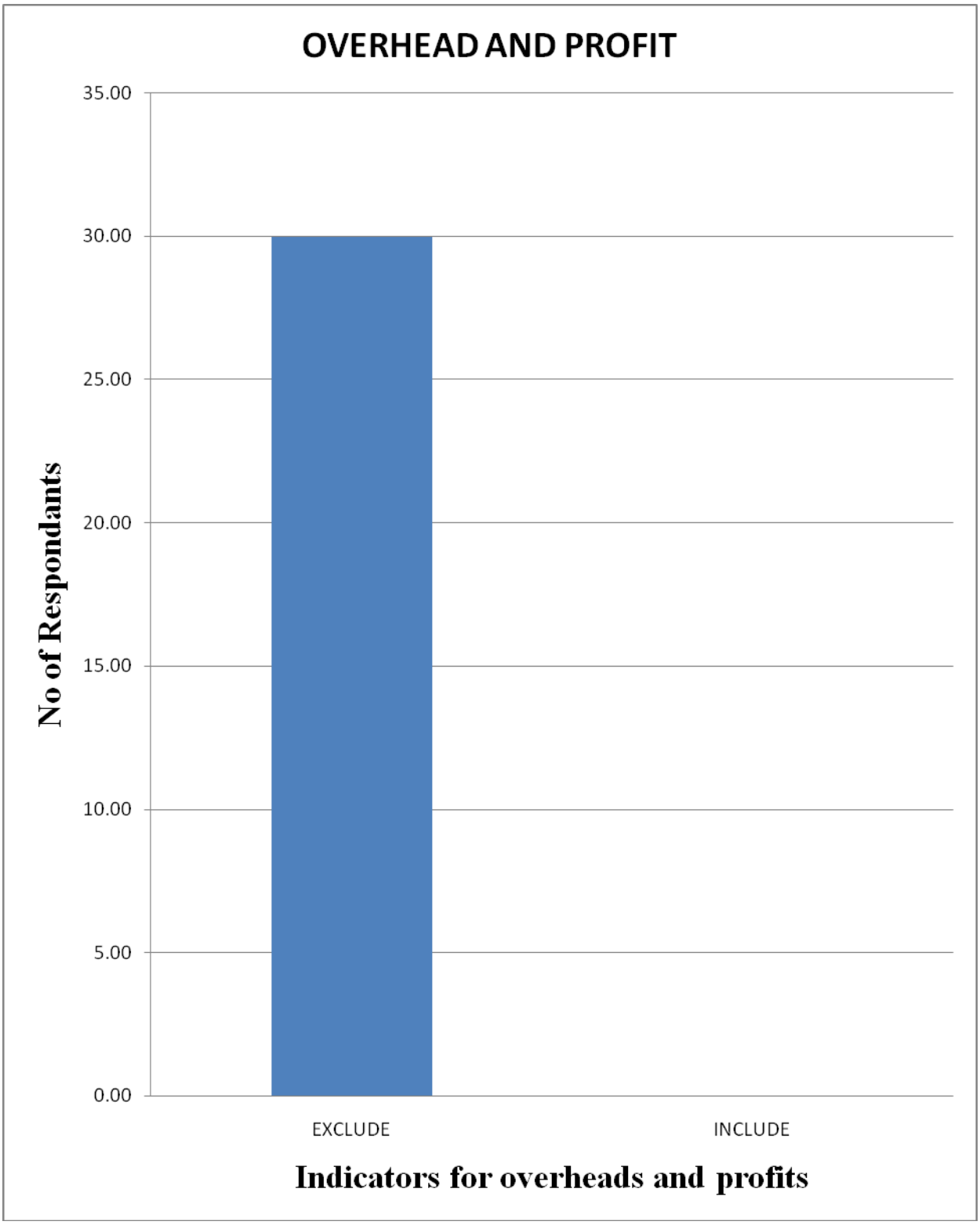

FIGURE 6-8 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR OVERHEADS AND PROFIT

- **Advance payment in Price Escalation**

There should always be mentioned in the contract regarding advance payment to be made in case of Cost Escalation when the rates of that period have not yet printed.
However 70% of the respondents said that it is not necessary to give advance payments in case of Cost Escalation.

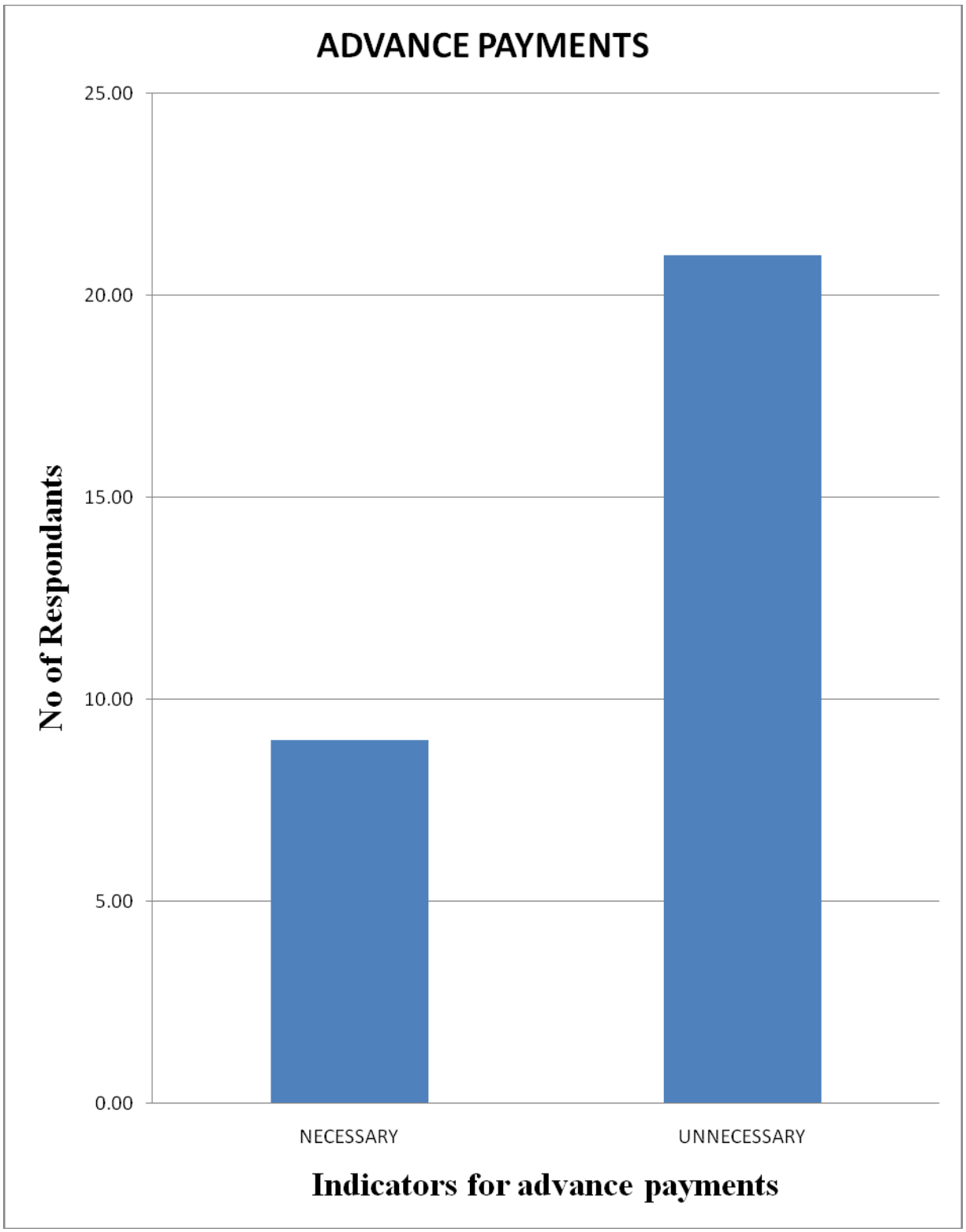

FIGURE 6-9 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR ADVANCE PAYMENTS

It Concludes that

Most governing factors in mentioning the provisions for cost escalations are

	INDICATOR	RESULTS
•	MINIMUM FLUCTUATION RATE	BULLETIN RATE
•	OPTIMUM LEVEL OF MFR	3 %
•	INITIAL DATE OF RECKONING PRIZE	BIDDING DATE
•	METHOD OF MEASUREMENT	ACTUAL BASED
•	MIN ELAPSED PERIOD	ONE MONTH
•	PROGRESS TO BE ADOPTED	ACTUAL
•	OVERHEADS AND PROFITS	EXCLUDE

TABLE 6-1 GOVERNING FACTORS IN PROVISION OF COST ESCALATION

(a) Minimum Fluctuation Rate

Minimum Fluctuation Rate should be the **BULITIN RATE** because it provides the Rates being published by the Government and it has the authenticity which doesn't create any dispute.

(b) Optimum Level of MFR

Optimum level should be **3 %** because Contractor should include in its Cost the probability of Inflation and Escalation more than 3 % of Total Contract Price should be paid to Contractor.

(c) Initial Rate in Reckoning Price

Initial Date in Reckoning price should be the **Bidding Date** because Contractor submitted their estimates in those days and rates during that period should prevail.

(d) Method of Measurement

Method to be used in the measuring the escalation should be **Actual Quantity Based Formula** because in this formula actual payment has been made to the Contractor and in case of de-

escalation actual payment is deducted from the Contractor and ni dispute occurs during the Project.

(e) Minimum elapsed Period

Minimum Elapsed period should be **One Month** because it would become difficult with the passage of time to calculate the previous payments and another factor behind it is the exact payment during every month.

(f) Progress Rate to be adopted

Actual Progress Rate should be adopted in measuring the Cost Escalation because it involves the actual physical progress of work.

(g) Overheads and Profit

Overheads should be **excluded** because Escalation is only amount due to increase or decrease in the cost of Material.

6.2 FACTORS AFFECTING COST ESCALATION

There are many factors affecting cost escalation. In this study, through the discussion experts, we came with following factors affecting cost escalation in construction projects of Pakistan

- High Production Cost
- International lending and national debts:
- Natural Calamities
- Devaluation
- Federal Taxes
- Increased domestic demand
- Increase in net imports
- Environmental Regulations
- Depreciating Pakistani Rupee
- Skill Shortages
- Frequent adjustment in Prices of Products
- Construction Congestion
- Expansion Of private Sector
- Construction Schedule
- Global Demand
- Energy Factor
- Increase In exports
- Immigration Policies

Severity impacts of all the factors are shown in Figure 6-28.

- **High Production Cost**

  60% of the people responded with the opinion that High production has the severe impact in the cost escalation of Construction projects.
  30% of the people responded with Moderate Impact.

- **International lending and national debts**

  50% of the people responded with the opinion that International lending has the mild impact in the cost escalation of Construction projects.
  However 50% of the people responded with Moderate Impact.

- **Natural Calamities**

  50% of the people responded with the opinion that Natural Calamities has the Moderate impact in the cost escalation of Construction projects.
  However 30% of the people responded with severe Impact.

- **Devaluation**

  50% of the people responded with the opinion that devaluation has the Moderate impact in the cost escalation of Construction projects.
  However 30% of the people responded with severe Impact

- **Federal Taxes**

  54% of the people responded with the opinion that federal taxes has the Moderate impact in the cost escalation of Construction projects.
  However 23% of the people responded with Severe Impact

- **Increased domestic demand**

  40% of the people responded with the opinion that domestic demand has the Moderate impact in the cost escalation of Construction projects.
  However 40% of the people responded with Severe Impact

- **Increase in net imports**

  45% of the people responded with the opinion that increase in net import has the mild impact in the cost escalation of Construction projects.
  However 22% of the people responded with Severe Impact

- **Environmental Regulations**

  - 60% of the people responded with the opinion that increase in net import has the severe impact in the cost escalation of Construction projects.

- **Depreciating Pakistani Rupee**

  60% of the people responded with the opinion that Depreciation in rupee has the severe impact in the cost escalation of Construction projects.
  40% of the people responded with Moderate Impact.

- **Skill Shortages**

  60% of the people responded with the opinion that skill shortages have the moderate impact in the cost escalation of Construction projects.
  However 10% of the people responded with Severe Impact

- **Frequent adjustment in Prices of Products**

  60% of the people responded with the opinion that frequent adjustments in prices of materials have the moderate impact in the cost escalation of Construction projects.
  However 10% of the people responded with Severe Impact

- **Construction Congestion**

  40% of the people responded with the opinion that Construction congestion has the moderate impact in the cost escalation of Construction projects.
  However 30% of the people responded with Severe Impact

- **Expansion Of private Sector**

  40% of the people responded with the opinion that frequent adjustments in prices of materials have the mild impact in the cost escalation of Construction projects.
  However 20% of the people responded with Severe Impact and Moderate impact respectively.

- **Construction Schedule**

  60% of the people responded with the opinion that frequent adjustments in prices of materials have the sever impact in the cost escalation of Construction projects.
  However 20% of the people responded with mild Impact.

- **Global Demand**

  50% of the people responded with the opinion that Global demand has the moderate impact in the cost escalation of Construction projects.
  However 30% of the people responded with sever Impact.

- **Energy Factor**

  50% of the people responded with the opinion that Energy Factor has the moderate impact in the cost escalation of Construction projects.
  However 10% of the people responded with sever Impact.

- **Immigration policies**

  70% of the people responded with the opinion that Energy Factor has the mild impact in the cost escalation of Construction projects.
  However 20% of the people responded with moderate Impact.

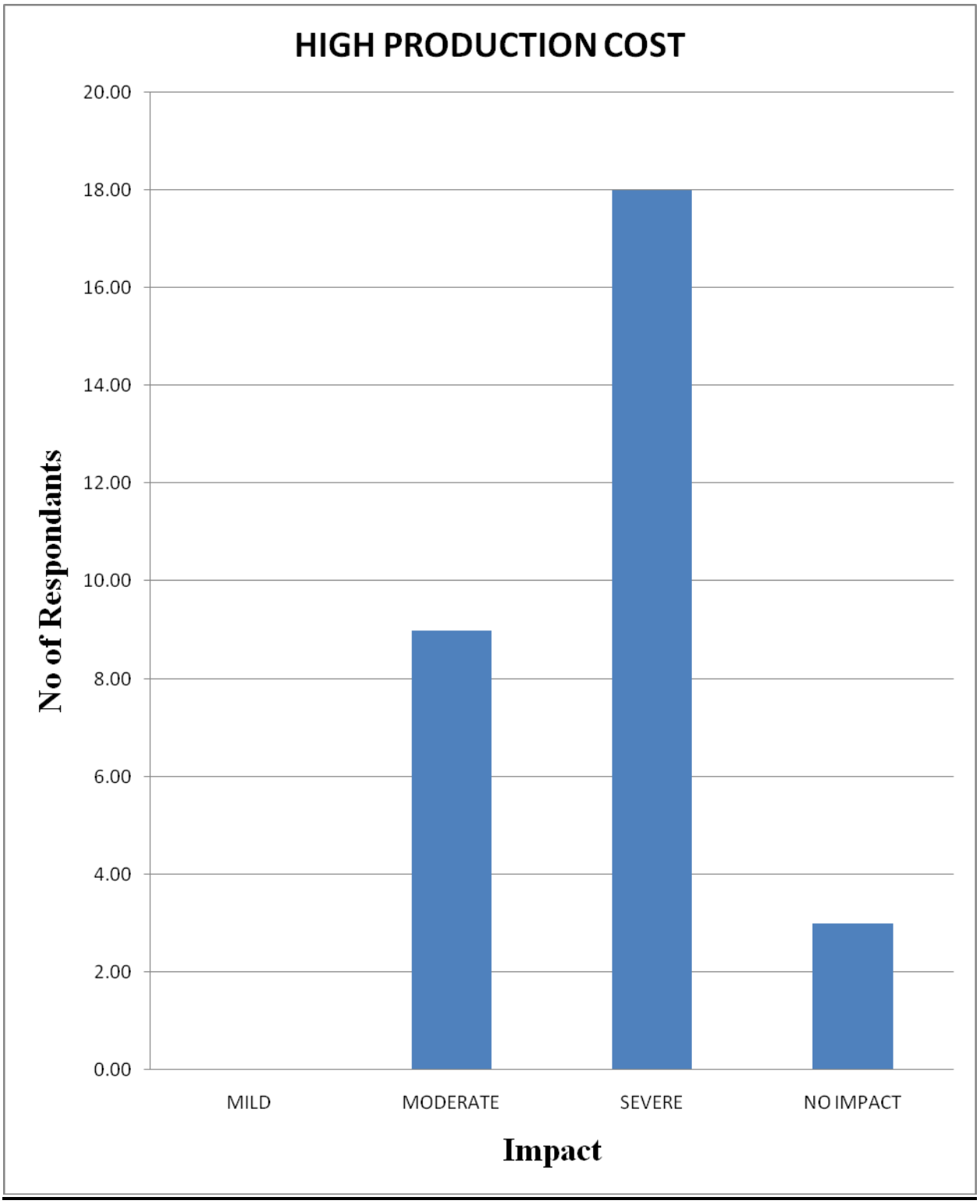

FIGURE 6-10 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR HIGH PRODUCTION COST

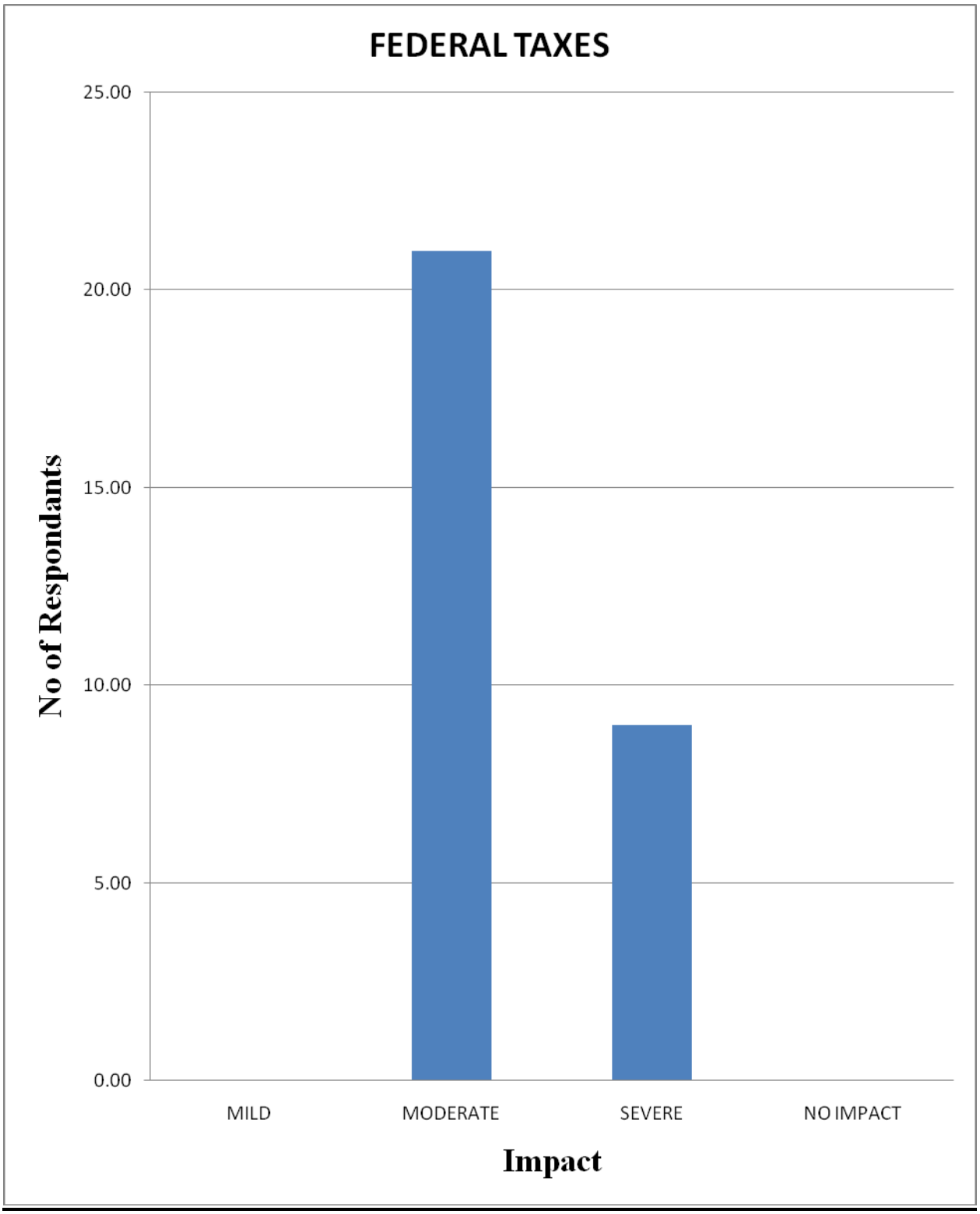

FIGURE 6-11 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR FEDERAL TAXES

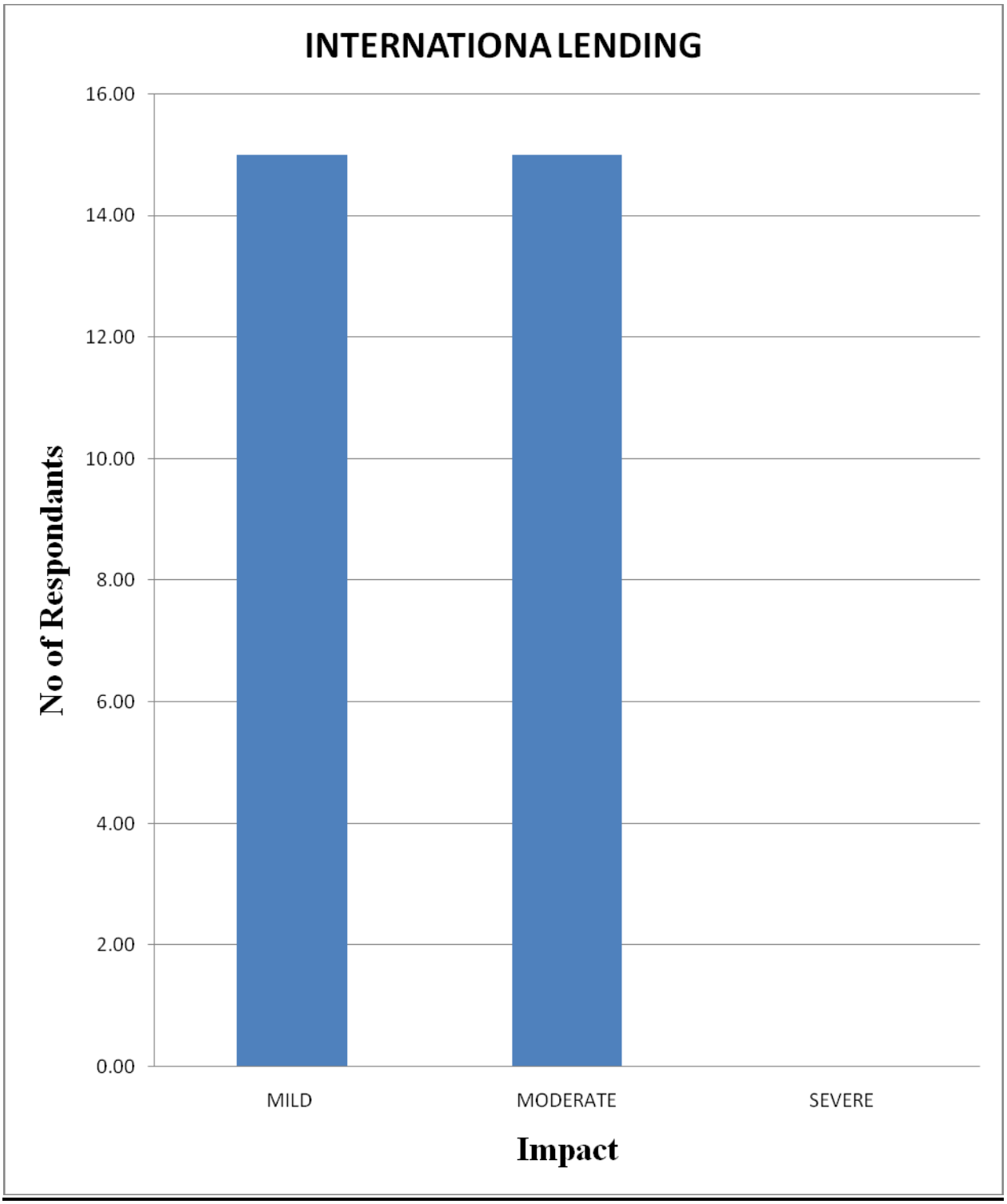

FIGURE 6-12 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR INTERNATIONAL LENDING

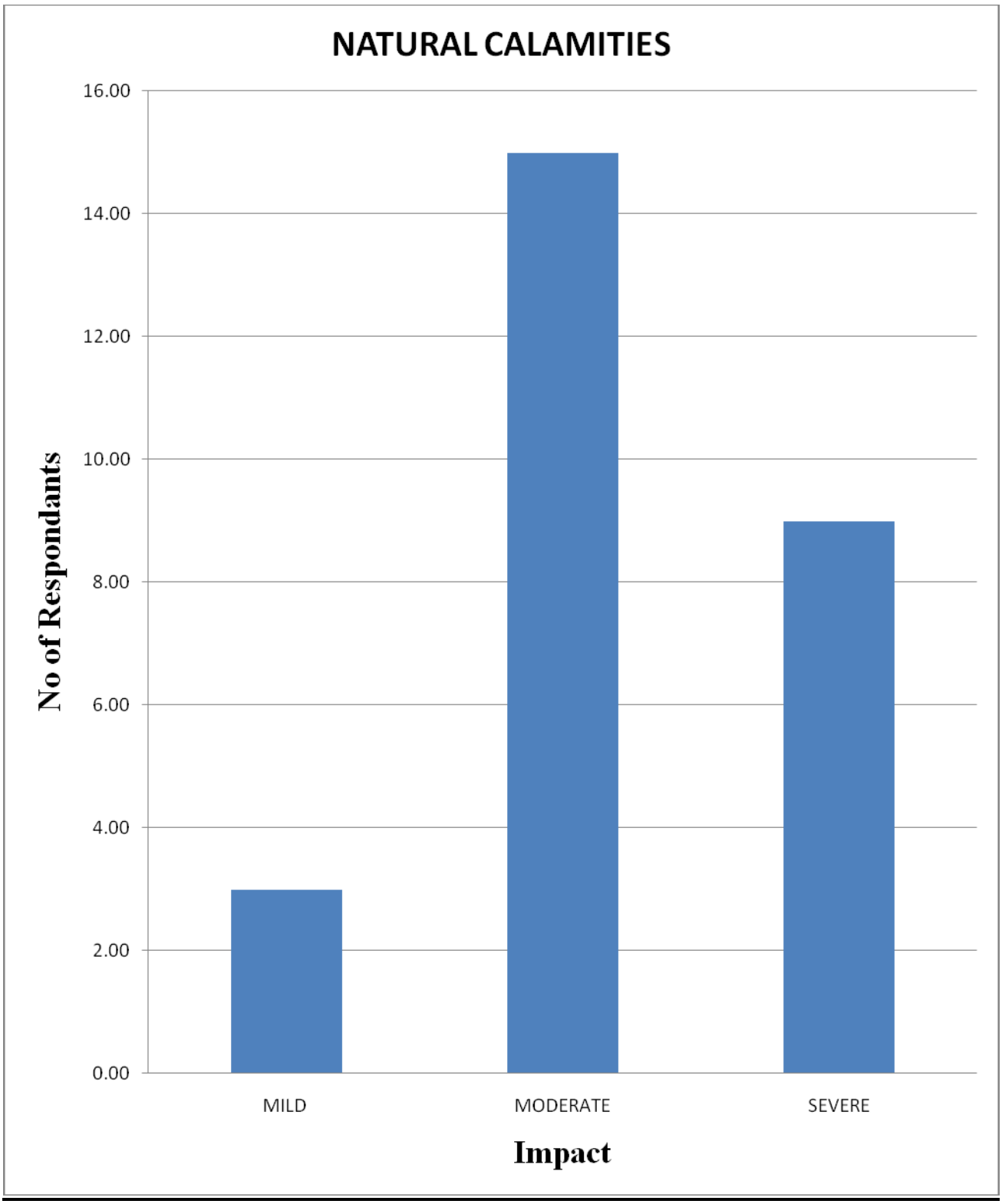

FIGURE6-13 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR NATURAL CALAMITIES

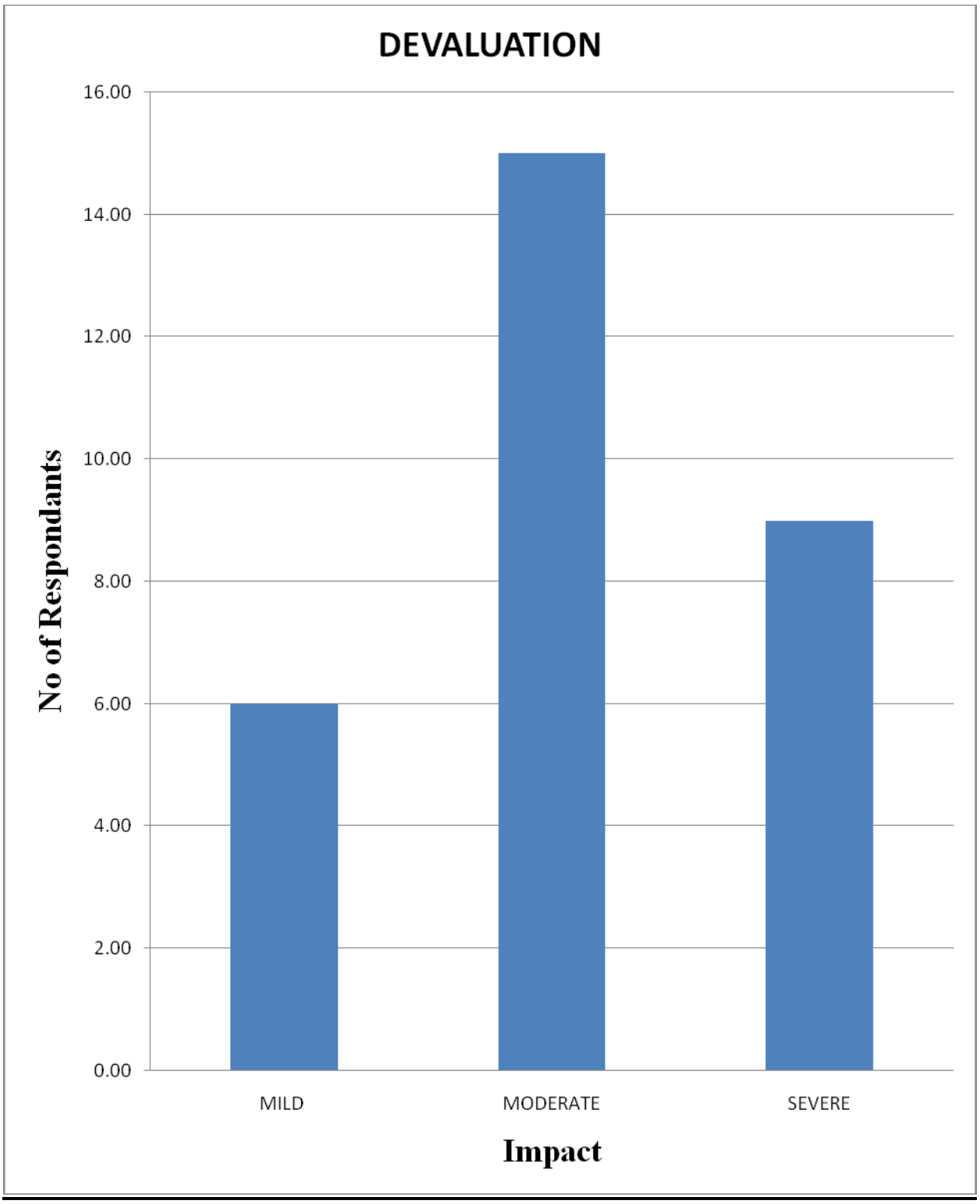

FIGURE 6-14 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR DEVALUATION

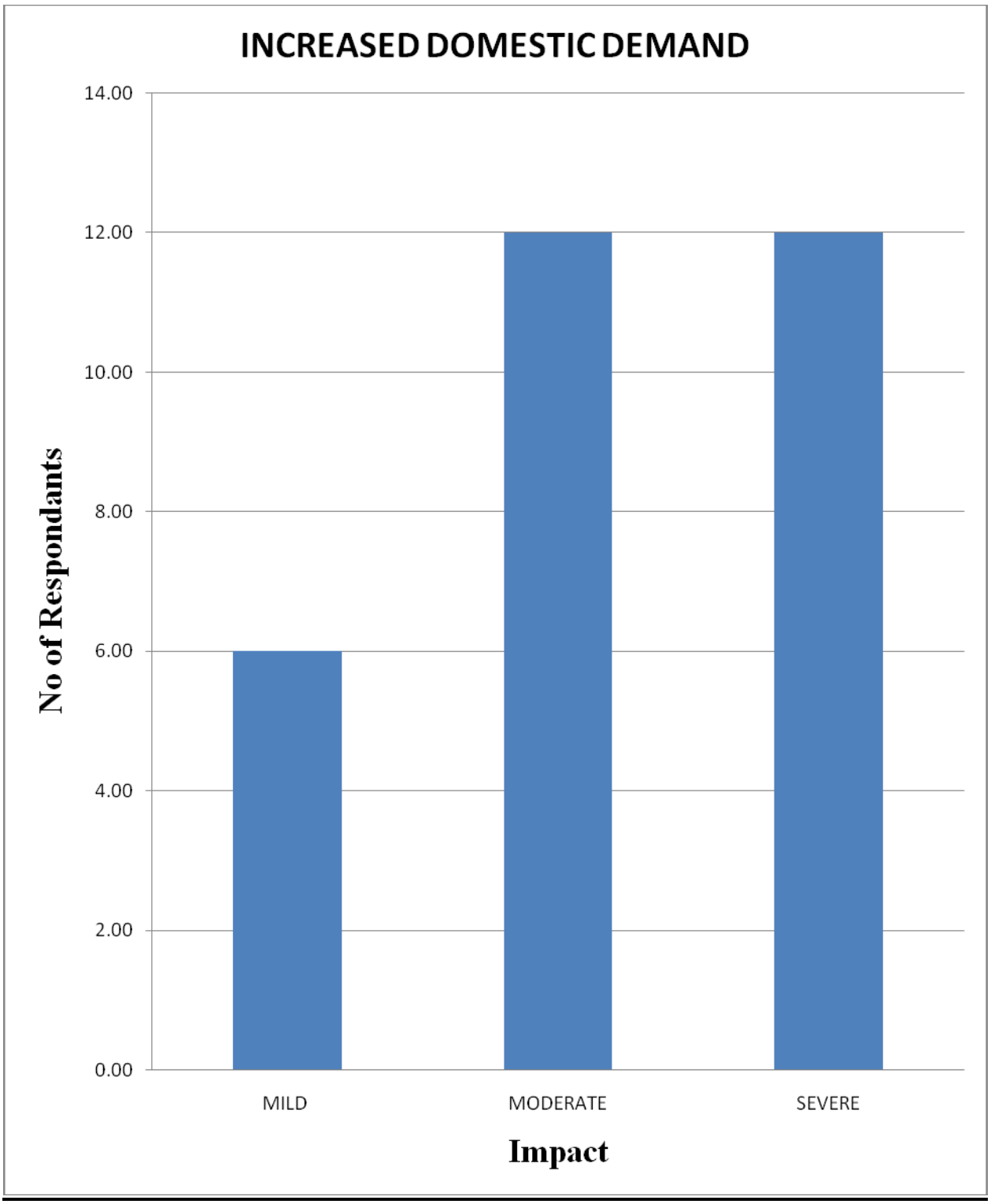

FIGURE 6-15 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR INCREASED DOMESTIC DEMAND

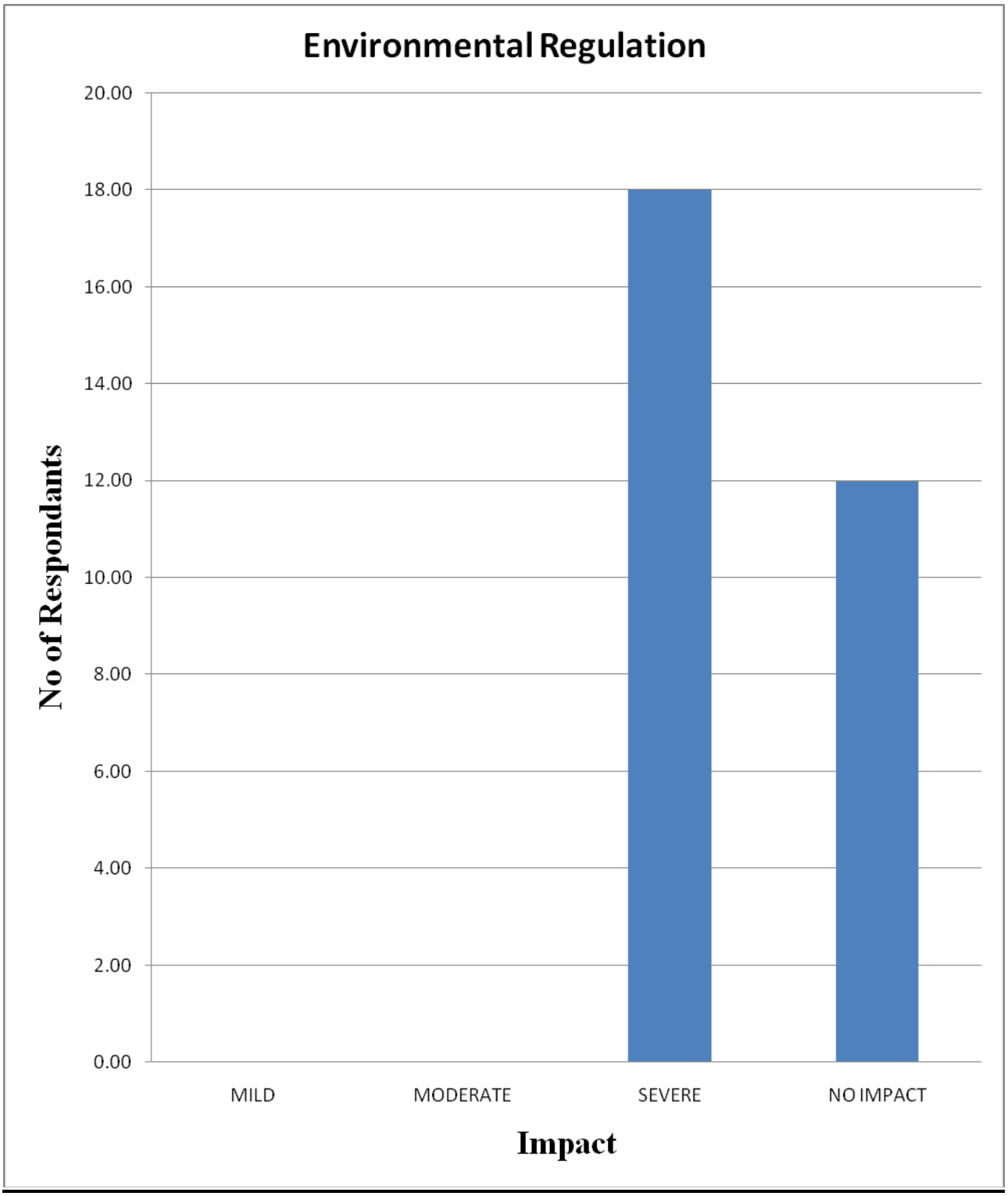

FIGURE 6-16 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR ENVIRONMENTAL REGULATIONS

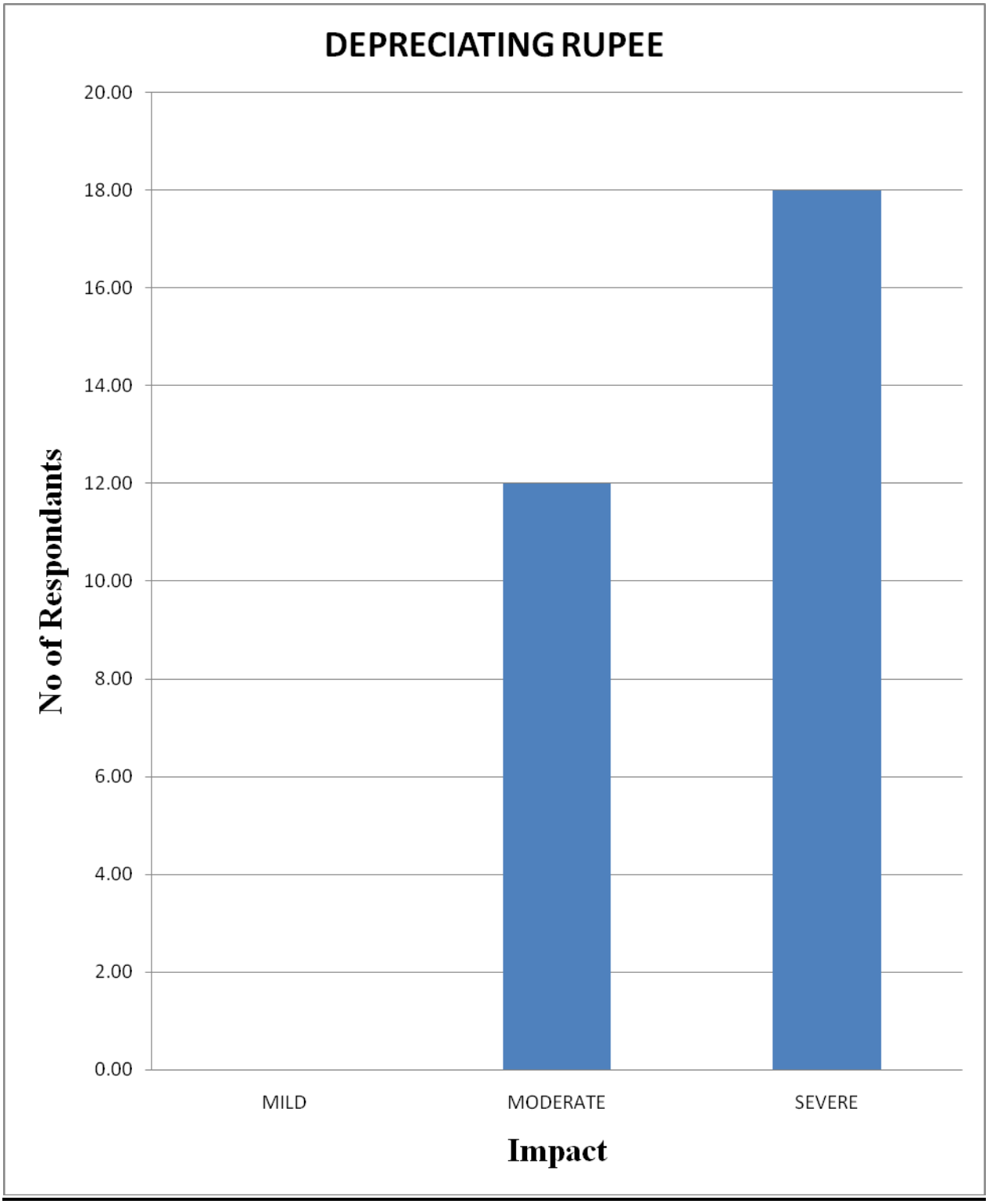

FIGURE 6-17 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR DEPRECIATING RUPEE

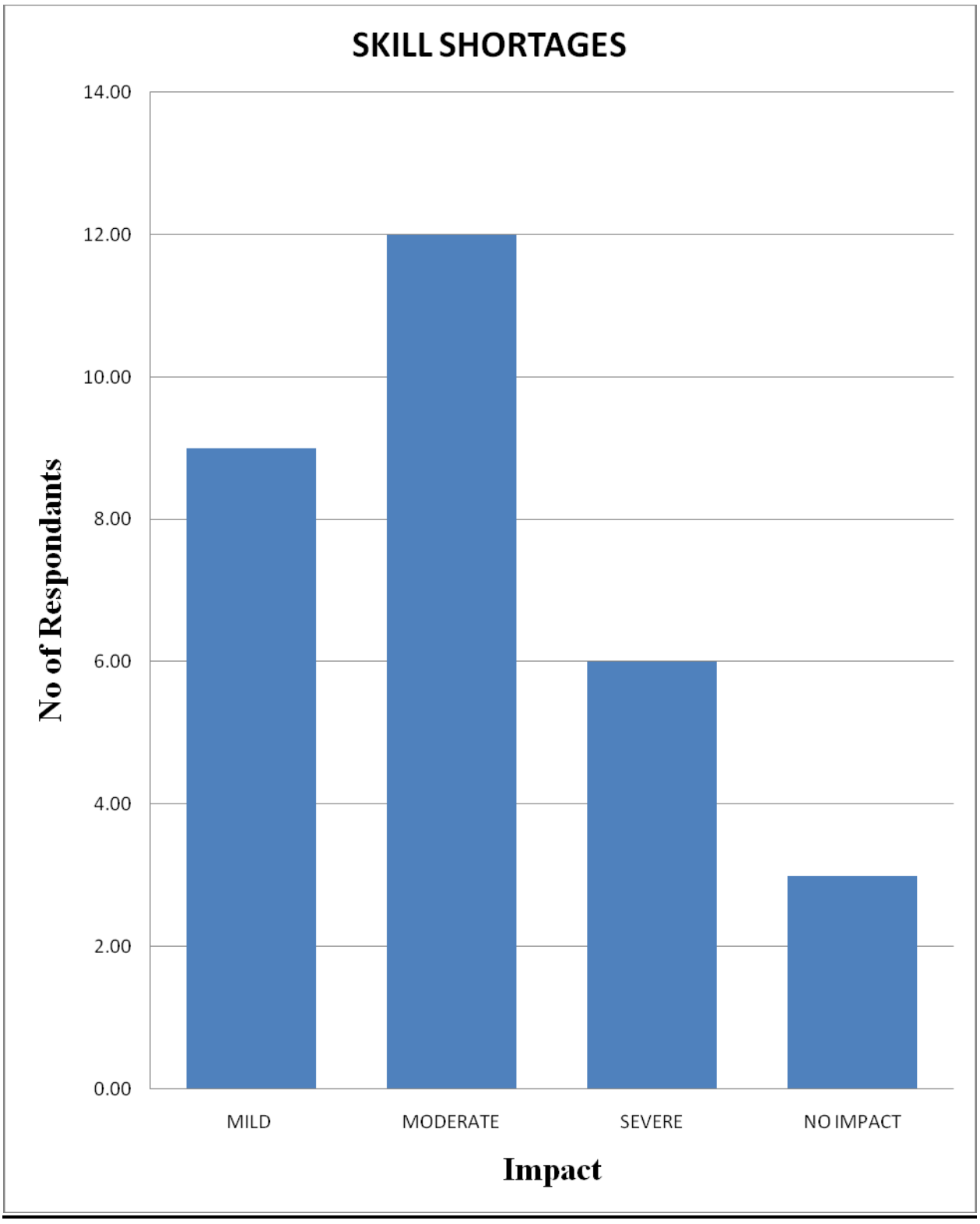

FIGURE 6-18 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR SKILL SHORTAGES

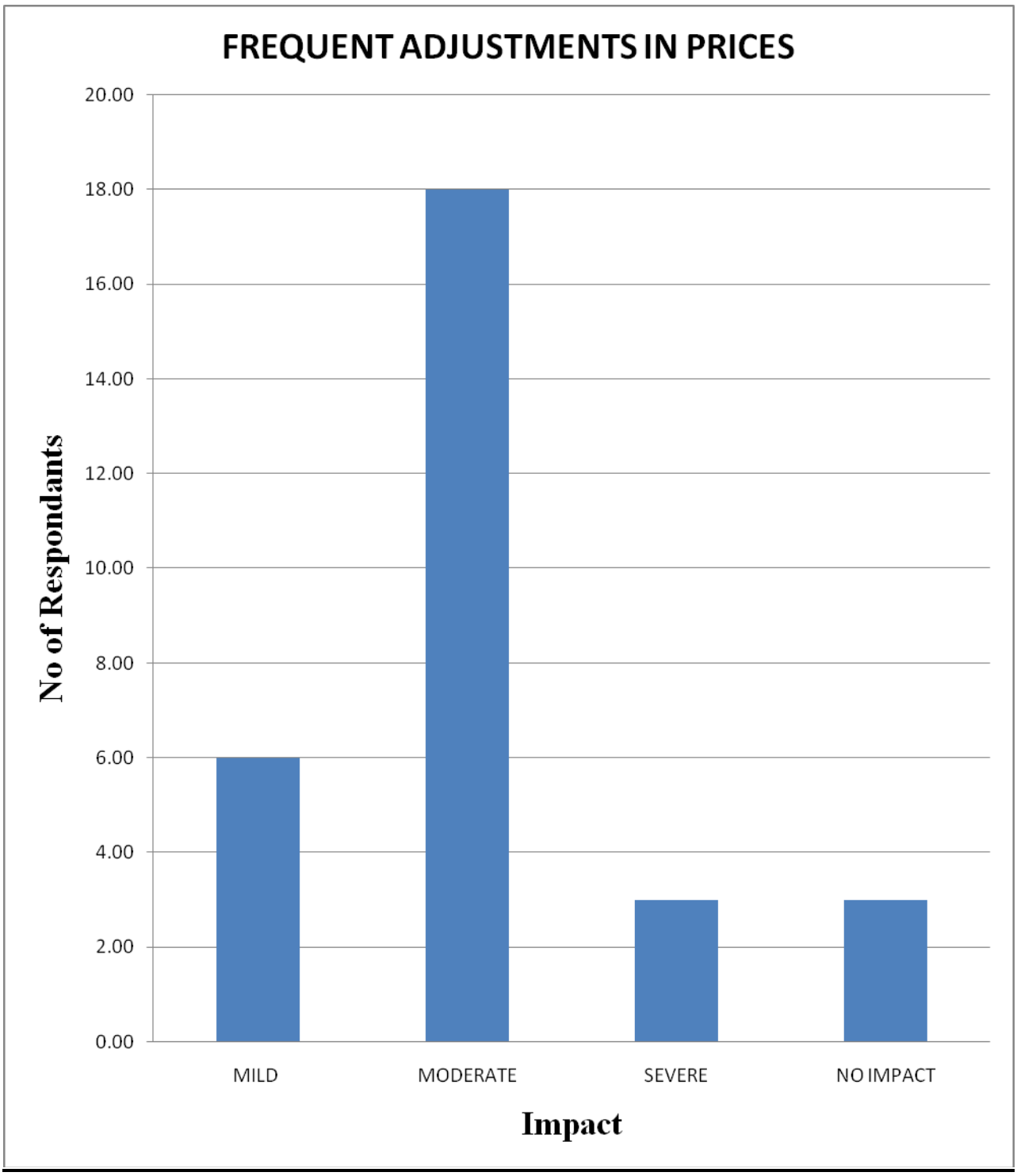

FIGURE 6-19 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR FREQUENT ADJUSTMENT IN PRICES

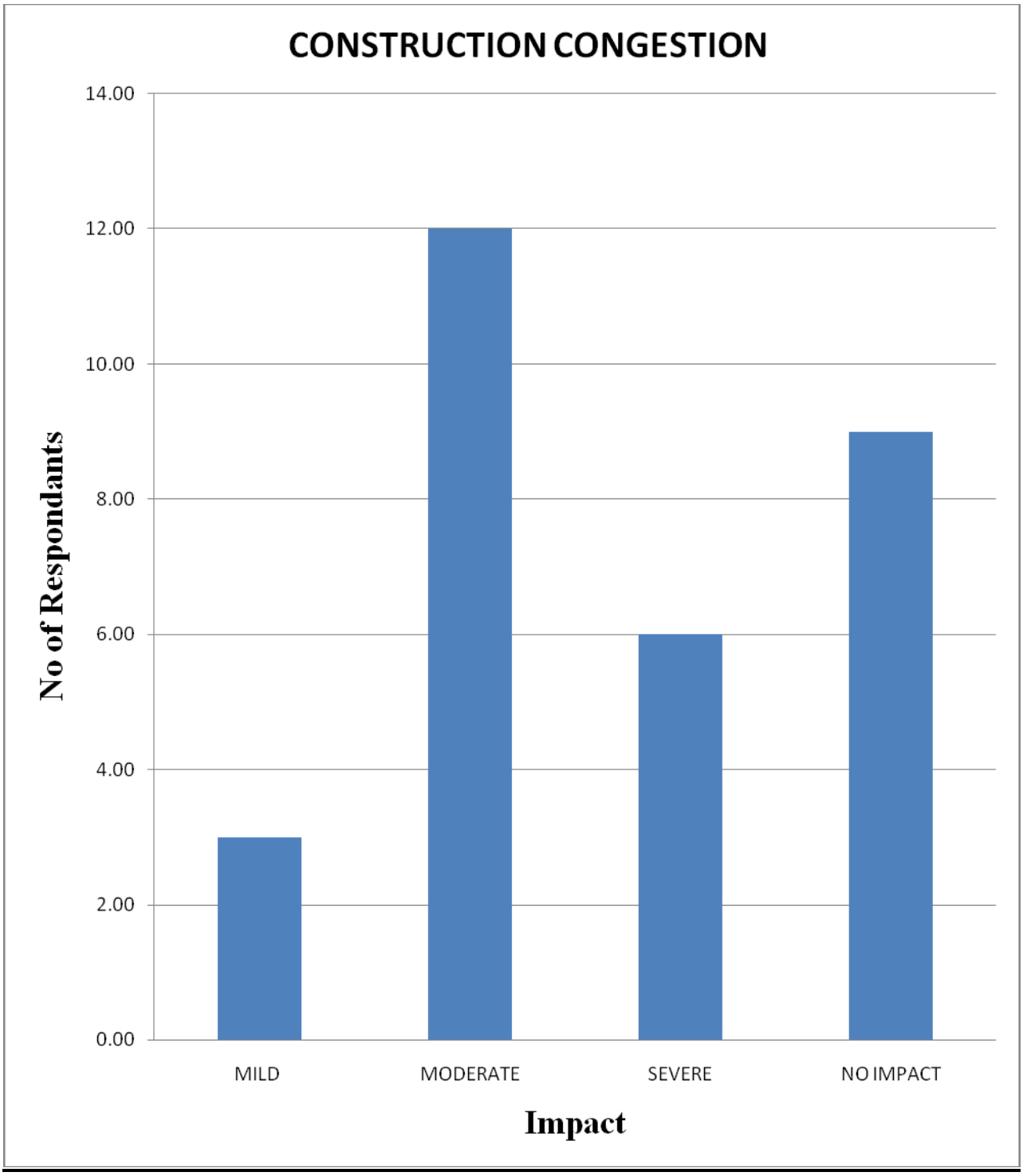

FIGURE 6-20 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR CONSTRUCTION CONGESTION

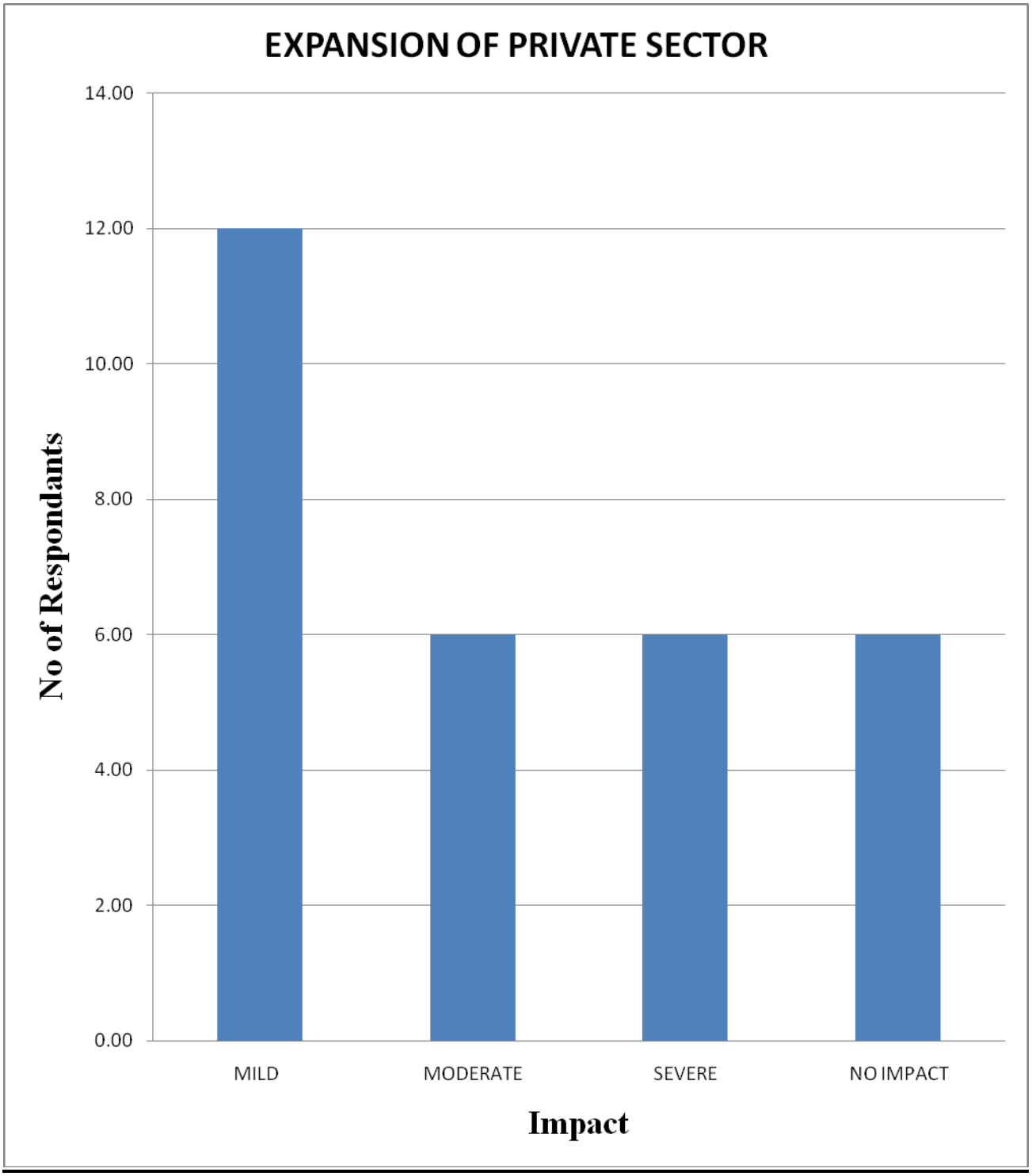

FIGURE 6-21 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR EXPANSION OF PRIVATE SECTOR

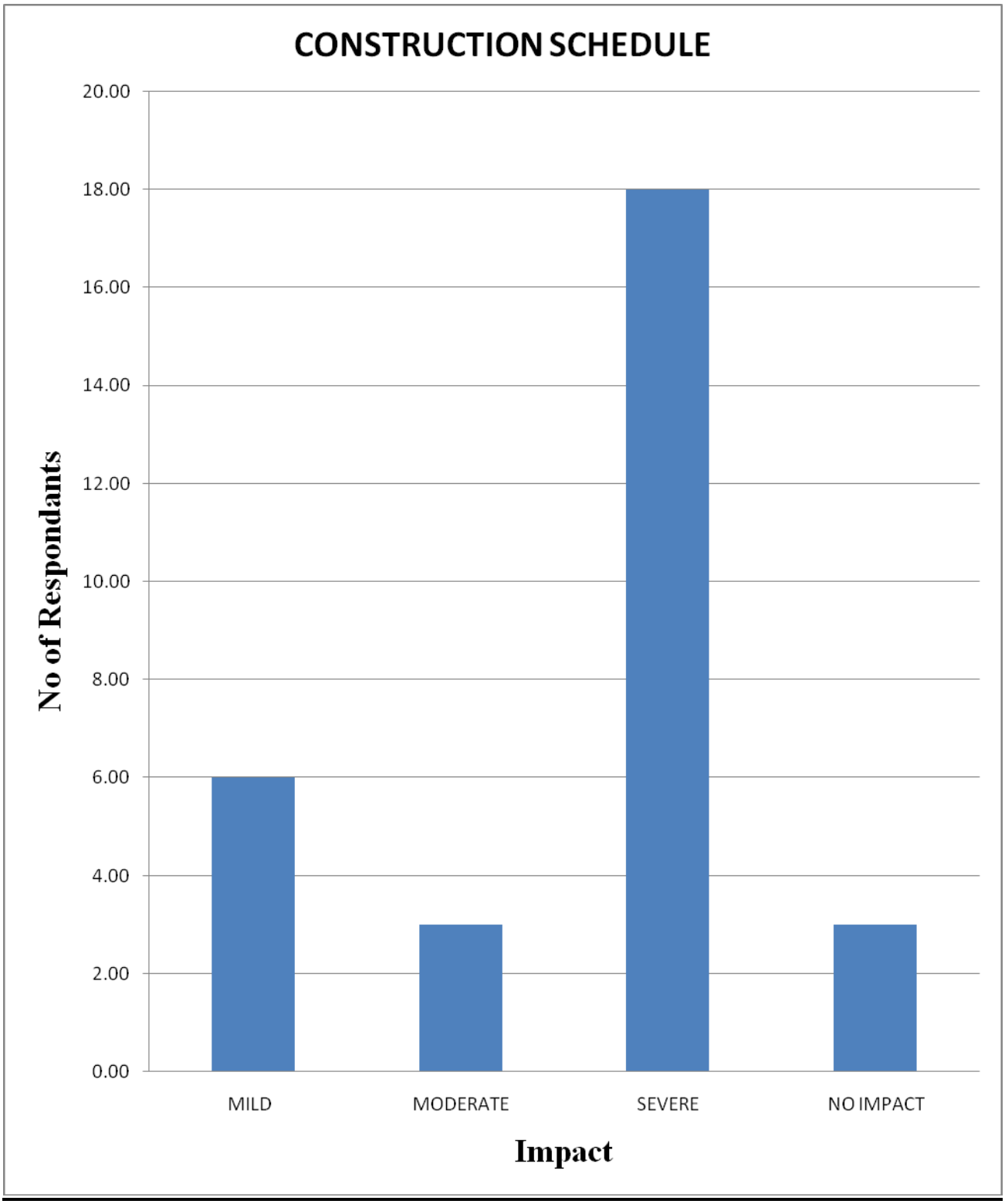

FIGURE 6-22 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR

CONSTRUCTION SCHEDULE

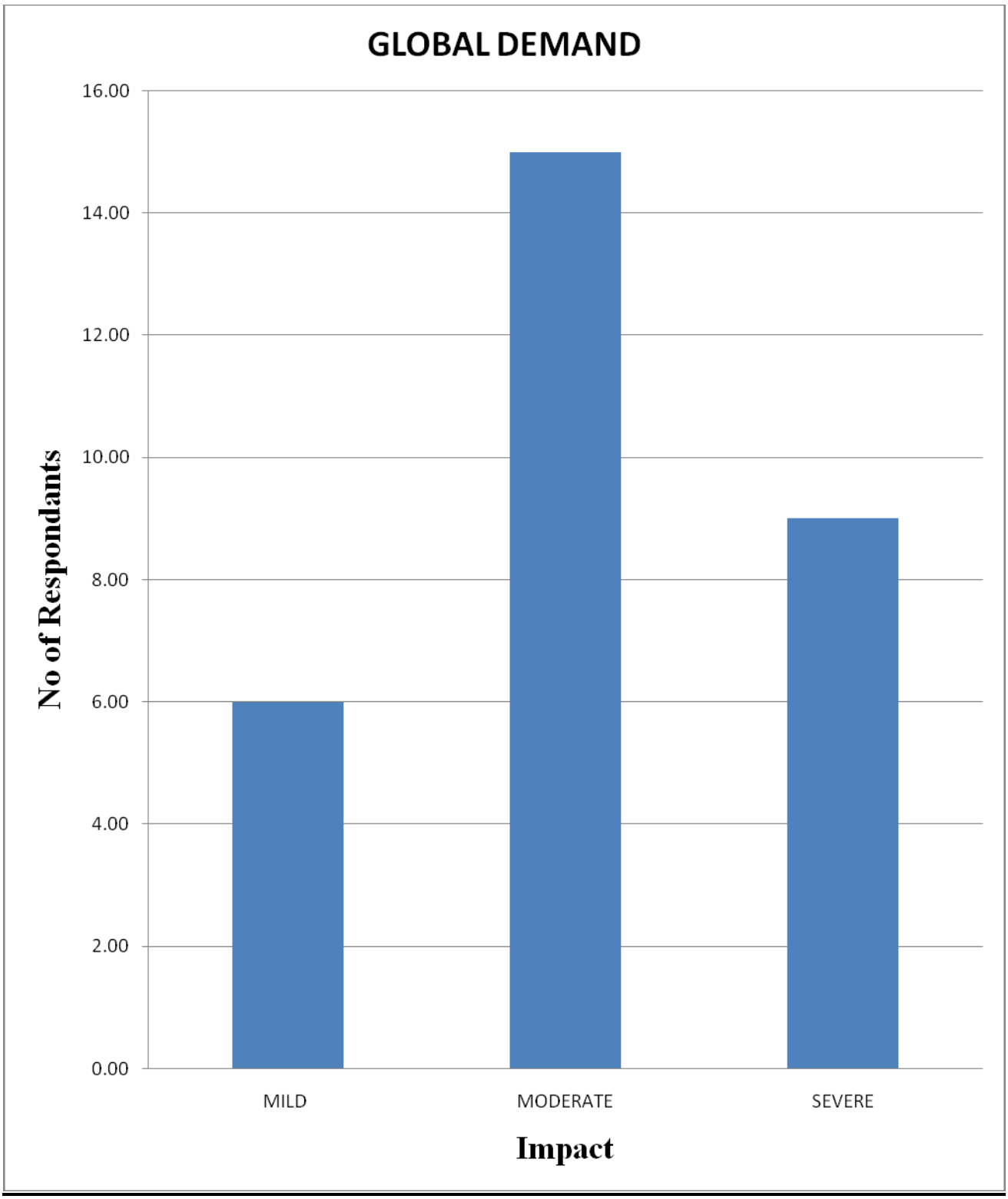

FIGURE 6-23 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR

EXPANSION OF PRIVATE SECTOR

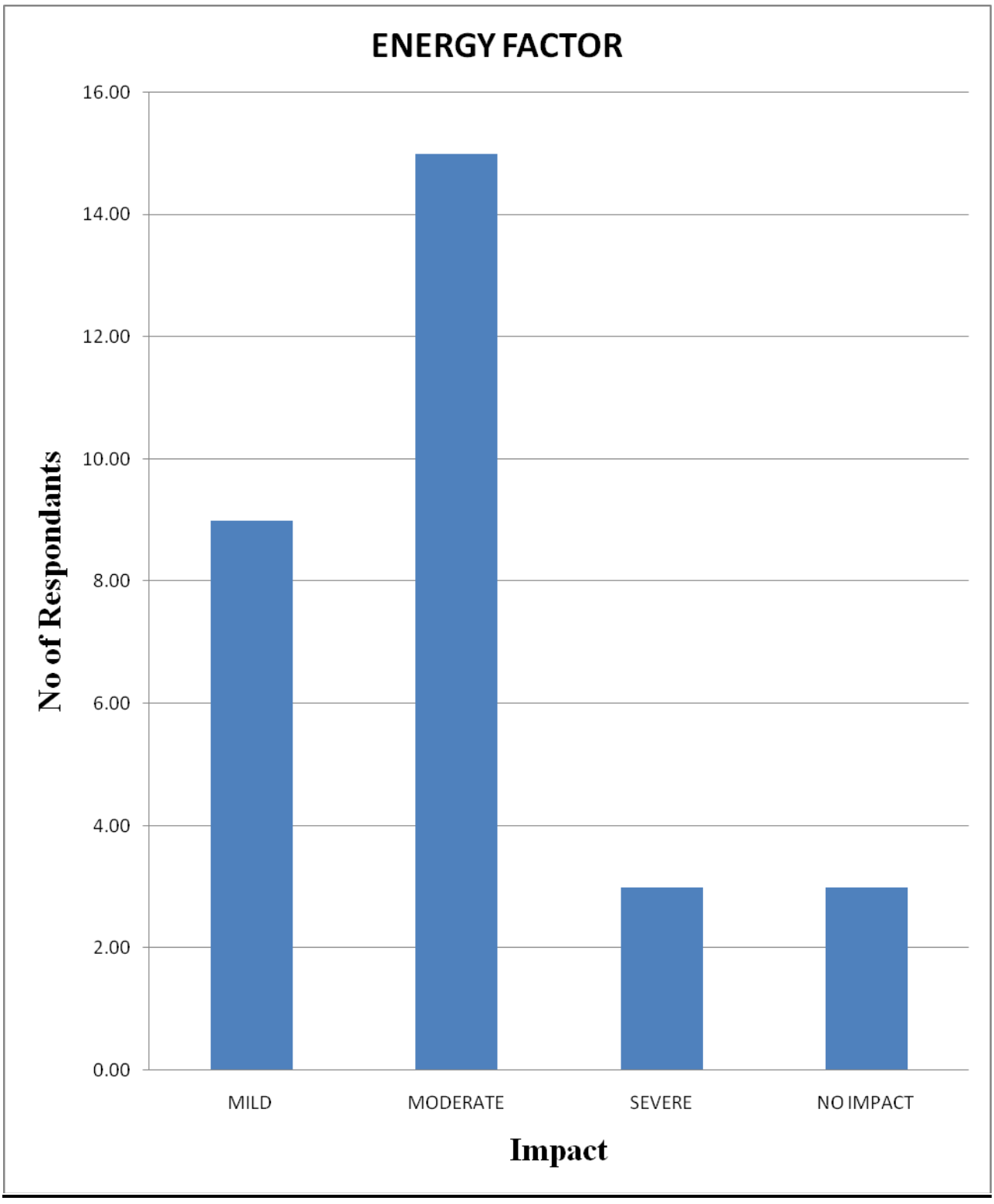

FIGURE 6-24 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR

ENERGY SECTOR

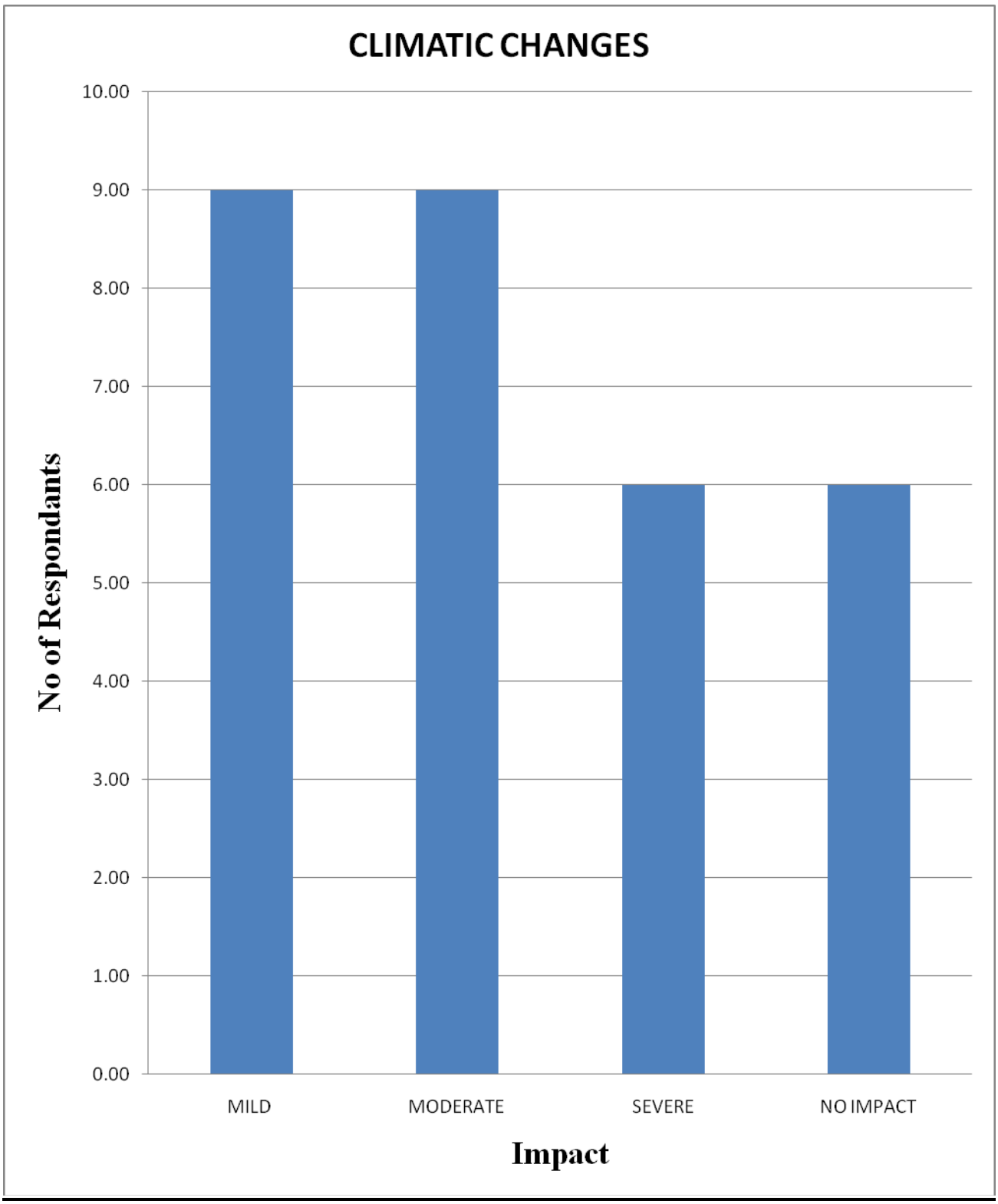

FIGURE 6-25 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR

CLIMATIC CHANGES

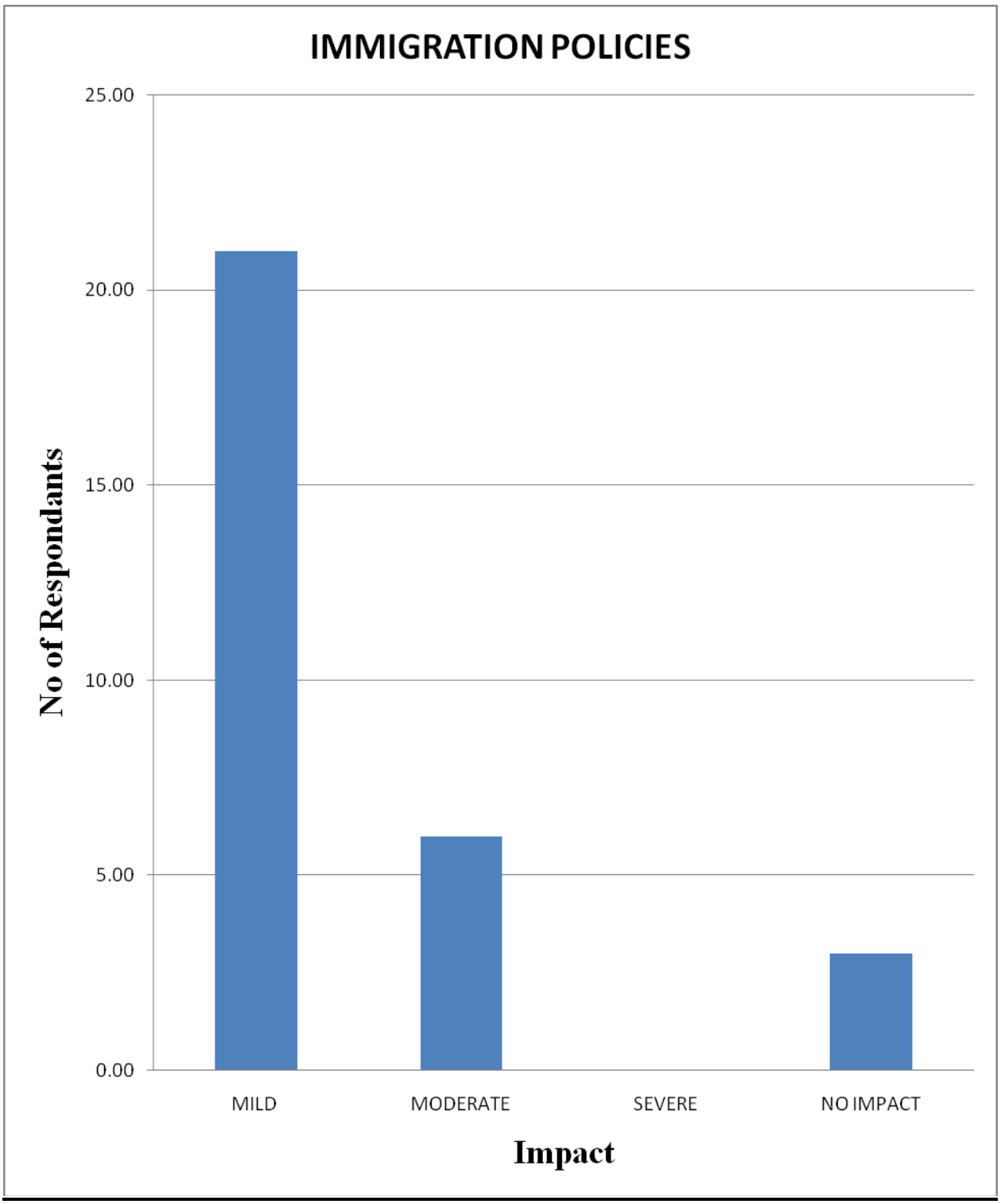

FIGURE 6-26 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR IMMIGRATION POLICIES

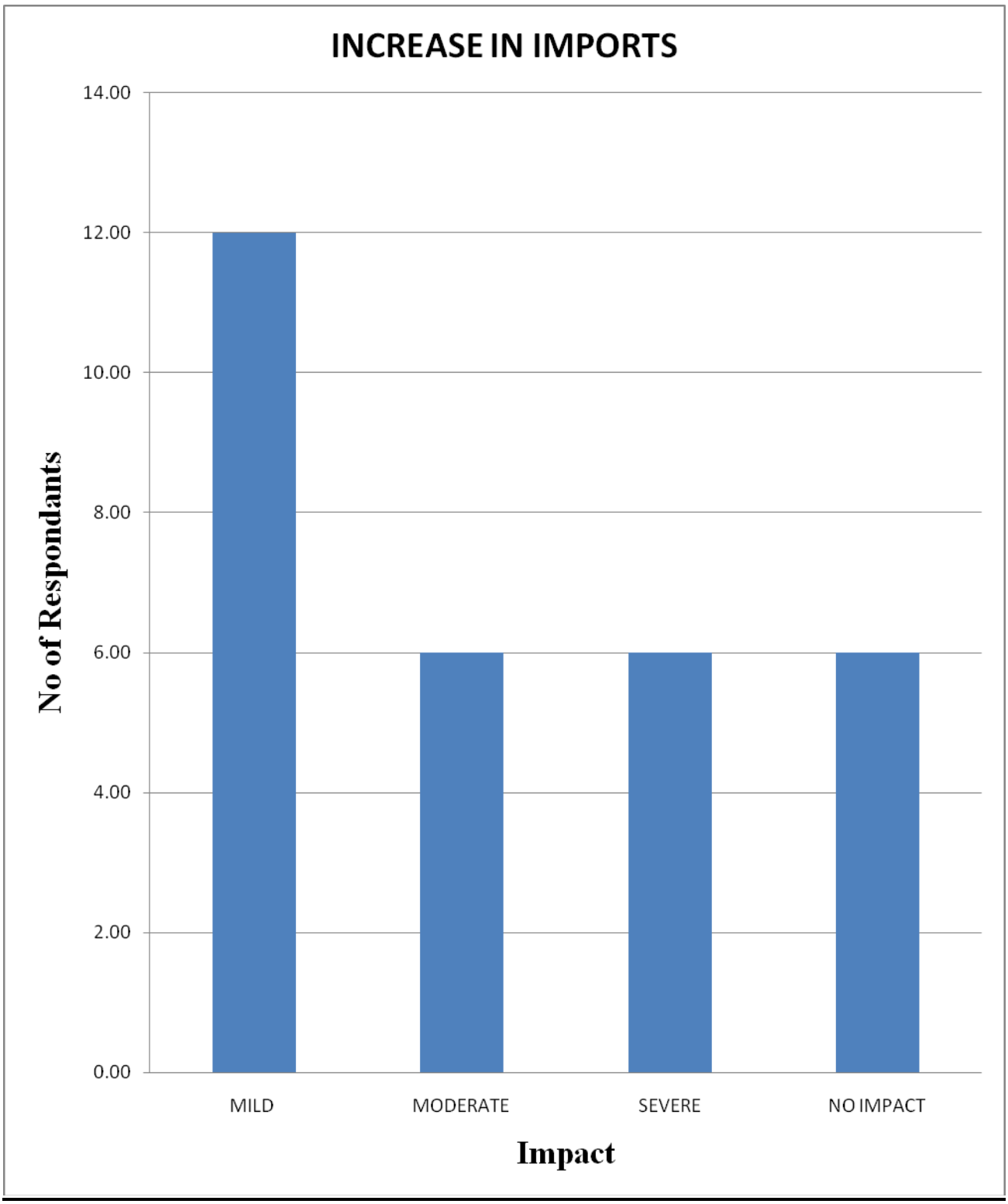

FIGURE 6-27 GRAPHICAL REPRESENTATION OF QUESTIONNAIRE FOR

INCREASE IN IMPORTS

It Concludes That

Most governing factors which cause escalation in construction projects of Pakistan are

(a) High Production Cost

High Production cost leads to an increase in the price of the final product in Pakistan. For example, if raw materials increase in price, this leads to the cost of production increasing, this in turn leads to the company increasing prices to maintain steady profits.

(b) Environmental Regulations

Environmental regulations leads to an increase in Cost as new environmental regulations/rules in Environmental law highly impact the Cost escalation. Mostly industrial area is away from main cities which ultimately/indirectly increase the cost of Transportation, prices of materials.

(c) Depreciating Pakistani Rupee

Cost Escalation also occurs when more money is printed by government to handle bad situations due to which prices increases at high pace to cope with surplus currency. In which prices are forced upwards because of a high demand.

(d) Construction Schedule

In periods of very high cost escalation, project durations have a significant impact on the total construction cost of a project. Delays in a project increase the costs in two main ways. In the first instance, the delay increases the impact of escalation. The second impact is the pressure on the entire project team to accelerate the project.

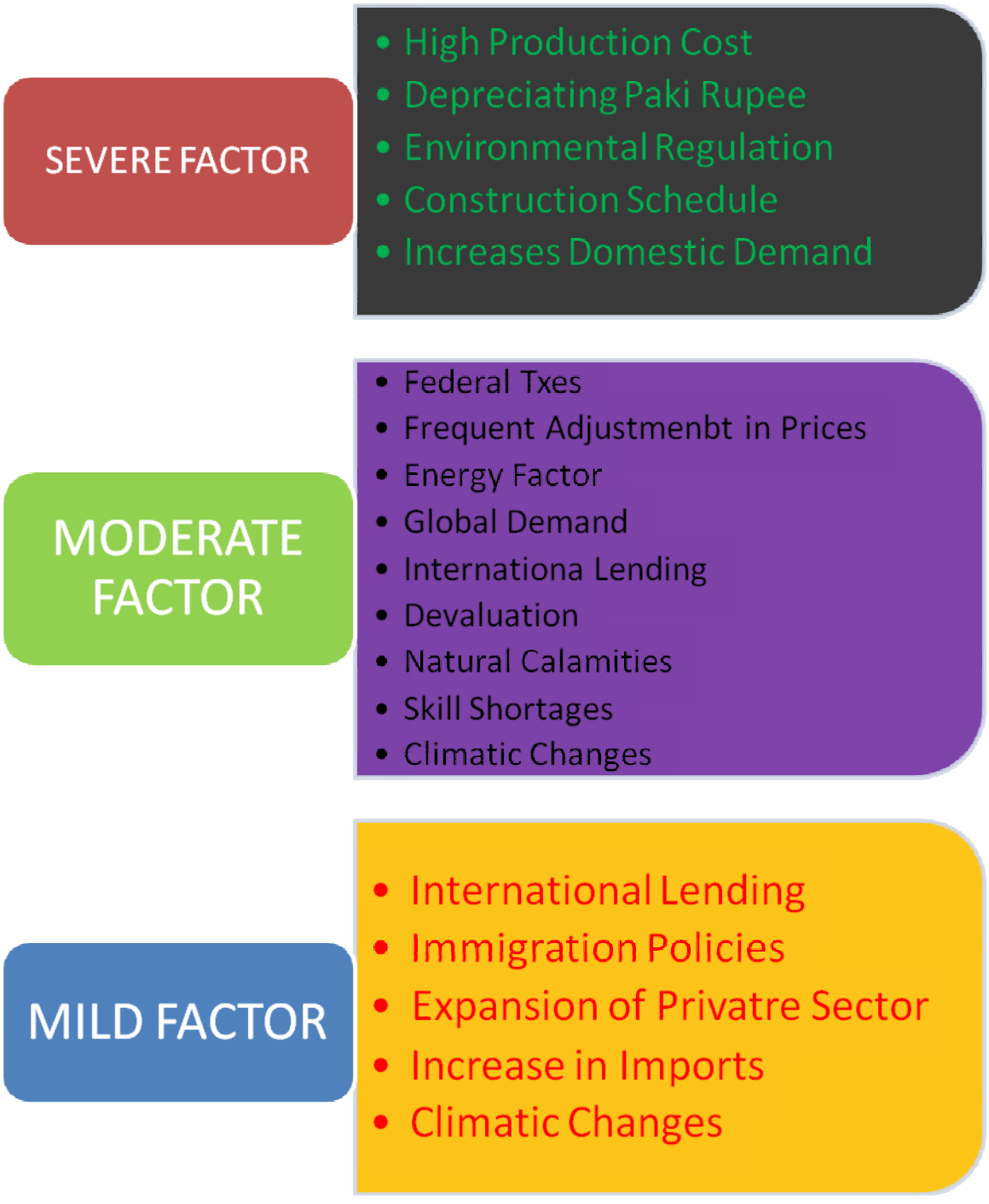
SEVERE FACTOR
• High Production Cost
• Depreciating Paki Rupee
• Environmental Regulation
• Construction Schedule
• Increases Domestic Demand
MODERATE FACTOR
• Federal Txes
• Frequent Adjustmenbt in Prices
• Energy Factor
• Global Demand
• Internationa Lending
• Devaluation
• Natural Calamities
• Skill Shortages
• Climatic Changes
MILD FACTOR
• International Lending
• Immigration Policies
• Expansion of Privatre Sector
• Increase in Imports
• Climatic Changes

FIGURE 6-28 REPRESENTATIONS OF ALL GOVERNING FACTOS

CHAPTER NO 7
FRAMEWORK FOR MANAGING CONSTRUCTION COST ESCALATION

7.1 From Owner's Perspective

- Specify the minimum limit of escalation in your Contract document below which the Contractor shall assume all risks.

- Provisions regarding the sharing of certain amount of risks among the stakeholders shall be included in the Contract agreement.

- Rates used for the calculation of escalation by comparing the actual increase over bid amount must be authentic.

- Early Involve all concerned contractors (e.g., Electrical, Mechanical, Civil) in order to minimize the cost escalation at later stages.

- In order to assume risks between contractors and subcontractors, prequalify both for financial bids.

- Use of performance bonds.

- In order to assume all risks between the Contractors, there will be chances that the Project cost might be high than expected due to the contingency costs included in the bid amount.

- Familiar yourself with the price indices to be used as a source for measuring construction cost escalation.

- Hire a proper cost Engineer for the evaluation of construction cost escalation.
- Ensure that no escalation will be paid to the Contractor due to defaults at his own end.

- Don’t use escalation in short duration projects so as to avoid higher prices bidding.

- Do mention that the contractor should bare the increase of increases in the specified period to be mentioned in the Contract.

7.2 From Contractor’s Perspective

- Use identical contracts conditions with both supplier and the Owner.

- Pre-qualify your subcontractors and suppliers on merit.

- Attempt to include and get payment of materials brought at site for the utilization at site (Secured Advance)

- Owner shall be well informed regarding the benefit of specifying those materials in the Contract document for which prices may increase in future.

- Owner shall be informed regarding the hiring of cost engineer by them in order to save project cost by specifying the alternate material whose prices are stable. Cost engineer can also provide with possible solutions of how to manage it.

- Another way to avoid the material price increase is to buy the large quantity of material in one time to be used on project. This will give better prices of materials in one time. Good working relations with suppliers has can also be developed through bulk purchases

- Allowances for construction cost escalation shall be included in the contract agreement so that a fixed amount can be added in the actual project cost.

- Ensure identical methods for measuring the cost escalation. Make sure that the contract agreement you have made with owner is same with the supplier regarding the provision of price escalation in the contract.

- Specify the items in the agreement on which escalation has to be paid and get a mutual understanding on it.

7.3 From Consultant's Perspective

- Educate the client and contractor on material price escalation provisions.

- Mutually agree all the escalation clauses in the document.

- Get involve yourself in the planning stage and design development stage.

- Be wary of bid requirements that you hold open prices for lengthy periods of time.

- Be wary of subcontract clauses (e.g., pay-if-paid clauses) that limit your recovery for material price escalation to only the amount, if any, which the contractor can obtain from the owner.

- Understanding cost indices and its source for the measurement of escalation.

- Ensure cost of storage, double handling, and insurance in purchase orders when materials have been ordered early.

7.4 FRAMEWORK FOR MANAGINF COST ESCALATION

Perspective/Roles of all 03 concerned authorities have shown on the figure below (Figure 38) however framework for managing the cost escalation has been shown in Figure 39.

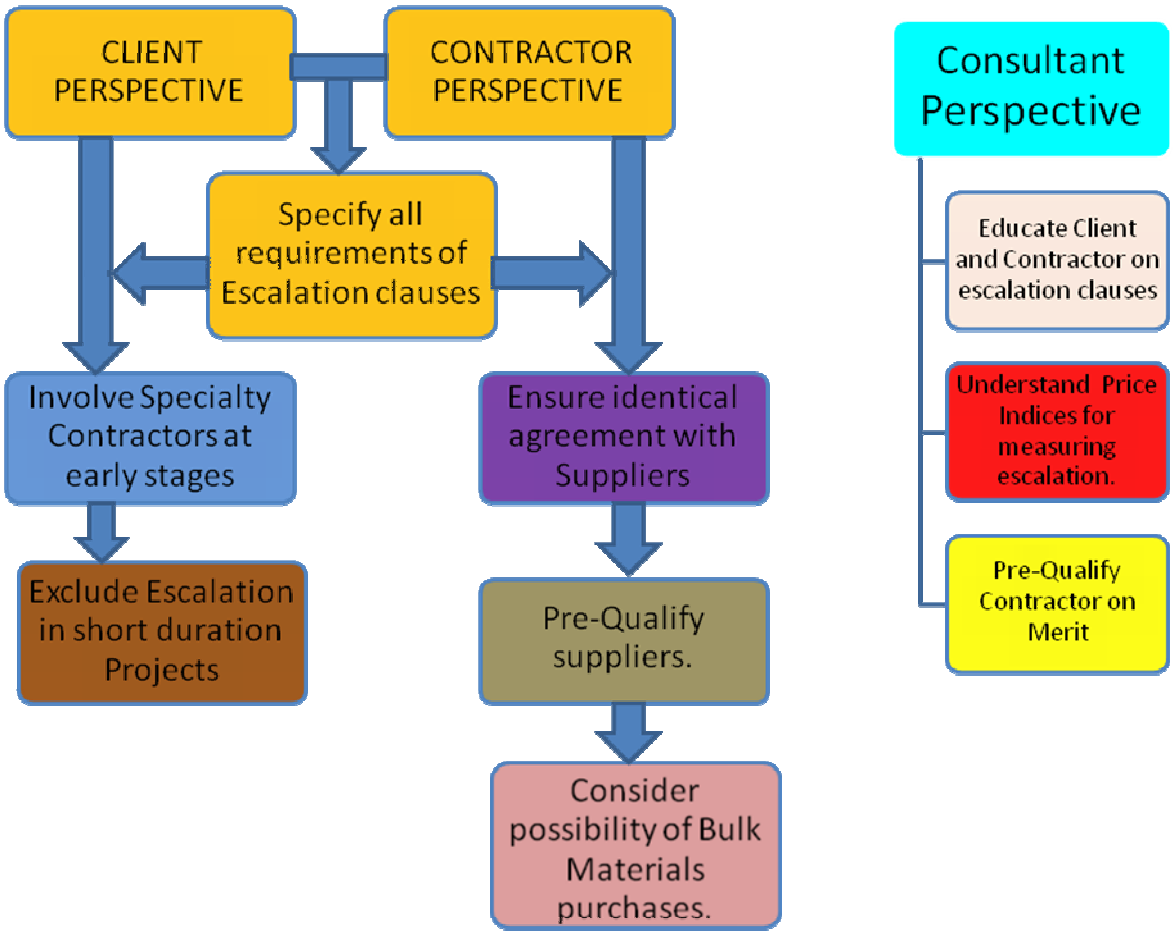

FIGURE 7-1 PERSPECTIVES OF ALL AUTHORITIES

FRAMEWORK

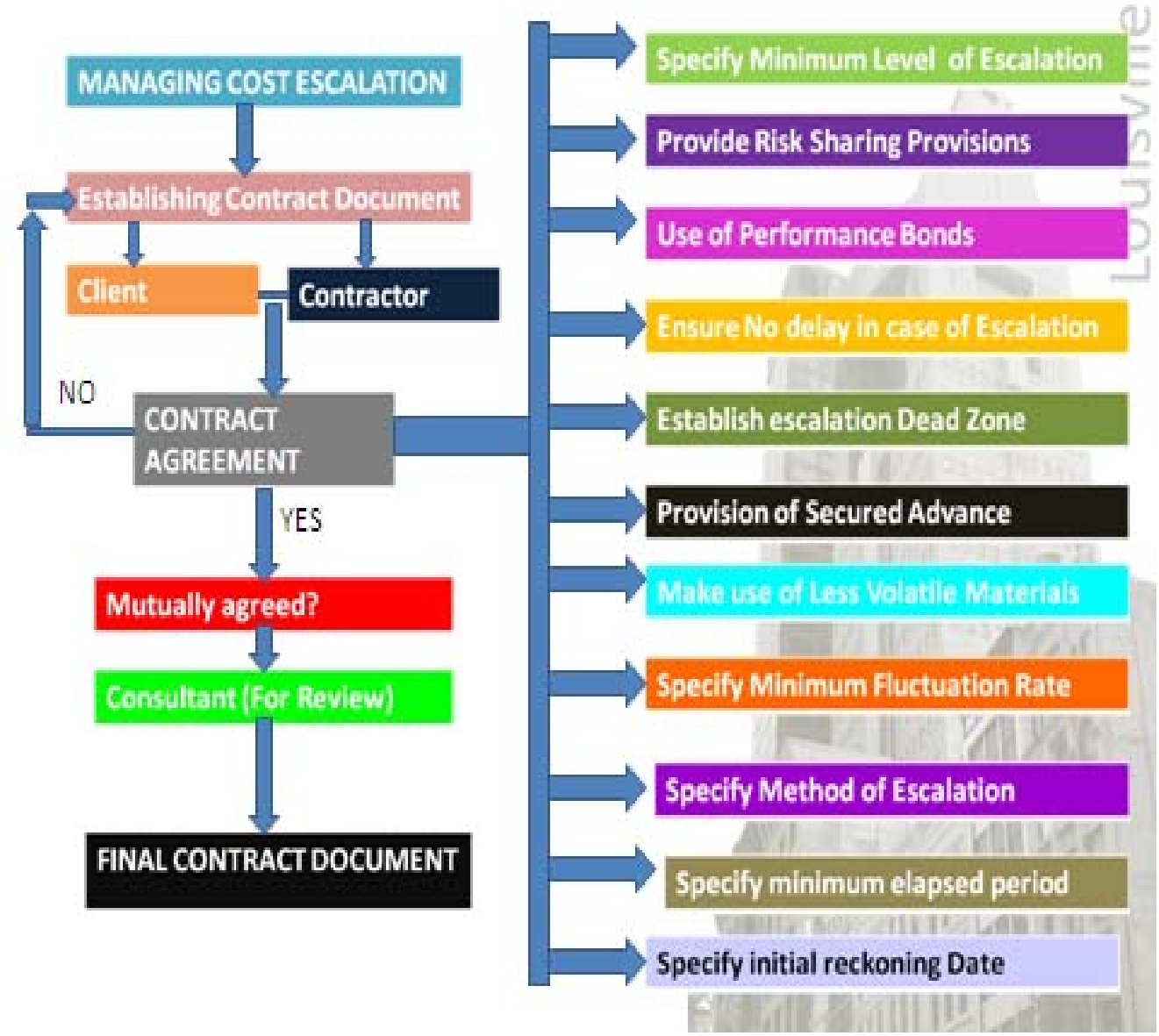

FIGURE 7-2 FRAMEWORK FOR MANAGING COST ESCALATION

CHAPTER NO 8
RECOMMENDATIONS AND CONCLUSION

There are numbers of factors which are affecting construction cost escalation and those factors added a very less amount in the total cost of the project when these factors get combined they became a significant force behind the increasing costs of materials and construction of any project.

8.1 Recommendations

The lesson learnt from this research concludes that construction cost escalation cannot be ignored. Though market volatility will settle down but the prices will remain high in coming future. The effect higher demand with limited supply is normal around the world and is likely to continue in future as well.

GOVERNMENT LEVEL

1. Government should take necessary steps to strengthen the planning abilities of regulatory authorities i.e. PEC. Engineering Council must summarize the construction escalation clauses in details without any ambiguity in it.

2. Necessary steps should be taken by Government to promote their local manufacturing and service industries instead of relying on foreign companies.

3. Government should make price escalation/revision data available as lack of data on materials availability affects project planning and execution.
4. Government should control monopolies of construction materials industries which cause the unfair means of escalation.

5. Government should establish more and more education, R&D and training facilities in technical fields to improve qualification of local manpower and introduce innovations in construction field.

6. Bidding criteria system should be improved by government as bidders with minimum bid less than that of Engineer's estimate shall be discouraged.

7. Construction machinery has a severe impact on cost/time overrun of construction projects. There should be no duty on import of these equipments.

8. Efforts should be made to improve the supply of quality products from within the country. Good quality construction material of international standards should be developed for export purposes.

9. Government should take necessary steps for improving the availability of key plant and equipment in local market.

10. Government should Strengthen R&D to integrate and support the industry and developing new and innovative means of project planning, monitoring and execution without cost/time overrun.

11. International lending should be avoided in order to avoid the devaluation of money.

12. The political stability and consistent government policies are the basic requirements to avoid this escalation.

13. Disputes during contract execution will go a long way in causing delays in time and increases in cost. There should be a dispute resolution system to avoid long disputes.

Future Research Directions

1. Development of software for measuring the construction cost escalation.
2. Analysis of trend of escalation in different projects of Pakistan in same time period.
3. Analysis of role of regulatory agencies in managing construction cost escalation.
4. Analysis of Construction bidding documents in Pakistan.
5. Analysis of most volatile materials in construction projects.
6. Analysis of Estimation model for construction projects.
7. Analysis of all prices indices used in construction projects.
8. Study of cost escalation in project management.

8.2 CONCLUSION

- Construction cost escalation is the main issue nowadays in Pakistan. Moreover project cost has remarkably increased due to construction cost escalation. It has been identified in the research that this cost can be control by taking all the steps by all the stakeholders involved in the execution of that project.

- Another lesson learnt is that escalation cannot be ignored in any project. Though market volatility will settle down with time but the prices will expected to remain high in coming future. The effect higher demand with limited supply not only in Pakistan but around the world is expected to continue in the long term.

ANNEXURE A

Sr. #	Factors	YES/NO	MILD (1-4)	MODERATE (4-7)	SEVERE (7-10)
1	High Production Cost				
2	Federal Taxes				
3	International lending and national debts:				
4	Natural Calamities				
5	Devaluation				
6	Increased domestic demand				
7	Increase in net imports				
8	Environmental Regulations				
9	Depreciating Pakistani Rupee				
10	Skill Shortages				
11	Frequent adjustment in Prices of Products				
12	Construction Congestion				
13	Expansion Of private Sector				
14	Construction Schedule				
15	Global Demand				
16	Energy Factor				
17	Climatic Changes				
18	Immigration Policies(Incase Of Labor)				
19	Increase In exports				

ANNEXURE B

Sr. No	QUESTIONS	TICK in front of appropriate Box
1.	**"Indicator to determine the MFR (minimum fluctuation rate)"**	
	• Bulletin Rates	
	• Market Rates/Factory rates	
	• Average profit rate of constructors	
2.	**"Level for Min Fluctuation rate "**	
	• 5%	
	• 10%	
	• 3%	
	• No Limit	
3.	**"Initial Date in calculation of the price change"**	
	• "Date of completion of design"	
	• "Date of Bidding"	
	• "Date of signing of Contract"	
4.	**"Method for the measurement of Price Escalation"**	
	• Factor Based Formula	
	• Actual Quantity based formula	
5.	**"Specifying the method for measurement of escalation"**	
	• Necessary	
	• Unnecessary	
6.	**"Minimum elapsed period"**	
	• Thirty Days	

	• sixty Days	
	• ninety Days	
	• one twenty days	
	• one eighty days	
	• One Year	
7.	**“Rate of progress” for price escalation”**	
	• Actual Progress Rate	
	• Scheduled Progress Rate	
8.	**“Overhead in construction cost escalation”**	
	• Exclude	
	• Include	
9.	**“Advance payment in construction cost escalation ”**	
	• Necessary	
	• Unnecessary	

ANNEXURE C

DATA COLLECTION SOURCES

- Islamabad Stock Exchange Tower Project
- New Secretariat Block Project Islamabad.
- Emigration Tower Project.
- Pakistan Telecom Tower Project.
- Different web sites of international journals, articles, thesis and universities
- Federal Bureau of Statistics, Government of Pakistan.
- NESPAK Islamabad.
- Guarantee Engineers Islamabad.
- Habib Rafiq Islamabad.
- Izhar Construction
- Interhome Construction

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[16] PEC document. Particular Conditions of the Contract. Clause No 70.1

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[22] "OECD, Paris, Main Economic Indicators, Sources, 1996"

[23] "OECD, Paris, PPI, Sources, 1994. (b)"

[24] "EUROSTAT, , Industrial Trends: National Methods, 1995"

[25] "EUROSTAT, Methodological Aspects of CPI,1996"

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[27] "The Associated General Contractors of America 2300 Wilson Boulevard Arlington, Virginia 22201 www.agc.org (Ken Simonson)"

[28] (Virginia Department of Transportation.www.vriginadot.org)

[29] (Virginia Department of Transportation Specification Section 5109DIC- 0105, Special Provision for Price Adjustment for Steel, dated 29 November, 04.

[30] Section 9, "Measurement and Payment, Florida standard Department of Transportation Specifications"

[31] "http://www.fhwa.dot.gov/programadmin/contracts/price.cfm"

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[33] "Inflation Maintains Strong Momentum," *Engineering News-Record*, p. 66, 26 June, 2006"

[34] (Two Categories of the construction having severe impact on escalation are provided by Id. Ken Simonson, the AGC's Chief Economist are here under:

(1) Construction contractors are contractually locked into contracts requiring fixed quantities of materials. When supplies become scarce, or more expensive as a result of domestic and international market forces, a contractor cannot simply build a smaller building or use less material to build a roadway. In other industries, the impact of

material shortages are dramatic price increases will be softened by, for example, reductions in product output; (2) Construction project costs also are particularly affected by transportation costs and transportation difficulties. On construction project, large quantities of materials must be delivered to a specific site, frequently from great distances. Also, as oil prices rise, and fuel costs increase, the construction industry feels a significant impact

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