A Thesis on

"COST CONTROL AND MANAGEMENT IN THE REAL ESTATE SECTOR"

Submitted for partial fulfillment of award of

MASTER OF TECHNOLOGY
Degree in

CONSTRUCTION TECHNOLOGY & MANAGEMENT

By

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DECLARATION

I declare that the research thesis entitled **"COST CONTROL AND MANAGEMENT IN THE REAL ESTATE SECTOR"** is the bonafide research work carried out by me, under the guidance of **Mr Sarthak Singh Rajput Assistant Professor, Department of Civil Engineering, Integral University, Lucknow**. Further I declare that this has not previously formed the basis of award of any degree, diploma, associate-ship or other similar degrees or diplomas, and has not been submitted anywhere else.

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CERTIFICATE

Certified that the thesis entitled **"COST CONTROL AND MANAGEMENT IN THE REAL ESTATE SECTOR"** is being submitted by **SHOZAB ZAIDI (1800103022)** in partial fulfillment of the requirement for the award of degree of Master of Technology (CTM) of Integral University, Lucknow, is a record of candidate's own work carried out by him/her under my supervision and guidance.

The results presented in this thesis have not been submitted to any other university or institute for the award of any other degree or diploma.

Mr. Sarthak Singh Rajput
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I also highly obliged to **Dr. Syed Aqeel Ahmad (HOD of department of civil engineering)**. For providing me all the facilities in all activities and for his support.

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Shozab Zaidi

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ABSTRACT

Today due the increasing the population space required for living to human being is decreases so need to build-up high rise structure, budget required for construction of high rise structure in too much. For high rise structure first of all to calculate the cost required from drawings. The cost required for construction is more that time need to reduces the cost by using various methods and techniques. In this research the cost of construction of residential building is reduced by using alternative material as well as to reducing the reactive accident which is reduces the cost of project work. At the time of construction of building think on the important issues like same project work done in past mean that to avoid the proactive accident done on same project. In this project the cost is controlled by reducing the wastage at the time of construction such as material waste (bricks, concrete and wood) ,insulation nails, electrical wiring, etc.

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CHAPTER-1

INTRODUCTION

1. Background:-

In India after Agriculture construction sector is second largest sector. Due to the regular growth in the construction industry the Indian economy is depend on it. According to gross domestic product (GDP) Construction sector becomes the largest sector in economy.

The cost management is a process that should be continued through the construction period to ensure that the cost of the project is kept within the agreed cost limits. It can divide into two major areas; control of cost during design stages and the control cost once the constructions of project have been started.

Lucknow has witnessed tremendous growth and development in real estate in the recent years. The city continues to witness good traction this year as well as this market continues to be relatively more affordable and new launches are helping to keep the momentum. Real estate in Lucknow has grown more rapidly and to higher levels than in most other Indian cities. Property prices have multiplied in almost all parts of the city and the suburbs and neighbouring areas have been getting absorbed at a considerable pace – although the market is not fully immune to a slowdown in the global and national economic environment.

The Lucknow real estate market has been driven by genuine demand resulting in increased development of both commercial as well as residential space. There are various reasons for Lucknow sudden rise in real estate fortunes. Lucknow, the state capital of Uttar Pradesh a city of historical and cultural significance, is a fast surfacing as a modern real estate destination. Increase in economic activity, and potential for real estate growth has led to massive changes within the city. Real estate is one of the many flourishing sectors of the economy. There are several malls, residential complexes and business complexes throughout the city. Lucknow, with its excellent education, commercial, banking and legal infrastructure, is witnessing brisk growth in information technology, banking education and other services sector ,

being one of the Indian cities that follow development graph of cities like Delhi, Mumbai, Surat. Cost Control Optimization and management is the basic concept of operational design and development of various projects that are related directly to certain organizations seeking proper estimated budget implementation. This research has been associated with the effective application of cost control management and budget analysis with the help of proper adjustment and association of strategic cost control. The industry under consideration here is the real estate industry mainly operating on the construction and promoting business. This research has been associated with proper discussion and appropriate presentation of the use of cost optimization technique to associate with lesser cost for certain aspects within a project structure. The valid analysis and management has been implemented with the help of proper determination and justification of the systems through operational analysis and management through experimental procedure

1.1 Concept of Cost Control :-

Cost Control is the procedure related with proper analysis and adjustment of the entire systems through deterministic use and association of the featured objectives of operation and strategic development. The necessary specification of cost control objective can be associated with the basic structure of understanding the requirements and procedure for cost control applications. These specific identifiers associated here have been initiated with the proper and deterministic analysis of procedural management and development of the operational strategies of consideration and adjustment of finance related operations:

- The necessary consideration and adjustment of the task monitoring is an effective way of understanding costs and their application. The directive implementation of a proper critical path analysis and adjustment is highly required to be understood for the proper operational management and determination.
- The application of lean management is highly necessary to be implemented within the systems through governed consideration of the various systems. Lean

management is associated requirement of the minimum amount of resource to successfully perform a specific work.

- The cost overrun is required to be associated with proper critical analysis ad requirement. The validated analysis has been associated with proper implementation and deterministic development of the considerations have been implemented with proper operational justification and strategic analysis
- Inclusion of extensive and advanced data management systems has been implemented with strategic analysis and adjustment of the cost structures. This type of data visualization assessment can be highly associated with proper consideration and analysis of cost optimization.

1.1.2 Information about Types of Costs :-

In the construction business there are mainly two types of costs associated with the systematic management of the real estate industry. These costs are either directly or indirectly associated with the entire structure of a construction project under implementation.

Direct Costs are associated with operational management and consideration of the relevant expenses that are directly proportional to the specific aspects of operational management and determination of resource requirements. The specific direct costs associated with the construction business are mainly the material costs, labour costs, subcontractor costs and equipment costs.

Indirect Costs are associated with the product or the operational functionalities. Indirect costs are associated with specific operational management and deterministic structure of cost assessment and analysis through relevant systematic consideration and adjustment for the strategic prospects and their analytical aspects. In a specific construction project structure, the indirect costs are mainly associated with personnel cost, security costs and administration costs.

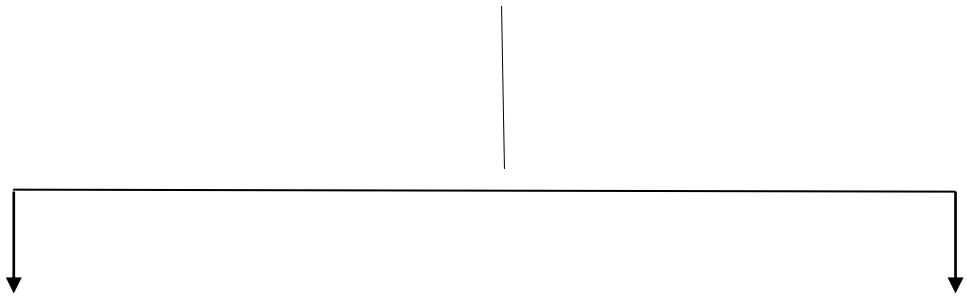
In case of indirect costs associated with the systems, the structure of segmentation can be done through proper analytics and management. The aspect is structured with the help of Project Overhead Cost and General Overhead Cost. The structural

governance has been associated with proper deterministic approach and evaluation through considerable management of maintaining various physical facilities associated with their application systems. The project overhead cost systems have been implemented with proper deterministic approach and specification of fixed-time related costs. The general overhead cost is associated with specific scenario under determination and management of the strategic concept of operational qualification and specified analysis and implementation costs related to design engineers, head-office expenses and cost of maintaining hierarchy.

These are the specific systems that are related with proper administrative consideration and use of strategic planning and management of the applied systematic preferences. The formula for general overhead cost is associated as follows:

(Project Direct Cost*General overhead of company annually) / (expected sum of direct costs annually)

Identification of potential factor based on



DIRECT COST **INDIRECT COST**

Cost classification is an important concept in project management in real estate sector. Cost classification and classification of expenses helps the management teams to understand during the project what kind of cost will be spent.

Basically there are two types of cost :

- **DIRECT COST**
- **INDIRECT COST**

1.2 DIRECT COST

Direct cost are those cost which can be chargeable directly and can be identify by the activities of the project. Direct cost can be classified as labour cost, material cost and equipment cost. Direct cost only varies when the cost of material, labour, and equipments varies.

Examples of Direct Cost

- Labourer's wages
- Equipment
- Direct material
- Wood, concrete, glass, handles etc.
- Royalty payment
- Consultants.

1.2.1 FACTORS AFFECTING DIRECT COST

Labour wage rates

The wages of labour is varies place to place. If the project starts after several month of estimating the project cost, the variation in the wage rate can also be occurred which should also be included during budgeting.

Construction material cost

The cost of the material can be varies from place to place according to availability. Since the shipping charges is also varies according to distance and places, this should also be included during budgeting.

Equipment cost

The costs of the equipment is not same for all places it varies from place to place, it includes transportation charges, site condition it may varies depends upon the construction site and location. It should be in mind during budgeting.

1.3 INDIRECT COST

Indirect cost are those cost which are not identified directly but they are associated with the project such as depreciation, accounting services, general supplies, salaries etc. Indirect cost is also known as overhead cost, ongoing costs, project management costs and operational costs. Indirect cost often fixed costs, but also they can be variable.

Examples of Indirect Cost

- Advertisement cost
- Project management cost
- Manager's salary
- Security cost
- Office cost
- Insurance
- Selling and distribution cost

1.3.1 FACTORS AFFECTING INDIRECT COST

Construction site condition and location of construction

The condition of the site can increase the construction costs. The site conditions includes poor soil conditions, wet lands, ground water, river or stream crossing,

heavy traffic, water logging etc can increases the project cost during construction. If the location of construction site is far away from the available resources it increases the project cost. Cost of transportation for workmen, equipment, materials, tools etc increases with distance and adds to the project cost.

Size and type of construction project

For demand for workforce increases as the size of the construction project increases. For such a requirement local workmen are not sufficient and workmen from different region need to be called. These may causes extra costs for such large project.

Quality of plans and specifications

A good quality construction plans and specification reduces the total construction time by proper execution at site without delay. Since poorly drawn plans not only causes confusion but places doubt in the contractors mind which may causes higher construction cost.

1.4 DIFFERENCE BETWEEN DIRECT COST AND INDIRECT COST

- Considering the product or services Direct Cost can be determined easily. While in Indirect Cost it is not easy to identify. Since to identify Indirect Cost detailed analysis is required.
- Direct Cost is related to a specific product, department, goods or services. While in Indirect Cost it is related to multiple product or services.
- Direct Cost is variable costs that changes based on the quantity of a product or services. While Indirect Cost are fixed cost

1.5 FACTORS ASSOCIATED WITH INDIRECT COSTS

In this part of the consideration, the specific factors affecting indirect costs mainly resulting in overestimation of budget and thus, increased spending has been associated. The structure of governance has been implemented with proper evaluation and determination of the specific key factors that result in increased indirect costs within the construction business structure. The factors under consideration and assessment are stated below:

- ***Location*** of the construction or site of construction
- ***Complexity*** of the project and involvement of specifics
- ***Size*** of the entire project and the requirements
- ***Quality*** of work required to be associated with the construction
- ***Scope*** associated with the real estate application

Duration of the entire project structure under governance.

1.6 CONCEPT OF COST CONTROL

Cost Control is the procedure related with proper analysis and adjustment of the entire systems through deterministic use and association of the featured objectives of operation and strategic development. The necessary specification of cost control objective can be associated with the basic structure of understanding the requirements and procedure for cost control applications. These specific identifiers associated here have been initiated with the proper and deterministic analysis of procedural management and development of the operational strategies of consideration and adjustment of finance related operations:

- The necessary consideration and adjustment of the task monitoring is an effective way of understanding costs and their application. The directive implementation of a proper critical path analysis and adjustment is highly required to be understood for the proper operational management and determination
- The application of lean management is highly necessary to be implemented within the systems through governed consideration of the various systems. Lean management is associated requirement of the minimum amount of resource to successfully perform a specific work
- The cost overrun is required to be associated with proper critical analysis ad requirement. The validated analysis has been associated with proper implementation and deterministic development of the considerations have been implemented with proper operational justification and strategic analysis

1.7 OBJECTIVE OF THE STUDY

- Objective of my study is to investigate the factor that affects cost of a construction project and to determine how to control the cost.
- To analyse and make proper recommendation by using Relative Importance Index (RII) Method

1.8 SCOPE OF THE STUDY

- Reducing the Indirect Cost of Construction project will ultimately leads to the reduction in the total cost of construction project.
- Reduction in Indirect cost of the construction project will leads to higher profit.
- Cost control to reduce the costs and expenses to boost the profitability and efficiency in Indirect Cost.

Limitations:-

My study will be based on the Lucknow Region

CHAPTER-02

LITERATURE REVIEW

1. A computer-based monitoring for cost control system applied to project management. Automation in construction by Abeid, J.N., Allouche, E., Arditi, D. and Hayman, M.,PHOTO-NET II.

This research paper describes the event and implementation of an automatic real-time monitoring system for construction projects programmed. The system links time-lapse digital movies of construction activities, critical path method (CPM) and progress control techniques. It accepts digital images taken from multiple cameras, stores them in chronological order and link them to a database that contains schedule information. The digital pictures taken from up to four cameras are placed on a website from where a remote computers can capture and store the picture in database. The development site taken by multiple cameras are often played back in synchrony with dynamic graphs showing planned versus actual schedule. PHOTO-NET II introduces a replacement concept in time-lapse photography that permits the user to control the frame rate, enabling an inexpensive playback time also because the implementation of the technology for long-term construction projects using standard PCs.

2. A web based construction Project Performance Monitoring System, Automation in construction by K.W.Cheung Cheung, S.O., Suen, H.C.H.

This paper describes the development of a Web-based construction Project Performance Monitoring System (PPMS) that aims to assist project managers in exercising construction project control. With the assistance of a panel of project management specialists, the next project performance measure categories are identified for inclusion within the PPMS: people, cost, time, quality, safety and health, environment, client satisfaction, and communication. for each of the performance measure categories, performance indicators and their measurements also are established. The monitoring process is automated through the utilization of the planet Wide Web and database technology. Data collection and dissemination are

similarly automated. The use of the PPMS can help senior project management, project directors, project managers, etc., in monitoring and assessing project performance.

3. Systematic approach for monitoring and Evaluating the construction project progress by Zubair Ahmed Memon, Mudh. Zaimi Abd. Majidand Mushairry Mustaffar.

During the construction phase it is the prime responsibility of project managers to monitor cost and avoid any overruns to maintain the cost baseline. Project monitoring is an ongoing process and its importance cannot be undermined during the project life cycle. It can be monitored by using traditional approach of direct reporting of actual cost against budget. This paper discusses traditional project monitoring practices in construction industry and proposes some guideline for improving cost management.

4. Accounting and control of the labour process by ROB BRYER.

Textbooks and business managers presume that accounting is the most important management control system, but modern scholars think its role and status are problematic. Accounting is the best method to control the surcharge since the senior manager will look into the project and will control the cost so that it will not cross Budgeted cost . It concludes that accounting is the key to controlling modern business organizations. Modern matrix model is introduce in order to estimate the labour cost by which quantity of work is relate to the labour cost.

5. Information management research on the cost control of real estate development projects by Rui Chen, Hailin Yuan.

cost control is a comprehensive project through the real estate developing process, it is the centre of gravity of real estate developing companies work. this paper wants to study research that how to establish a unit of information management system, based on advance managing mode and management software, to help the real estate development item cost controlling exactly and convenience, the information management system is based on the network development platform of information on the enterprises merger. Every functional departments and all staff real estate enterprises need to participates. This paper want to provides a learning mode on real estate enterprise’s costs control, to create the most profits.

6. Cost and time control of construction projects: inhibiting factors and mitigating measures in practice by Yakubu Adisa Olawale.

Despite the availability of various control techniques and project control software many construction projects still do not achieve their cost and time objectives. Research in this area so far has mainly been devoted to identifying causes of cost and time overruns. There is limited research geared at studying factors inhibiting the ability of practitioners to effectively control their projects. To fill this gap, a survey was conducted on 250 construction project organisations in the UK, which was followed by face-to-face interviews with experienced practitioners from 15 of these organisations. The common factors that inhibit both time and cost control during construction projects were firstly identified. Subsequently 90 mitigating measures have been developed for the top five leading inhibiting factors design changes, risks or uncertainties, inaccurate evaluation of project time or duration, complexities and non-performance of subcontractors were recommended. These mitigating measures were classified as preventive, predictive, corrective and organisational measures. They can be used as a checklist of good practice and help project managers to improve the effectiveness of control of their projects

7. The cost monitoring of construction projects through earned value analysis by Mohd Faris Khamidi and Waris Ali Khan.

In this paper we will study that the duty of project manager is to monitor cost and avoid any overruns to maintain the cost baseline. Cost monitoring is an ongoing process and its importance cannot be neglect during the project life cycle. It can be monitored by using traditional approach of direct reporting of actual cost against budget. , the comparison of budget versus actual spending does not indicate the worth of the work which is completed at any given time. This approach does not portray the true cost performance of the project. Because of these limitations, this paper discusses the applications of Earned Value Analysis (EVA) for cost management of construction projects.EVA is a three-dimensional technique that compares the budgeted value of work scheduled with the earned value of physical work completed and the actual cost of work completed.

8. Study of residential project cost control based on value engineering by Zhang TieShan.

This paper analyzed the existing problems and trends of residential project cost control, and discussed the advantages of using value engineering method in cost control. Then author proposed the issues needing to pay attention of value engineering applied to the residential project cost control, uniquely from three angles of application time, the choice of breakthrough points and application process. The purpose of this paper is to use value engineering in residential project cost control, for lower cost and improving the function and value of the residential project.

9. Project Cost Control in the Nigerian Construction Industry by C.I. Anyanwu.

The key to the success of our construction investment industry is professional management. There is urgent need for innovations in the cost management of our construction resources for viable products. The vital question however is whether the Project Manager being the construction cost planner is economizing enough the variables that affect the cost of construction which are supposed to be under his control in other to bring down cost of construction to a tolerable level. This is the main focus of the study to unveil the management philosophy, practice and inputs to be affixed in evaluating and monitoring construction cost in order to reduce project abortion and abandonment, which are caused by project cost overruns.

10. Research on Construction Cost Control of Contestable Measure Items by Xiang Mei Yu.

Beginning from the definition and cost of measure item fee, analyzes the significance of construction cost control of contestable measure items. Measures of cost control are summarized from five perspectives of specific construction plans formulation, materials, machinery, labour and management-with combination of specific projects, so as to provide reference for cost control in projects.

11. Study of cost control on construction project by Prof. Deepak P. Patil, Prof. Pankaj P.Bhangale.

This dissertation work is aimed to minimise and control the construction cost of a construction project. To minimize the cost of a project there are different methods such as quality management, time management etc. In this work I have applied the inventory control system to control the cost of a project. In inventory control system if we applied ABC (Always Better Control) analysis and EOQ (Economical Ordering Quantity) to the project then there will be definitely savings in cost and also avoids

wastage of material. The mathematical module of ABC analysis and EOQ gives the importance of material and its effect on cost of construction project because the cost consumed by the materials in any project is approximately 65% to 70% cost of total project. In this work one case study of construction project of a school building has been considered and the cost required by project with and without material management is analysed.

12. Research on Cost Control of Construction Project Based on the Theory of Lean Construction and BIM by Ye Wen.

Lean construction is a new type of management mode of construction project, which is especially suitable for those complex, changeable and speedy construction projects. Besides, building information model (BIM) is "computable digital information" created and utilized during the design and construction of buildings. This paper takes construction project as the object and combines BIM technology with the theory of lean construction. Both of them will play a collective role in cost control of construction project. A case study is made to illustrate that to the construction projects, the lean construction and BIM technology can control their cost effectively.

13. Construction Project Control in the UK: Current Practice, Existing Problems and Recommendations for Future Improvement by Yakubu Olawale , Ming Sun.

Time control practice for construction projects in the UK. A questionnaire survey was carried out with 250 top companies to establish the current practice and identify existing problems. This was followed by in-depth interviews with 15 experienced practitioners from these companies in order to gain further insights of the identified problems, and their experience of good practice on how these problems can be tackled. On the basis of these interviews and synthesis with existing literature, a list of 65 good practice recommendations have been developed for the key project controls tasks: planning, monitoring, reporting and analysing. The Delphi method was then used, with the participation of a panel of 8 practitioner experts, to evaluate these improvement recommendations and to establish the degree of their relevance. After two rounds of the Delphi, these recommendations are put forward as critical,

important, or helpful measures for improving project control practice in the UK construction industry.

14. Cost Reduction in Construction Projects by Urmila A Mahadik.

Time and cost are two main problems which increase importance of cost reduction techniques. Reduction of cost of construction is a constant goal for construction industry. One way of reducing construction cost is to develop innovative technologies as well as methodologies to increase productivity. This paper covers types of cost, factors affecting cost of projects as well as discussion on achievement of satisfactory results of time and cost by applying cost reduction techniques.

15. Research on Cost Management of Construction Project based on Activity-based Costing by Jianqiang Tang, Maoping Zhang.

This paper, based on the principle of activity based costing, mainly introduced the specific process of applying the method in cost accounting and cost forecasting during the Project Construction being constructed. Through using the activity-based costing to calculate the actual cost and the budget cost in the process of project construction, which to be compared to analysis the cost deviation, while predicting the material supply-demand relationship of next issue. Furthermore, in the light of the deviation, reengineer the process of project construction and adjust resource supply level, thereby effectively refine and control costs, improve management and competitiveness of project contractor.

16. Cost Control in Construction Planning on Site by Anuranjan Kumar, Prof (Dr.) Om Prakash Netula.

Cost control and schedule control are two of the most important management functions in the construction industry. Major research efforts are focused on developing procedures for improving the effectiveness of cost and schedule control. As a result, researchers are concerned with the quality, integrity, and timeliness of data that flow through such control systems. A number of data models have been proposed to integrate cost- and schedule-control functions, because such integration is viewed as the, solution to the many problems facing construction projects today. This paper provides an overview of cost- and schedule-control functions, defines the desired control cycle, and discusses the problems and needs of cost- and schedule-

control functions. A number of integrated cost- and schedule- control data models, which represent the state of construction research in this area, are discussed.

17. Project cost control: a new method to plan and control costs in large projects by R.Jayaraman.

Large projects overrun their budgets because of the long time period needed to completion**;** it was decided to reengineer the cost management. Findings The re-engineered method of cost control worked well and yielded better than expected results, leading to the setting up of a new world record in the completion time for setting up a million tonnes per annum continuous, tandem cold rolling mill to roll steel sheets. Practical implications Large projects can deploy the methodology and complete their projects on time and under budget. Social implications The reengineering of the cost management was done primarily with a view to complete projects under budget. Since many governments spend many billions of dollars on publicly funded projects for the welfare of citizens, the use of this technique could have a salutary effect on the cost. The method was innovated in the company by the author's team and deployed in a live project over four years for the first time to achieve world-class results.

18. Time and cost control in construction projects in southeast Mexico by Romel Solis, Morfin Garcia.

Monitoring time and costs has been traditionally served as a basis for control of construction projects. In the late nineteenth century, Frederick Taylor laid the foundations in order to ascending the management to the category of science, and through engineering techniques he changed the paradigms of productivity in industry. After several decades of research on project management the Earned Value technique was developed, which allowed control the execution of a project through its budget and its schedule; and in the early twenty-first century took another step in how to make a project assessment for performance of time, through Earned Schedule technique. The aim of this study was to evaluate the effectiveness of two project management methods: Earned Schedule and Earned Value; to control the time and cost in construction projects executed in Mexico. For achieving this, time and cost performance indicators and predictors from six projects were calculated. Results showed better performance in projects using the method of Earned Schedule to

control the time; and independence between the performance indicators of time and cost.

19. Impact of Cost Control Techniques on Cost Overruns in Construction Projects. By S.N. Malkanthi.

The success of any project is depend upon the how the project achieves the objectives in terms cost, quality and duration. Good cost control technique should be used to achieve the goal. This study is done using a questionnaire survey conducted among C1-C5 grade contractors. The data collected were analysed by converting them into quantitative values using percentage analysis and weighted score analysis. The result indicate the cost controlling practices that are in frequent use and the importance of minimizing the cost overrun in order to reduce over budget. Cost controlling techniques by motivating the contractors, conducting training programs, awareness programs etc.

20. Real estate company project cost management responsibility system by JI Chao Wen

This paper analyzes the existing cost management level of the project management of the real estate enterprises in china is uneven, and not clearly defined the scope of management, feedback is low efficiency, the project cost management theory, the paper proposed to set cost management model, strengthen the reasonability cost management team and its members of the contract management, and perfect the cost management information system. It may promote the small and medium-sized real estate enterprises to improve project management levels, improve the social effect of real estate investment.

.**21. Strategic cost management for construction project success: a systematic study by T. G. K. Vasista.**

Large construction projects are inherently complex and dynamic. Many projects start with good ideas, huge investments and great efforts. However, most of them do not achieve much success. A major contribution to unsuccessful projects is the lack of understanding on scope, time, cost and quality. Projects as powerful strategic weapons when initiated create economic value and competitive advantage. The objective of the research is to explicitly declare the scope of the research to by considering only the scope, time, cost and quality as process success parameters and

how specifically the cost element would influence the project success when all other elements or factors other than cost are represented in terms of cost factor along with the contract conditions as basic rules or constraints that drive the strategic cost based on applying the CRASP methodology concept. The concept of benchmarking would provide right meaning of project success when allowing to properly distributing the meaning of customer profitability to the project providers

22. Analysis of Project Cost Management and The Effect On Cost Overrun In Construction Projects by Manlian Ronald A. Simanjuntak , Agung.

One indicator of the success of a project is how good we carry out the project based on cost estimation and also provide an optimum financial benefit for the contractor. The current condition is, there is so many problems related the failure of construction project caused of delay schedule and cost overrun. This condition has increased in construction projects because the contractors and project owners did not use the correct management methodology so that projects delays and cost overruns. Identifying the causes of cost overrun and classifying the correct project cost management variables is now become our consideration in this study. The first research problem is how to identify cost overrun in construction, the second research problem is to identify factors and variable project cost management. For the third research problem is the research framework of project cost management.

23. Cost Control Techniques for Construction Project by Miss. Punam Bhimrao Kokate.

Increasing in population decreases the space so that high rise structure is needed to built. The construction cost of high rise building is too much, from drawing we will calculate the cost required for construction. In this research paper we will control the cost by using alternative material, accident which affects the cost. in this research the preset construction work is compared to same project work done in past mean to avoid same accident which was done on same project. In this project cost is also controlled by controlling wastages at the time of construction.

24. A critical literature review on improving project cost management practice and profitability of domestic contractors by Amanuel Girma and Patel Dixit.

The most important factor for project success is construction cost management, cost variance from the budget shows the performance of the construction project. Project

firms and contractor should focus on the management in order to achieve project objective successfully. In this research paper we will study about limitations, drawbacks and shortcomings of each project cost management system related to domestic contractors which need to be improved for achieving the predefined project objectives and the profitability of contractors along with the proposed improvement recommendations

25. Research on Cost Control and Management of Real Estate Project by Qun Gao.

This paper takes the cost control and the management of real estate project as the object in research, and analyzes and studies relevant issues. By analyzing the cost structure of real estate construction, this paper identifies problems in cost control and management of real estate construction at present. Besides, this paper puts forward measures for cost control and management of real estate construction, with the hope of offering useful ideas for this issue.

26. Minimizing the Cost of Construction Materials through Optimization Techniques by KAMALNATRAJ.

In construction industry the main motive of project is to minimize the cost of the Labour, material, equipments and complete it on time, according to estimated budget. The constant goal of construction industry is to minimize the construction cost. For the desired design combination based on the cost of construction optimization technique is used in this project. In this research paper we will find out the expected design combination for the reduction in cost.

INFERENCE

S.N	PROBLEM STATEMENT	SOLUTIONS
1	To control the cost by monitoring the work regularly	Critical path method (CPM) and progress control technique is used to control the cost. Digital images is taken from multiple cameras linked them to a database that cantains schedule information.
2	To control the cost, time, quality, safety and health, environment, client satisfaction by monitoring system, automation in construction.	Project performance monitoring system (PPMS) that aims to assist project managers in exercising construction project control. The use of the PPMS can help senior project manager in monitoring and assessing project performance
3	Monitoring of cost and avoid any overruns to maintain the cost baseline.	It can be monitored by using traditional approach of direct reporting of actual cost against budget.
4	Control of the labour cost and avoid overrun in project	Accounting is the best method to control the surcharge since the senior manager will look into the project and will control the cost so that it will not cross budgeted cost.
5		
6	Factors inhibiting the ability the ability of practitioners to identifying causes of cost and	A survey was conducted in order to find out the common factors that inhibit both time and cost control during construction

	time overruns	project were identified. Mitigating measures help project managers to improve the effectiveness of control of their projects.
7	Avoid any overruns to maintain the cost baseline. The budgeted cost will not cross the actual cost.	For cost management of construction projects Earned Value Analysis (EVA) is used. It is a three-dimensional technique that compares the budgeted value of work with the actual cost of work completed.
8	Existing problems and trends of residential project cost control.	The author proposed the issues needing to pay attention of value engineering applied to the residential project cost control , for lower cost and improving the functions.
9	Need of innovations in the cost management of our construction resources for viable products.	Focus should be on unveil the management philosophy, practice and inputs to be affixed in evaluating and monitoring construction cost in order to reduce project abortion and abandonmen.
10	analyzes the significance of construction cost control of contestable measure items	. Measures of cost control are summarized from five perspectives of specific construction plans formulation, materials, machinery, labour and management-with combination of specific projects, so as to provide reference for cost control in projects
11	Main aimed is to minimise and control the construction cost of a construction project	In inventory control system researchers applied ABC (Always Better Control) analysis and EOQ (Economical Ordering Quantity) to the project then there will be

		definitely savings in cost and also avoids wastage of material.
12	Cost control for the construction of changeable and speedy construction projects.	Building information model(BIM) and Lean construction is used. Combinations of BIM technology with the theory of lean construction. Both of them will play a collective role in cost control of construction project
13	The key project controls tasks: planning, monitoring, reporting and analysing.	The Delphi method was then used, with the participation of a panel of 8 practitioner experts, to evaluate these improvement recommendations and to establish the degree of their relevance. After two rounds of the Delphi, these recommendations are put forward as critical, important, or helpful measures for improving project
14	Time and cost are two main problems which increase the overall budget in construction.	Cost reduction techniques are used to control the cost and methodologies to increase productivity.
15	Use of Cost accounting and cost forecasting during the Project Construction being constructed.	Through using the activity-based costing to calculate the actual cost and the budget cost in the process of project construction, which to be compared to analysis the cost deviation, while predicting the material supply-demand relationship of next issue.
16	How to develop procedures for improving the effectiveness of cost and schedule control.	. A number of data models have been proposed to integrate cost- and schedule-control functions, because such integration

		is viewed as the, solution to the many problems facing construction projects today. This paper provides an overview of cost- and schedule-control functions, defines the desired control cycle, and discusses the problems and needs of cost- and schedule-control functions.
17	Large projects overrun their budgets because of the long time period needed to completion**;** it was decided to reengineer the cost management. Findings The re-engineered method of cost control worked well and yielded better than expected results	Practical implications Large projects can deploy the methodology and complete their projects on time and under budget. Social implications The reengineering of the cost management was done primarily with a view to complete projects under budget, the use of this technique could have a salutary effect on the cost
18	Monitoring time and costs has been traditionally served as a basis for control of construction projects	The aim of this study was to evaluate the effectiveness of two project management methods: Earned Schedule and Earned Value; to control the time and cost in construction projects executed in Mexico. For achieving this, time and cost performance indicators and predictors from six projects were calculated. Results showed better performance in projects using the method of Earned Schedule to control the time
19	Control the cost of the overall project and the quality as well as duration of the project of the work.	Cost control technique is used to reduce over budget by motivating the contractor conducting training programs.

20	The existing cost management level of the project management of the real estate enterprises in china is uneven, and not clearly defined the scope of management	Reasonability of cost management team and its members of the contract management, and perfect the cost management information system. It may promote the small and medium-sized real estate enterprises to improve project management levels, improve the social effect of real estate investment
21	Large construction projects are inherently complex and dynamic. Many projects start with good ideas, huge investments and great efforts. However, most of them do not achieve much success.	The concept of benchmarking would provide right meaning of project success when allowing to properly distributing the meaning of customer profitability to the project providers
22	One indicator of the success of a project is how good we carry out the project based on cost estimation and also provide an optimum financial benefit for the contractor.	. Identifying the causes of cost overrun and classifying the correct project cost management variables is now become our consideration in this study. The first research problem is how to identify cost overrun in construction, the second research problem is to identify factors and variable project cost management. For the third research problem is the research framework of project cost management.
23	In high rise building the construction cost is too much,	Cost is controlled by using alternative material,

	reduce the cost through techniques.	Controlling wastage at the time of construction, prevention of accident which affects the cost by comparing the work with same work done in past mean.
24	Cost variance from the budget due to the improper management in the project	Cost control management should be good enough in order to control the cost by proper planning
25	Tthe cost control and the management of real estate project as the object in research, and analyzes and studies relevant issues.	, this paper identifies problems in cost control and management of real estate construction at present. Besides, this paper puts forward measures for cost control and management of real estate construction, with the hope of offering useful ideas for this issue.
26	The cost of the construction is very high due to the design of the construction project	Optimization technique is used in order to find the desired design combination based on the cost of the construction.

CHAPTER-03

RESEARCH METHODOLOGY

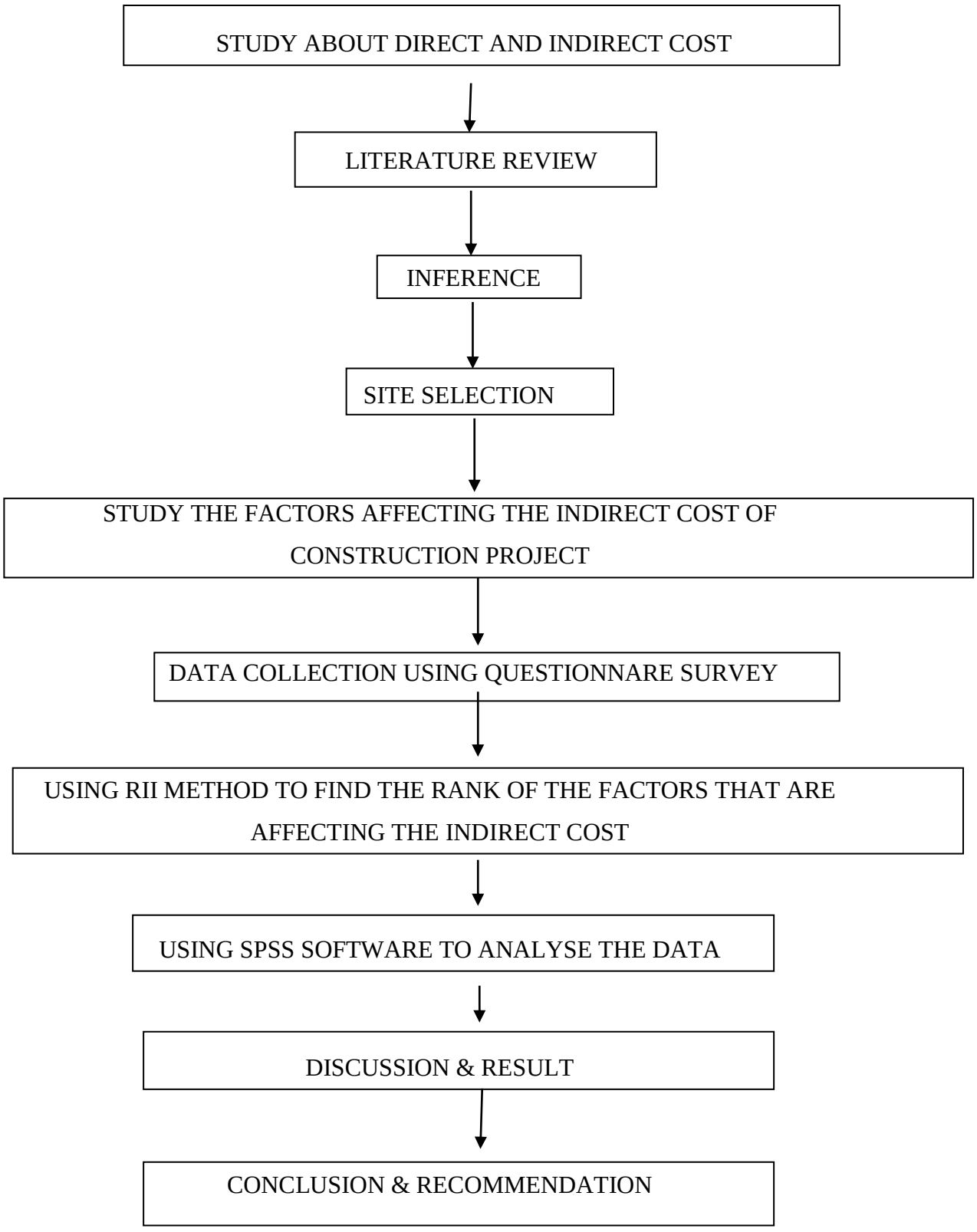


Figure- (Google image of the site)

Experion Capital at new High court near Indiragandhi Pratishthan, Lucknow.

Questionnaire Survey

S.no	Questions	Practically ignored (1)	Does not affects (2)	Moderately affects (3)	Highly affects (4)	Weighting	R.I INDEX	Rank
1	**How much the transportation cost affects the Indirect Cost in real Estate sector**							
2	**How much the size and types of construction projection affects the Indirect Cost in real Estate sector**							

3	**How much the Time duration of project affects the Indirect Cost in real Estate sector**							
4	**How much the project schedule affects the Indirect Cost in real Estate sector**							
5	**How much the Locations and site conditions affects the Indirect Cost in real Estate sector**							
6	**How much the project complexity affects the Indirect Cost in real Estate sector**							
7	**How much the selling and distribution affects the Indirect Cost in real Estate sector**							
8	**How much the exactness in supervision affects the Indirect Cost in real Estate sector**							
9	**How much the sub-contracted work affects the Indirect Cost in real Estate sector**							

10	**How much the advertisement cost affects the Indirect Cost in real Estate sector**							
11	**How much the client strictness affects the Indirect Cost in real Estate sector**							
12	**How much the Office cost affects the Indirect Cost in real Estate sector**							
13	**How much the Security cost affects the Indirect Cost in real Estate sector**							
14	**How much the quality plans and specific conditions affects the Indirect Cost in real Estate sector ?**							
15	**How much the Manager salary affects the Indirect Cost in real Estate sector**							

Relative Importance Index

In order to facilitate the study, after the literature review and the focus interviews, a plan was formulated for collecting field information and creating an evaluation process and numerical values Ranking of the various factors according to their significance, and calculating their Relative Importance Index (RII) [1], [2]. The Relative Importance Index (RII) was used to decide various professional's opinions of the RII in construction projects. RII is

$$\boldsymbol{RII} = (\boldsymbol{\Sigma W}/\boldsymbol{A}) \times \boldsymbol{N}$$

W is the weight given to each factor by the respondents and ranges from 1 to 4.

W ranges (1. Practically ignored 2. Does not affect it, 3. Moderately affects it, 4. Highly affects it) × Number of respondents for each degree

A is the highest weight = 4. N is the total number of respondents

S.no	Questions	Practically ignored (1)	Does not affects (2)	Moderately affects (3)	Highly affects (4)	Weighting	R.I INDEX	Rank
1	**How much the transportation cost affects the Indirect Cost in real Estate sector**	0	3	17	22	145	0.863	**1***
2	**How much the size and types of construction projection affects the Indirect Cost in real Estate sector**	0	5	17	20	141	0.839	**2***
3	**How much the Time duration of project affects the Indirect**	2	4	14	22	140	0.833	**3***

	Cost in real Estate sector							
4	**How much the project schedule affects the Indirect Cost in real Estate sector**	2	6	14	20	136	0.809	**4***
5	**How much the Locations and site conditions affects the Indirect Cost in real Estate sector**	3	4	18	17	133	0.791	**5***
6	**How much the project complexity affects the Indirect Cost in real Estate sector**	2	8	14	18	132	0.785	**6***
7	**How much the selling and distribution affects the Indirect Cost in real Estate sector**	3	4	19	16	132	0.785	**7***
8	**How much the exactness in supervision affects the Indirect Cost in real Estate sector**	4	7	13	18	129	0.767	**8***
9	**How much the sub-contracted work affects the Indirect Cost in real Estate sector**	7	1	19	15	126	0.750	**9***
10	**How much the advertisement cost affects the Indirect**	3	6	23	10	124	0.738	**10***

	Cost in real Estate sector							
11	**How much the client strictness affects the Indirect Cost in real Estate sector**	3	9	18	12	123	0.732	**11***
12	**How much the Office cost affects the Indirect Cost in real Estate sector**	2	11	18	11	122	0.726	**12***
13	**How much the Security cost affects the Indirect Cost in real Estate sector**	4	7	21	10	121	0.720	**13***
14	**How much the quality plans and specific conditions affects the Indirect Cost in real Estate sector ?**	4	6	24	8	120	0.714	**14***
15	**How much the Manager salary affects the Indirect Cost in real Estate sector**	3	12	17	10	118	0.702	**15***

CHAPTER-04

ANALYSIS & DISCUSSION

SPSS Analysis

SPSS Statistics are software system package used for statistics analysis. SPSS is among the foremost wide used programs for statistics analysis in scientific discipline. it's additionally employed by market researchers, health researchers, survey firms, government, education researchers, selling organizations, and others. the initial SPSS manual has been represented in concert of "sociology's most influential books" for permitting normal researchers to try and do their own statistical analysis .In addition to statistical analysis, knowledge management

4.1 Frequency Statistics:-

The Frequencies procedure provides statistics and graphical displays that are helpful for describing many sorts of variables. to make a table of frequencies (number of occurrences of given categories), by analyzing by suggests that of descriptive Statistics, the frequency within the needed variables would be calculated. Figure shows concerning choose the variables to be pictured within the frequency table by moving them from the left- to the right- hand box. SPSS provides the user further choices, as well as statistics, charts, and format.

Statistics

		Transportation	Size	Duration	Schedule	Location
N	Valid	42	42	42	42	42
	Missing	0	0	0	0	0

Table 4.1.1 Frequency statistics table of factors which affects cost control

Transportation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Does not affects	3	7.1	7.1	7.1
	Moderately affects	17	40.5	40.5	47.6

	Highly affects	22	52.4	52.4	100.0
	Total	42	100.0	100.0	

Table 4.1.2 Frequency statistics of transportation

Size

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Does not affects	5	11.9	11.9	11.9
	Moderately affects	17	40.5	40.5	52.4
	Highly affects	20	47.6	47.6	100.0
	Total	42	100.0	100.0	

Table 4.1.3 Frequency statistics of size

Duration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Practically ignored	2	4.8	4.8	4.8
	Does not affects	4	9.5	9.5	14.3
	Moderately affects	14	33.3	33.3	47.6
	Highly affects	22	52.4	52.4	100.0
	Total	42	100.0	100.0	

Table 4.1.4 Frequency statistics of duration

Schedule

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Practically ignored	2	4.8	4.8	4.8
	Does not affects	6	14.3	14.3	19.0
	Moderately affects	14	33.3	33.3	52.4
	Highly affects	20	47.6	47.6	100.0
	Total	42	100.0	100.0	

Table 4.1.5 Frequency statistics of schedule

Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Practically ignored	3	7.1	7.1	7.1
	Does not affects	4	9.5	9.5	16.7
	Moderately affects	18	42.9	42.9	59.5
	Highly affects	17	40.5	40.5	100.0
	Total	42	100.0	100.0	

Table 4.1.6 Frequency statistics of location

4.2 Pie Chart- A Pie Chart is a type of graph that displays data in a circular graph. The pieces of the graph are proportional to the fraction of the whole in each category. In other words, each slice of the pie is relative to the size of that category in the group as a whole. The entire "pie" represents 100 percent of a whole, while the pie "slices" represent portions of the whole. Pie charts are generally used to show percentage or proportional data and usually the percentage represented by each category is provided next to the corresponding slice of pie. Pie charts are good for displaying data for around 6 categories or fewer.

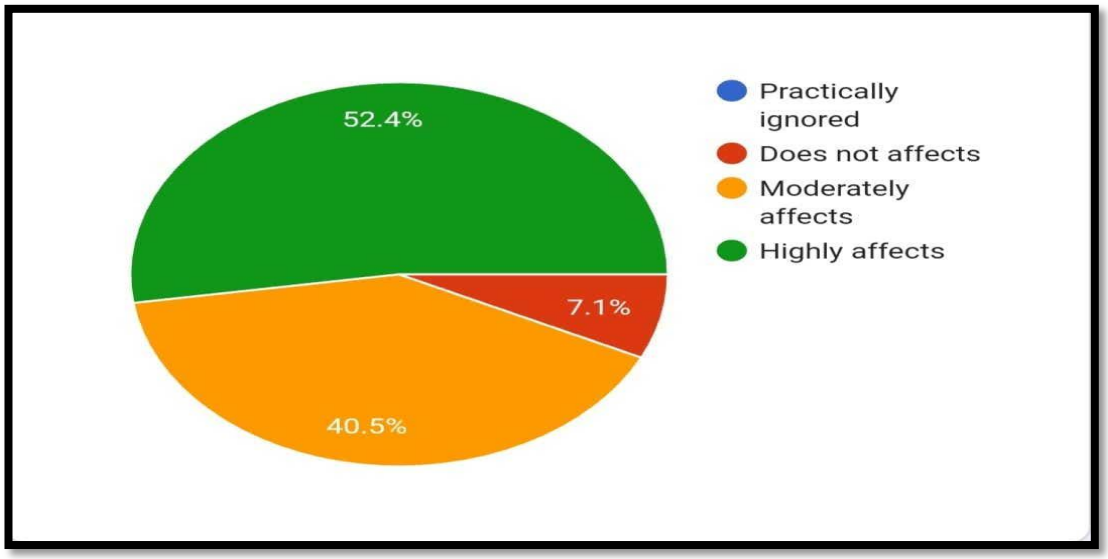


Fig 4.2.1 Pie-chart representing the contribution of transportation cost on a single project

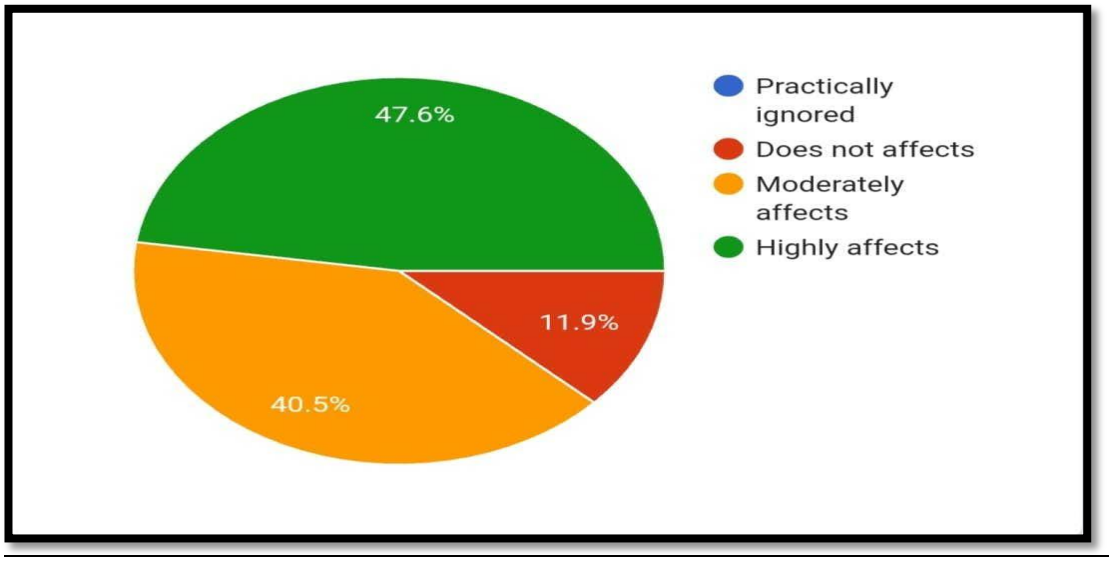


Fig 4.2.2 Pie-chart representing the contribution towards size & type of construction

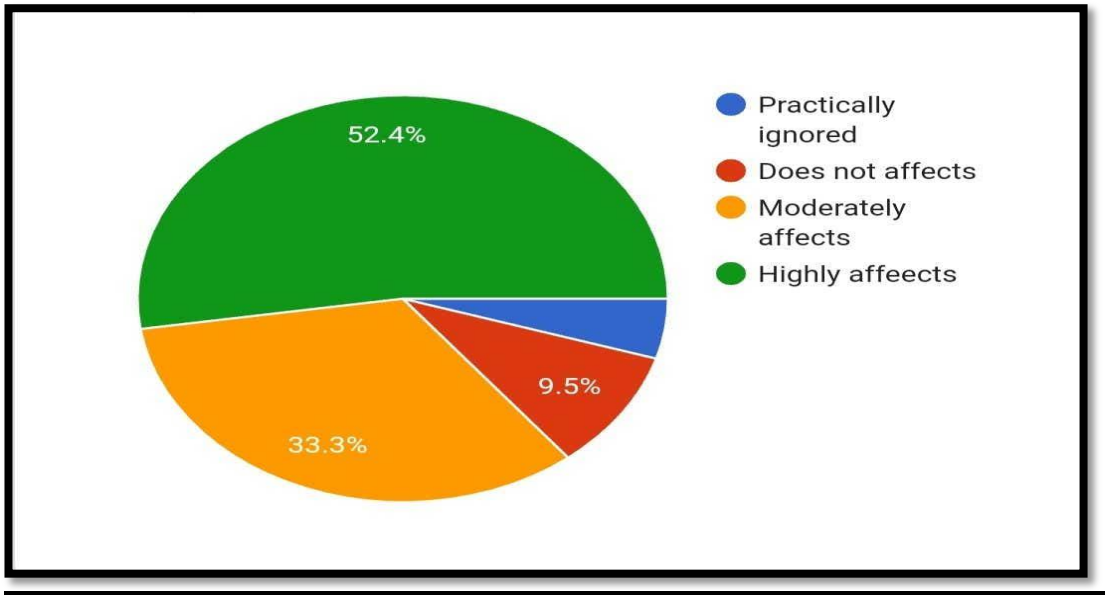


Fig 4.2.3 Pie-chart representing the contribution towards project duration

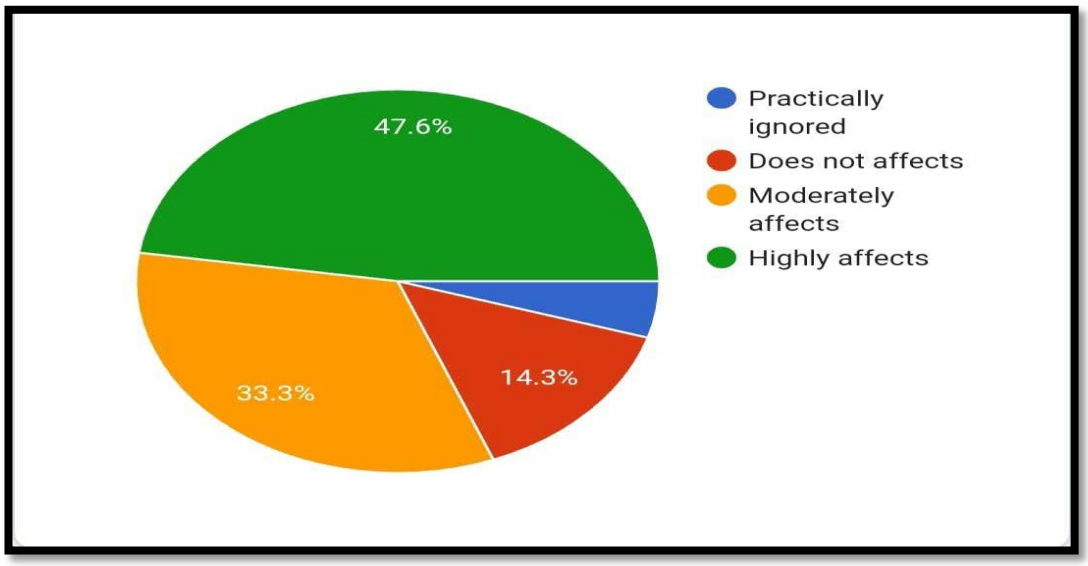


Fig 4.2.4 Pie-chart the represent the contribution people towards schedule management as an indirect cost

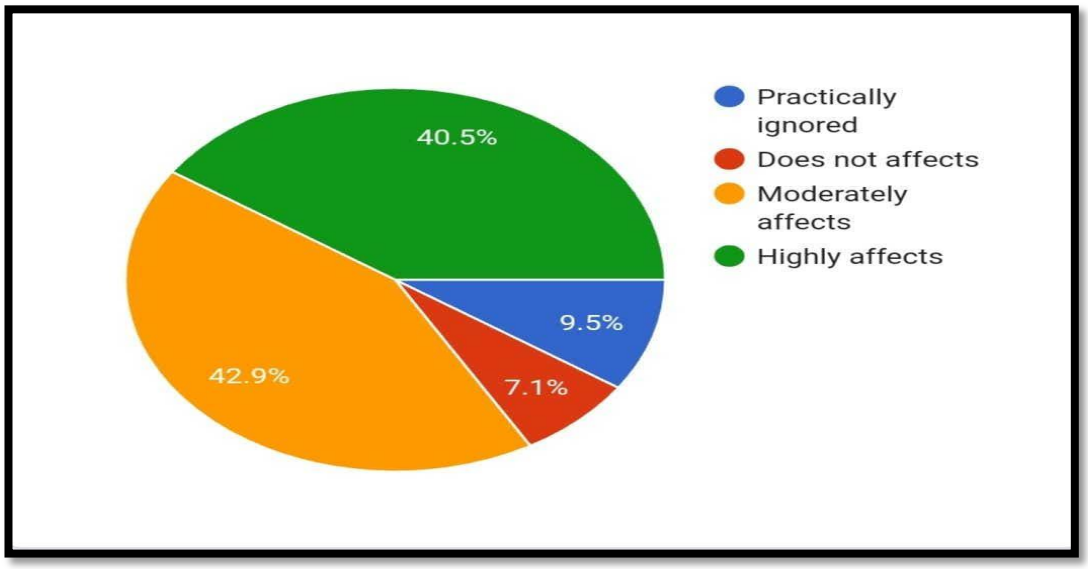


Fig 4.2.5 Pie-chart representing the contribution towards project duration

4.3 Histogram : It was introduced by Karl Pearson. A histogram is an appropriate representation of distribution of numerical data. A frequency distribution shows how often each different value in a set of data occurs. A histogram is the most commonly used graph to show the frequency distributions. It looks very much like a bar chart, but there are important difference between them

- On the vertical axis, place frequencies. Label this axis " Frequency"
- On the horizontal axis, place the lower value of each interval.
- Draw a bar extending from the lower value of each interval to the lower value of the next interval

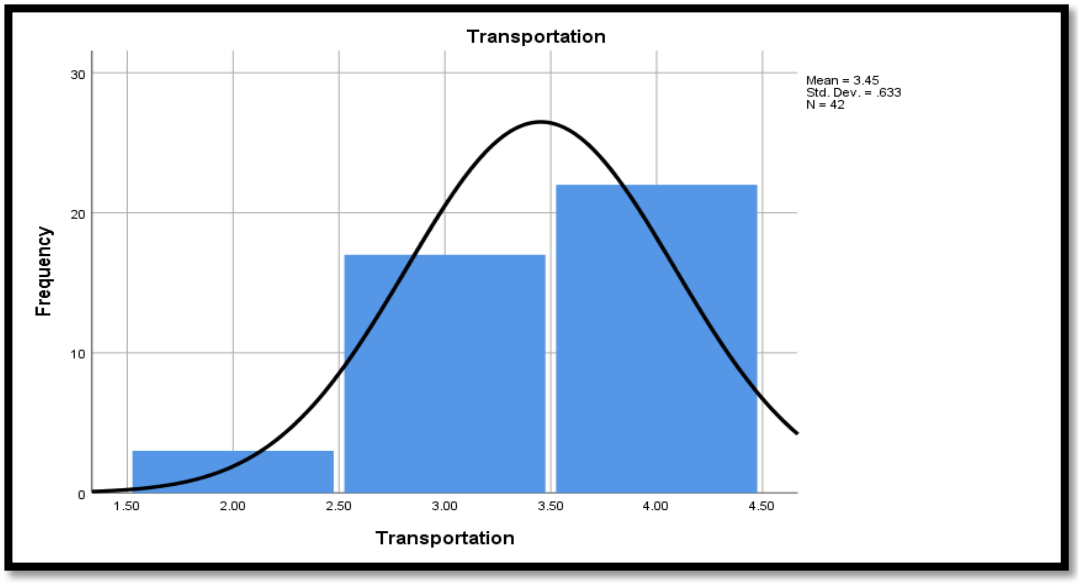


Fig 4.3.1 Histogram represent the effect of Transportation cost

In this Histogram :-

1. The center of the data (mean) is 3.45 (average value of all the responses occurs) .
2. The spread out of data is not perfectly normally distributed.
3. The maximum value of response for the data 22.

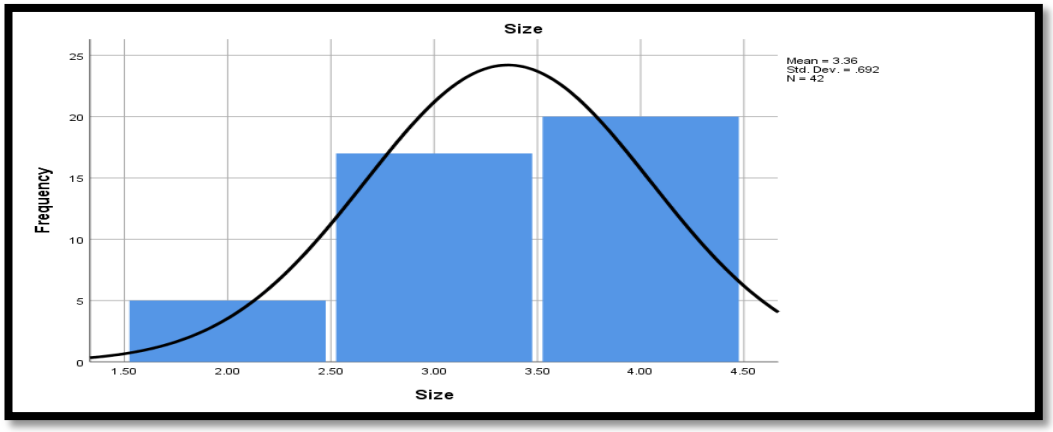


Fig 4.3.2 Histogram represent the effect of size and type of Construction

In this Histogram :-

1. The center of the data (mean) is 3.36 (average value of all the responses occurs) .
2. The spread out of data is not perfectly normally distributed.
3. The maximum value of response for the data 20.

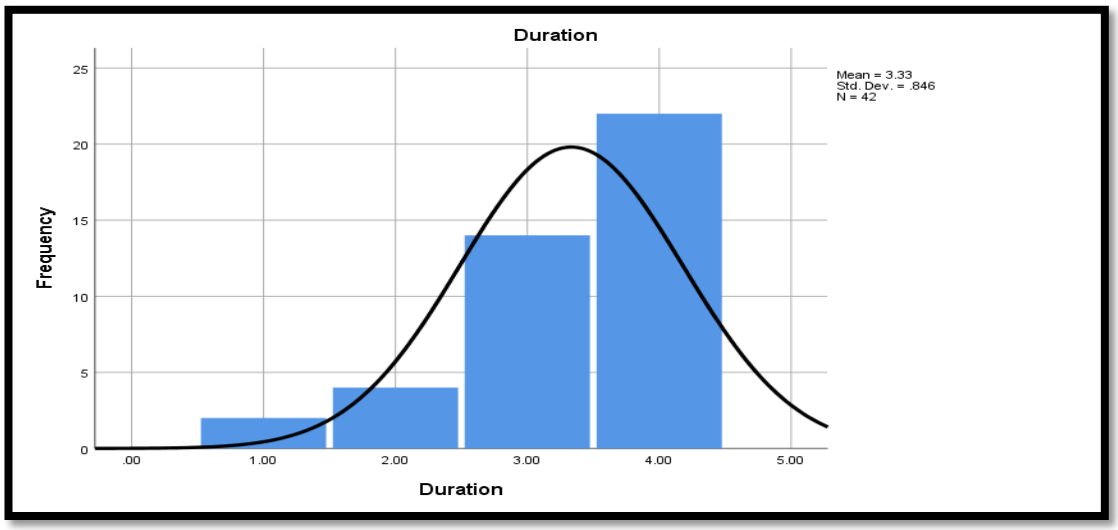


Fig 4.3.3 Histogram represent the effect of time duration of projects

In this Histogram :-

1. The center of the data (mean) is 3.33 (average value of all the responses occurs) .
2. The spread out of data is perfectly normally distributed.
3. The maximum value of response for the data 22.

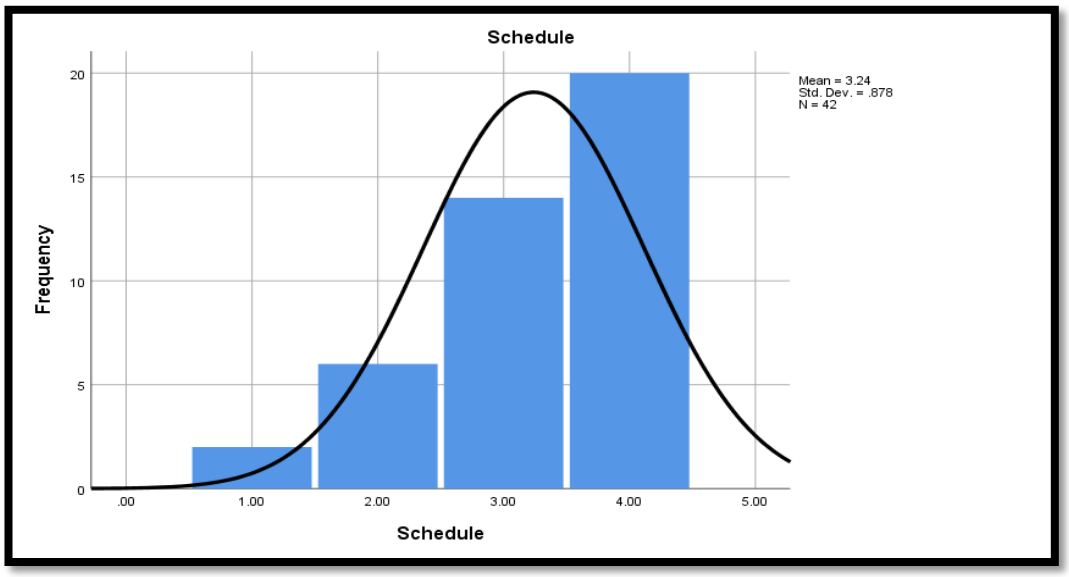


Fig 4.3.4 Histogram represent the effect of project schedule

In this Histogram :-

1. The center of the data (mean) is 3.24 (average value of all the responses occurs) .
2. The spread out of data is perfectly normally distributed.
3. The maximum value of response for the data 20.

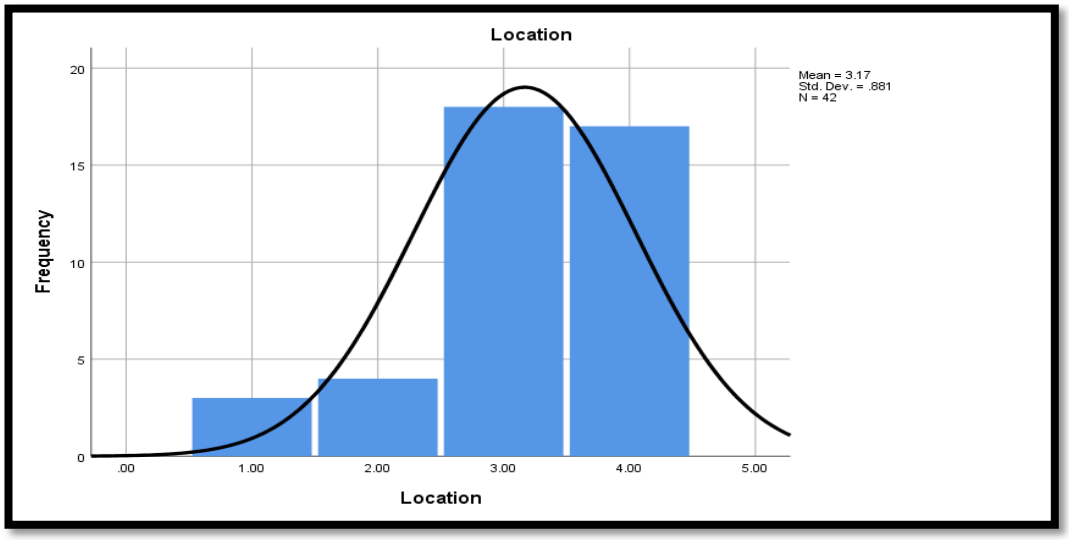


Fig 4.3.5 Histogram represent the effect of Location and Site Condition

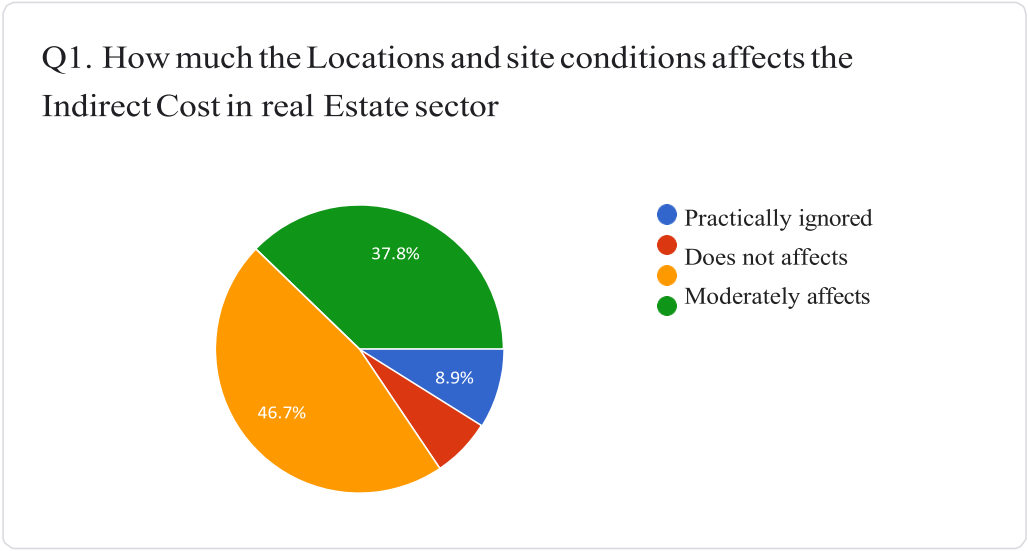
In this Histogram :-

1. The center of the data (mean) is 3.17(average value of all the responses occurs) .
2. The spread out of data is perfectly normally distributed.
3. The maximum value of response for the data 17.

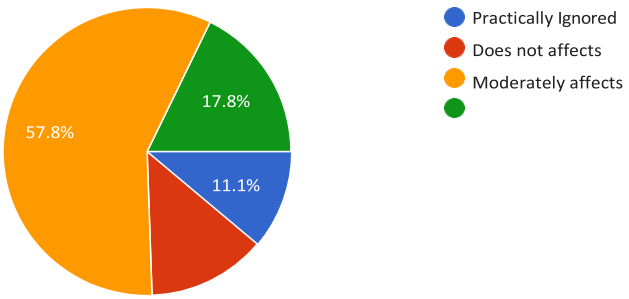
Discussion :- According to this research we can conclude that following are the main factors that are affecting Indirect Cost which are need to be discuss:

1. Transportation cost
2. Size and types of construction
3. Time duration of project
4. Project schedule
5. Location and site condition

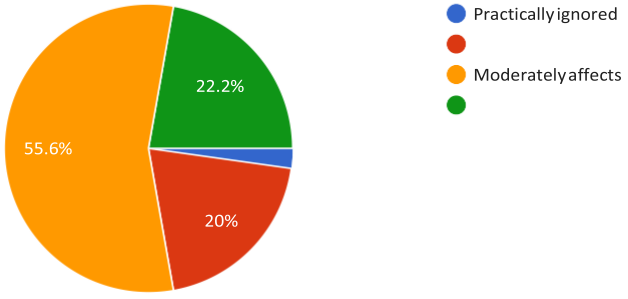
4.4 Questionnaire survey sample & responses



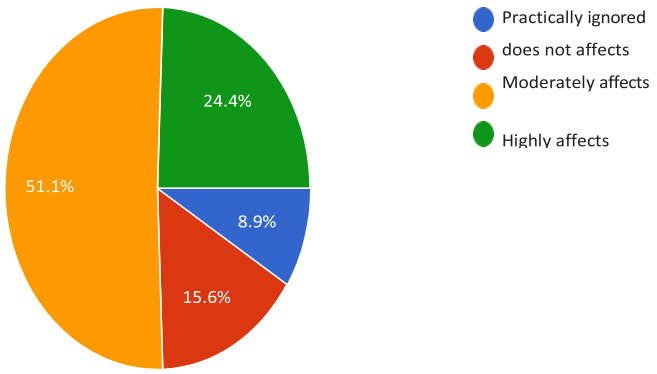
Q2.How much the quality plans and specific conditions affects the Indirect Cost in real Estate sector ?



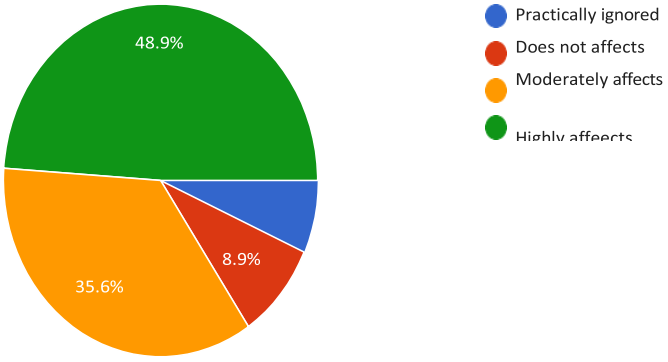
Q3.How much the advertisement cost affects the Indirect Cost in real Estate sector?



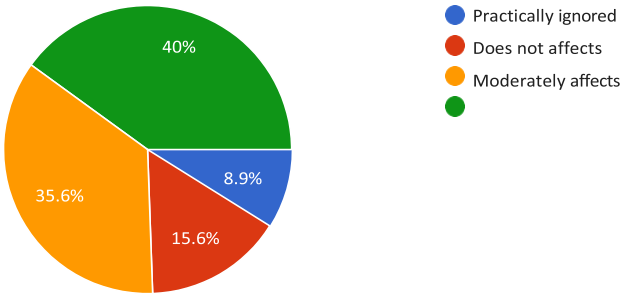
Q4.How much the Security cost affects the Indirect Cost in real Estate sector?



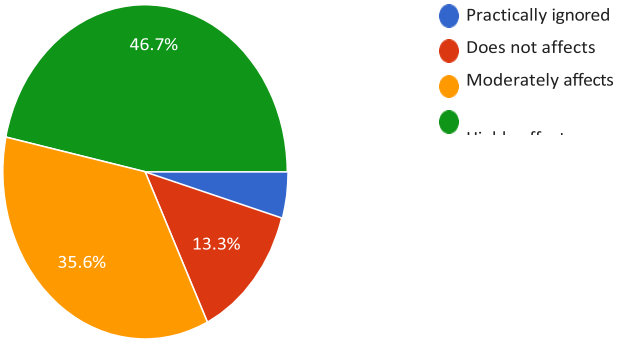
Q5.How much the Time duration of project affects the Indirect Cost in real Estate sector?



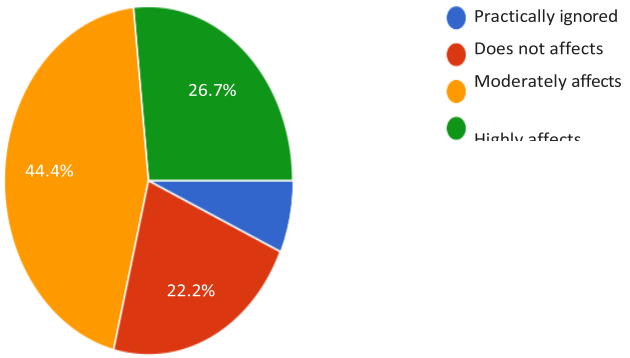
Q6.How much the exactness in supervision affects the Indirect Cost in real Estate sector?



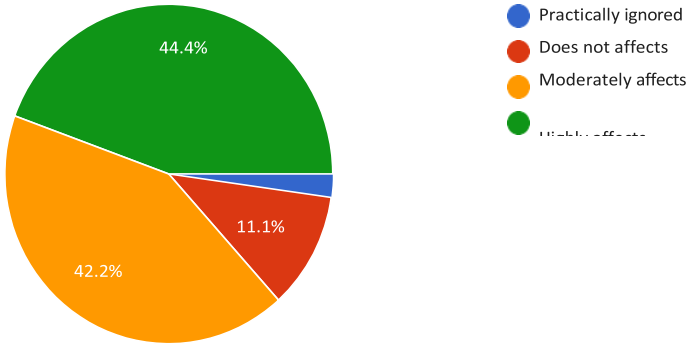
Q7.How much the project schedule affects the Indirect Cost in real Estate sector



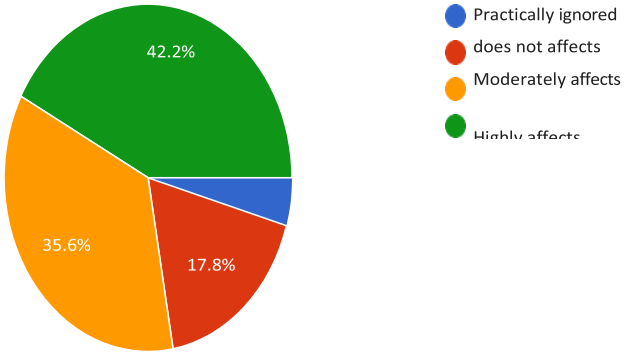
Q8.How much the client strictness affects the Indirect Cost in real Estate sector?



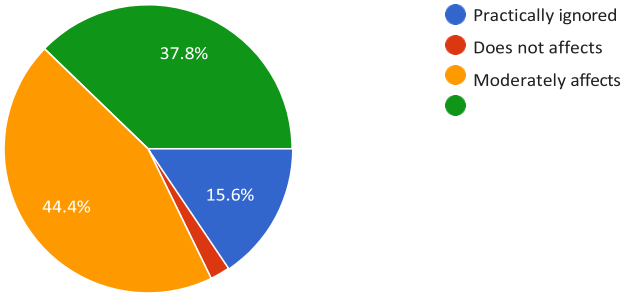
Q9.How much the size and types of construction projection affects the Indirect Cost in real Estate sector?



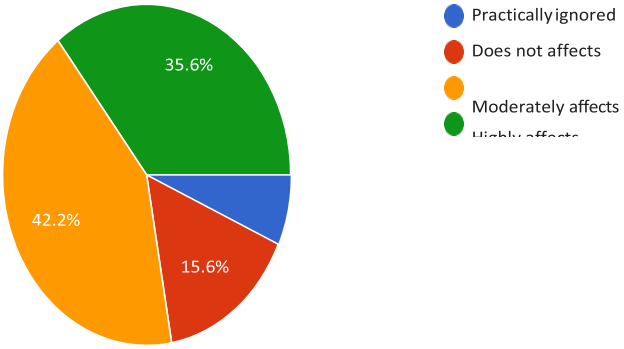
Q10.How much the project complexity affects the Indirect Cost in real Estate sector?



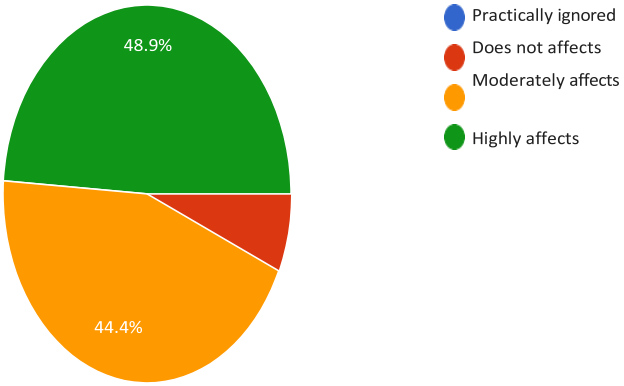
Q11.How much the sub-contracted work affects the Indirect Cost in real Estate sector?



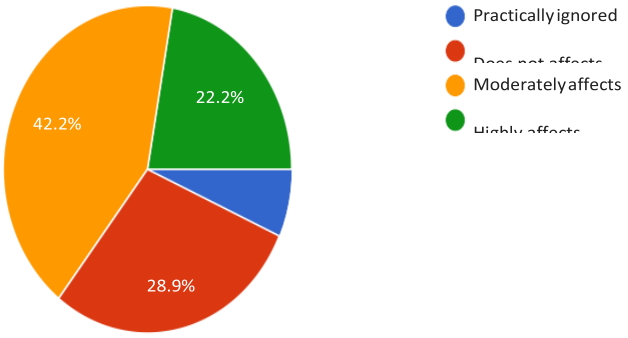
Q12.How much the selling and distribution affects the Indirect Cost in real Estate sector?



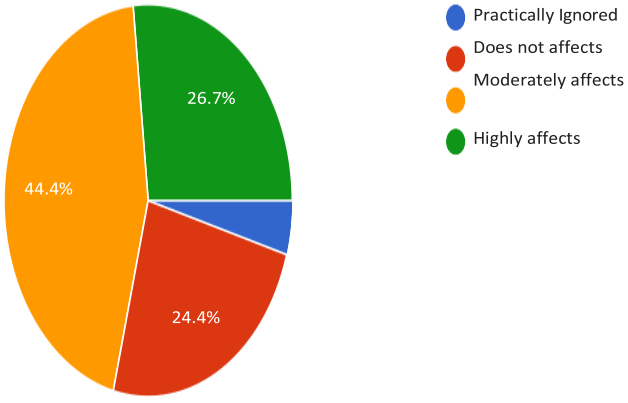
Q13.How much the transportation cost affects the Indirect Cost in real Estate sector?



Q14.How much the Manager salary affects the Indirect Cost in real Estate sector?



Q15.How much the Office cost affects the Indirect Cost in real Estate sector?



CHAPTER-05

RECOMMENDATION AND CONCLUSION

Recommendations:-

1.Transportation cost affect the Indirect cost

a) **Don't relay on single mode of transportation. Switch to alternative mode of transportation.**

The advantages of multimodal transportation are plenty. Companies and businesses use this mode of transport because it is a win-win for the carriers and the customers. Its simplicity in the contract and the cargo flexibility makes it the most efficient among businesses. If we use single mode of transportation the fuel consumption and other charges will increase and it almost saves 10% to 15%(percentage is based on the site survey carried out in this study).

b) Consider warehousing services. Provide warehouses near the customer's (market) to avoid long distance transportation every time.

warehousing firms generally offer essential services to businesses that deliver physical goods to consumers. Some of these services include transloading, order fulfillment, inventory control, cross docking, and transport**.**

A warehouse is great for storing surplus goods, which customers and clients don't need immediately. Most companies usually produce goods in anticipation of demand. This means they'll need adequate storage for their surplus goods until their customers and clients start putting in orders. When the warehouse is near the customer's it saves 7% to 10% cost (percentage is based on the site survey carried out in this study).

c) use automatic container loading and unloading system to reduce labor costs.

- Eliminates the expense of running a forklift fleet. ...
- Optimizes human resources and reduces labor costs. ...

- Improves workplace safety.
- It saves time and provides services quickly.
- It saves 5% to 7% of cost (percentage is based on the site survey carried out in this study).

d) Make better use of available storage space and increase the storage density.

- The Starting Point. Quantify your storage profile in terms of capacity and utilization.
- Use Your Vertical Space.
- Analyze Your Department Space.
- Consolidate Locations.
- Right-Size Your Slots.
- Use Off-Site Location for Overstock.
- When the storage is good enough, it saves 12% to 17% of the total cost (percentage is based on the site survey carried out in this study).

2. Size and type of project affects the indirect cost

a) Worker should be hired as per the requirement of the project. Excess worker unnecessarily increased the indirect cost of the project.

The successful completion of a construction project is reliant on the right workers, but it is rare for a construction business to have all the required staff (in numbers or skills) on hand. This is where labour hire comes in to play. Outsourcing the recruitment of temporary construction workers makes good business sense, and can provide you with the right mix of long or short-term employees to get your construction project completed on time and to budget.

So, if the workers are hired in a construction project as per need then it saves 5% to 7% of the total cost of the labour (percentage is based on the site survey carried out in this study).

b) Adopt well suited types of project with proper planning.

- Clear objectives. Knowing what you plan to achieve greatly increases the likelihood that you will actually do it.
- Better chances of hitting milestones.
- Risk assessment.
- More efficient resource allocation.
- Identifying task dependencies.
- Communication.

If the project is planned well with all dimensions then it helps to accomplish the work within time and in a proper way, and it saves 13% to 17% of the project work (percentage is based on the site survey carried out in this study).

c) Machine use Optimization should be followed

Proper use of appropriate equipment contributes to Economy, Quality, Safety, Speed and Timely completion of the Project. Construction equipment is an important part of any construction process. It saves 6% to 9% of the work (percentage is based on the site survey carried out in this study).

d) Try to keep the size of the project compact, as much as possible.

When the size of the project is compacted it helps to accomplish the work within time and within the agreement is signed by the both party. It saves 6% to 11% of the work (percentage is based on the site survey carried out in this study).

3. Time duration of project affects the indirect cost.

a) Reduce the lag time between the tasks if the critical path of the project schedule contains lag time.

A lag time is the amount of time whereby a successor activity is required to be delayed with respect to a predecessor activity. Lag Time play an important role in developing the schedule baseline. Lag can be used in any type of dependency in a network diagram. They are very helpful and offer project managers flexibility in schedule development. When it fails to complete the work within the time it makes losses of 4% to 5% (percentage is based on the site survey carried out in this study).

b) Speed up the project by performing the task concurrently, if possible instead of running them in sequence.

When the project is performing concurrently instead of running in sequences we get 4% to 7% (percentage is based on the site survey carried out in this study) of the work saving the time, the main benefit of speeding the project is to save time and finish the work within time.

c) Use crashing technique in which, additional money is spent to reduce duration. This technique should be only adopted if the money spent is less than money saved by shortening the duration.

Crashing is the technique to use when fast tracking has not saved enough time on the schedule. It is a technique in which resources are added to the project for the least cost possible. Cost and schedule tradeoffs are analyzed to determine how to obtain the greatest amount of compression for the least incremental cost. In the project when the spent is less then money saved, in this situation time saving much priority compare to money. It saves 1% to 3% of the project (percentage is based on the site survey carried out in this study).

4. Project schedule affects the indirect cost.

a) A proper project schedule means skipping the unwanted time duration shortening the time duration of the project up to a possible extent.

- Identify & Meet with Stakeholders.
- Set & Prioritize Goals.
- Define Deliverables.
- Create the Project Schedule.
- Identify Issues and Complete a Risk Assessment.
- Present the Project Plan to Stakeholders.

When the project is well scheduled it provide 10% to 15% benefit (percentage is based on the site survey carried out in this study).

b) When resource do not materialize as planned and agreed, estimate the impact and communicate this to the management.

Cost estimation in project management is the process of forecasting the financial and other resources needed to complete a project within a defined scope. Cost estimation accounts for each element required for the project—from materials to labor—and calculates a total amount that determines a project's budget. It saves 12% to 17% (percentage is based on the site survey carried out in this study).

c) When things go wrong analyze why, estimate the impact and communicate with stake holder and take action to bring the schedule accomplishment back within acceptable range.

Stakeholders need to see the bigger picture. To do that, project managers should clearly communicate the project drivers, purpose, and end goals. Sharing details about what prompted the project, how it helps the organization and the intended outcome helps stakeholders better understand the project's significance. It saves 5% to 7% of the project (percentage is based on the site survey carried out in this study).

d) Use Earned value Method as a tool to reduce the project schedule performance.

- Project Requirements.
- Work Breakdown Structure.
- Change Management Process.
- Correct Schedule and Budget.
- Schedule and Budget Contingency.

It saves 5% to 7% (percentage is based on the site survey carried out in this study) of the project if we use Earned value method as a tool.

5. Location and Site Condition affects Indirect Cost

a) Check the soil condition, land with poor soil condition should be avoided.

Soils can make or break construction projects. Engineers and soil scientists measure soil strength to see how easily a soil changes shape or shifts, to see whether it will bear the weight of structures. Watch out for soil texture and type of clay.

b) Best try to select the site without conflicting utilities infected materials or stream crossings.

- The soil of site should have good bearing capacity. ...
- The site should be on elevated ground. It should have slope towards Front Street to afford good facility of drainage.
- Sites nearer to ponds ,pools of water, water logged areas must be avoided as they remain in damp condition .

c) Try to select a location that fulfills the need of the building users and accessible with city center if not necessary do not construct buildings in a very high value area.

Location selection of a building should be done based upon some surveys of various aspects of the site such as the development of the site, cost, the stability of the proposed structure, and type of construction project, for example industrial, commercial or residential building.

When the location and site condition is favorable it saves 5% to 7% (percentage is based on the site survey carried out in this study) cost of the project.

CONCLUSION

- This research has been associated with the effective application of cost control management and budget analysis with the help of proper adjustment and association of strategic cost control. The industry under consideration here is the real estate industry mainly operating on the construction and promoting business. This research has been associated with proper discussion and appropriate presentation of the use of cost optimization technique to associate with lesser cost for certain aspects within a project structure. The valid analysis and management has been implemented with the help of proper determination and justification of the systems through operational analysis and management through experimental procedure.
- Success of any construction project strongly depend on the effective utilization of cash flow indirect cost management to complete project in scheduled time frame with required quality norms in optimized cost.

- One of the most important aspect of any business is inventory management. Those who have never worked in the business sector may no the understand importance of efficient inventory management.
- This research has been associated with proper discussion and appropriate presentation of the use of cost benefit analysis to associate with lesser cost for certain aspects within a project structure. The valid analysis and management has been implemented with the help of proper determination and justification of the systems through operational analysis and management through experimental procedure.
- This research has found out that there are five main factors that affecting the Indirect cost of the construction in real state sector which are as follows :-

1. Transportation cost
2. Size and types of construction
3. Time duration of project
4. Project schedule
5. Location and site condition

- The specific recommendation can be associated with the proper analysis and determination of the systems through operational structure and strategic growth of cost-effective systems through relevant use of proper theoretical tool under application. The structural management and implementation of the analytical specifics have to be associated with deterministic growth and application of the necessary adjectives of governance.
- A questionnaire survey was prepared for the data collection
- For data analysis I have used Relative Importance Index method .
- For the statistical analysis I have used SPSS software.

REFERENCES

[1] Jorge Abeid,Erez N.Allouche, September (2003), "*A computer-based monitoring for cost control system applied to project management. Automation in construction".*

[2] Jorge Abeid,Erez N.Allouche, September (2003), "*A computer-based monitoring for cost control system applied to project management. Automation in construction".*

[3] Muhd.Zaimi Abd Majid, Mushairry Mustaffar (2006), " *Systematic approach for monitoring and Evaluating the construction project progress*" TIEM (Vol.67, No.3, September 2006).

[4] Rob Bryer (2006), "*Accounting and control of the labour process",* Vol 17,Issues 5,July 2006.

[5] Rui Chen, Hailin Yuan (2010*),"Information management research on the cost control of real estate development projects",* 978-1-935068-18-1@2010.

[6] Yakubu Adisa Olawele (2010), "*Cost and time control of construction projects: inhibiting factors and mitigating measures in practice".*

[7] Mohd Faris Khamidi, Waris Ali Khan, (2011),"*The cost monitoring of construction projects through earned value analysis".* IPEDR Vol.4(2011)

[8] Zhang TieShan, Song Hui, May (2011), *" Study of residential project cost control based on value engineering*".

[9] C.I. Anyanwu, (2013), *"Project Cost Control in the Nigerian Construction Industry*" ISSN:2319-6734, Vol 2,December 2013.

[10] Xiang Mei Yu, Zhen Bin Xie (2013), *" Research on Construction Cost Control of Contesable Measure Items*", August 2013.

[11] Prof. Dipak P. Patil, (2014), "*Study of Cost Control on Construction Project",* AERS/III/IV/SEPTEMBER 2014.

[12] Ye Wen (2014), "*Research on Cost Control of Construction Project Based on the Theory of Lean Construction and BIM",* OCTBJ,2014,8,382-388.

[13] Yakubu Olawale, Ming Sun(2014),"*Construction Project Control in the UK: Current Practice, Existing Problems and Recommendations for Future Improvement",* 2014,10.003.

[14] Urmila A Mahadik (2015*),"Cost Reduction in Construction Projects",* IJETMAS September 2015, Volume 3, Special Issue, ISSN 2349-4476.

[15] Jianqiang Tang, Maoping Zhang (2015), "*Research on Cost Management of Construction Project based on Activity-based Costing*", (CMIES2015).

[16] Anuranjan Kumar, Prof. (Dr.) Om Prakash Netula (2015), *"Cost Control in Construction Planning on Site"*, ISSN:2348-4098, Vol 3 Issue 6 2015.

[17] R. Jayaraman (2016), *"Project cost control: a new method to plan and control costs in large projects"* BPMJ 1247-1268,November 2016.

[18] Romel Solis Time(2017), *"Cost control in construction projects in southest Mexico",* October 2017.

[19] Nirosha Malkanthi (2017), *"Impact of Cost Control Techniques on Cost Overruns in Construction Projects"* Vol 1, No. 04, pp.[53-60],2017.

[20] JI Chao Wen (2017), *"Real Estate company project cost management responsibility system"* (ICHSSR 2017).

[21] T.G.K. Vasista (2017), *"Strategic cost management for Construction project success"* (CiVEJ) Vol4, March 2017.

[22] Manlian Ronald A. Simanjuntak, Agung (2018), "*Analysis of project cost management and the effect on cost overrun in construction projects*", Vol. 7 Issue 7, July 2018.

[23] Miss.Punam Bhimrao Kokate (2018), "*Cost control Technique for construction project",* ISSN:2395-0056, Vol: 05 Issue:06 |June 2018.

[24] AmanuelGirmaYismalet, Asst. Prof. Dixit Patel (2018), *"A critical literature review on improving project cost management practice and profitability of domestic contractors",* Vol.5 (ISS.1:January,2018 ISSN:2454-1907

[25] Qun Gao (2019), *"Research on Cost Control and Management of real estate project"* Vol.4, No. 12, December 2019.

[26] Akalya.K, Rex.L.K, Kamalnatrraj.D, *"Minimizing the Cost of Construction Materials through Optimization Techniques*", IOSRJEN ISSN (e):2250-3021,ISSN (p):2278-8719.