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Study and investigation of price variation in construction materials across Kerala

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ABSTRACT

The construction industry is one of the main sector that caters important ingredients for the development of an economy in a nation. It is creating large number of job opportunities, innovating ideas and knowledge. But due to hike in money value for materials causing delays in completion time of each project. There is some methodology which helps to predict the price escalation during planning stage. Construction materials and they are classified according to ABC classification. From the ABC classification we took seven materials that mostly affected the total cost of the project, the materials are cement, steel, fine aggregate, coarse aggregate, brick, flooring tile and wood. Then found out the past unit price (MRP) history for 10 years. For this we have chosen few companies randomly from districts in Kerala and captured data and founded their price fluctuation in each materials as well as their weightage of each year. After that with the help of SPSS (statistical package for the social sciences tool) forecasting tool we predicted the price from the year 2020 to 2025 by considering the maximum upper confidence limit price for each material. The price of considered material have a price hike in between 0% to 15% from 2010 to 2019 excluding the flooring tile as it have a price drop of 1% to 4% in five different districts in Kerala. From the prediction we have concluded that all the materials have a price hike of 1% to 4% but the tiles have a drop of 1% to 2%. It is because of the maximum upper confidence limit price. Finally the construction materials are prepared according to their percentage contribution to the total cost of project different years

Index terms: Variation of construction materials, ABC analysis, GDP analysis, Cost benefit analysis, Analysis of material value for past and upcoming year

INTRODUCTION

The construction industry is one of the main sectors that provide important ingredient for the development of an economy. A typical construction project suffers from high raise in materials price and get associated with schedule delays and time-based disputes, since time is the main factor of the essence of the construction contract. Many projects experience extensive delays and thereby exceed initial time and cost estimates even after with the introduction of

advanced construction technologies and more effective management techniques in our country. Construction delays are considered to be one of project success in term of time, cost, quality, and safety. More over each construction material price is going up to mark by each quarter of a year. The biggest driver of the overall increase was the cost of energy, as the price of crude petroleum rose 71.9 percent in June; material costs themselves didn't move too much in that same time, apart from softwood lumber, the price of which rose 11

percent. It's important to place these numbers in context, however. Material costs are on the whole 3.4 percent lower than they were in June of 2019, most likely due to the near-simultaneous closures of construction sites around the world. While escalation incorporates general expansion identified with the cash supply, it is likewise determined by changes in innovation, rehearses, and especially flexibly and request awkward nature that are explicit to a decent or administration in a given economy. For instance, while general swelling in the US was under 5% in the 2003-2007 timeframe, steel costs expanded by over half as a result of flexibly request lopsidedness. Cost escalation may add to the task cost overwhelm.

AIMS AND OBJECTIVES

The main aim of the project is to identify the cost variation among building materials using for construction purpose (major influencers) using different statical analysis and direct interactions from engineers and contractors in state Kerala.

- To identify the major cause of constructions materials price variation.
- Solutions to rectify or to overcome materials price
- To evaluate the causative factor by statistical data evaluation.

EFFECT OF PRICE

As per the observing conditions we have to point out that a common man or lay man is directly affected by the price variation of building materials. Although project completion time starting another work design of the structure quality of the construction are inter related and these are the integrated part of the construction industry. Workers will not get regular payment and if projects are not taking on time it will affect real estate area too and all are indirectly affected.

MATERIAL PRICES FLUCTUATE

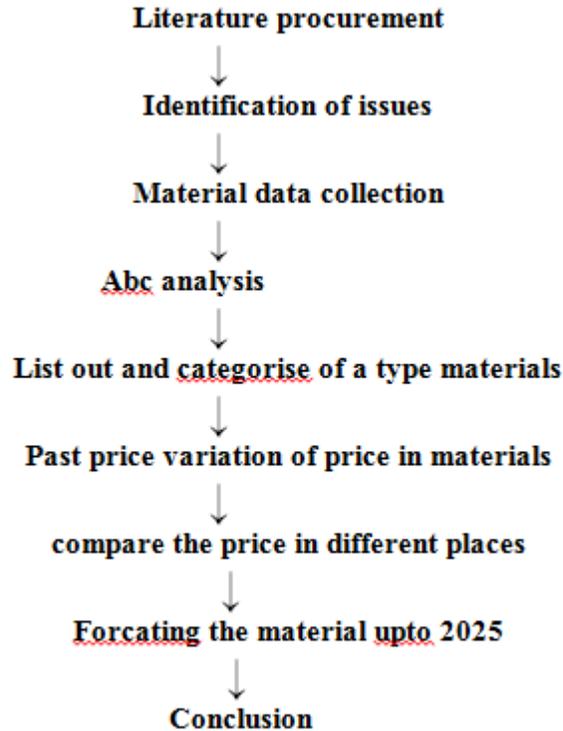
As referenced, regular material costs can vary because of cataclysmic events and increased development movement. One fundamental purpose behind the yearly ascent remembers an expansion for vitality and raw petroleum costs. For instance, raw petroleum is a key segment of black-top, expanded by 12% in 2017 to a \$54.14 barrel. The exchange circumstance including taxes on materials including steel and aluminum additionally made vulnerability in the commercial center. However the development organizations must have materials to finish ventures. It is absolutely impossible around this reality.

Generally, rising material expenses are out of our control. The main arrangement that development organizations have available to them is to discover more astute approaches to oversee materials. By fixing the belt on development waste and wasteful aspects, development supervisors can all the more likely equalization the financial plan for materials.

So as to work all the more effectively and lessen squander, development organizations ought to think about grasping construction. The utilization of generally sourced development materials brings about a great deal of waste. When utilizing a pre- assembled segment for working, there will be no loss as the material is planned offsite by a different organization. Structures are deliberately planned ahead of time so you just what is required is bought and utilized.

METHODOLOGY

The methodology selected for this research paper is identification survey. The form is made contains different factors which cause the delay in variation in construction materials on basis of detailed literature survey and data analysis



DATA COLLECTION & ANALYSIS

For this project, we need a huge data to analyze the price fluctuation of materials. From the state of Kerala, we took some of the provisions/districts to collect the data and from each provision, we took three companies

We collected all data of the project and verified all material price and quantity of these years. Then we found out the price fluctuation of the material throughout the project and verified the fluctuation of each item and found the reasons of the price fluctuations.

ABC ANALYSIS

'ABC' analysis is a basic and expository administration apparatus. 'ABC' analysis is a method of classifying material things as indicated by their generous effect on the general consumption of the organization. It allows an answer for defective material organization inside the bought items. It depends on the Pareto Principle which expresses that "80% of the general

utilization esteem depends on just 20% of total items". The breakdown proposes that the materials are of various qualities; thus it requires various strategies and the executive controls. The course of action of classifications depends on its foreseen esteem. 'ABC' analysis is a "material categorization technique" which involves the isolating things into three classifications, 'A', 'B' and 'C': 'A' contains the "most important items" and 'C' comprises the "least significant items", while 'B' contains items extending between 'A' and 'C'. It means to concentrate on the basic few ('A' - items) and not on the insignificant many ('C'- items). In this investigation, different items are recorded by their complete use; unit cost and afterward the all-out expense of items are determined. Various parameters are recorded in plain arrangement which makes it simple for grouping items as per their expense and use. This methodology expresses that, when investigating stock, items ought to be appraised among 'A' to 'C' by the firm, setting up its appraisals on the accompanying standards.

MATERIAL CLASSIFIED ACCORDING ABC

Classification

'ABC' characterization is a positioning framework for recognizing and gathering things as far as how helpful they are for accomplishing business objectives. The framework requires gathering things into three classes: 'A' - critical, 'B' - respectably significant, 'C' - generally unimportant. 'A' items – 10% of the items represents 70% of the yearly utilization estimation of the items. 'B' items – 20% of the items represents 20% of the yearly utilization estimation of the items. 'C' items – 70% of the items represents 10% of the yearly utilization estimation of the items.

A-CLASS MATERIAL CONSIDERED

From above 'ABC' classification we considered the 'A'-class material for the study for the future

prediction of price and study the fluctuation of the material from 2010 to 2019. 'A' contains the “most valuable items”. 'A'-items have the “highest annual consumption value” of goods i.e. 70%-80% of the annual consumption value of the company. Ironically, it accounts only 10%-20% of the total material items. They require stringent material control, more protected storage areas and improved sales forecasts, re-orders should be frequent, with weekly or even daily reorder; avoiding stock-outs on 'A'-items is a priority.

MATERIAL WEIGHTAGE

The weightage is for understanding the different between each year; the material price fluctuation is increased or decreased according to year.

Weightage calculation in percentage= (A-B)/(A)*100

'A'=Material cost of this year

'B'=Material cost of last year

Table -1: Material details

A class Materials	Brand	Remarks
Cement	BHARATHI	According to shop or distributor
TMT Steel	TATA Steel	According to shop or distributor
Fine aggregate	Available quarries	Available according to place or local market
Coarse aggregate	Available quarries	Available according to place or local market
Brick	A class (19*9*9cm)	Local vendors
Tile	Croma ceramic (30*30cm)	According to shop or distributor
Wood	Teak wood	Local vendors

Table -2: ABC Classification of materials

Rank	Resources	Cost	Contribution of % of Resource	category	Classification
1	Cement	261200	14.8		
2	Fine aggregate	204500	11.8	70.3	A class
3	Wood	196700	11.3		
4	Tile	165200	9.5		
5	Brick	159500	9.1		
6	TMT Steel	135850	7.9		
7	Roofing sheet	103700	5.9		
8	Epoxy	90000	5.2		
9	Waterproofing	82500	4.7		
10	Painting	80200	4.6		
11	Wire	65000	3.7		
12	Industrial Work	58200	3.3	91.9	B class
13	Coarse aggregate	50100	2.9		
14	Glass	48200	2.8		
15	Admixture	12000	0.7		
16	Pipe	9600	0.6		
17	Hinges	6300	0.4		
18	MS flat	6150	0.4		
19	Stone cladding tile	6000	0.3		
20	Tower bolt	3150	0.2	100	C class
21	Nails	500	0.1		

RESULT AND DISCUSSION

The study conducted in the research was 'A'-class building materials, and these materials are used for construction work from the starting to the end. Building materials are the basic construction products such as cement steel, fine aggregate, coarse aggregate, brick, tile and wood. Increase in price of building material has become a common trend in Kerala. Recently a number of developing cities are experiencing the problem with the prices increment of building materials.

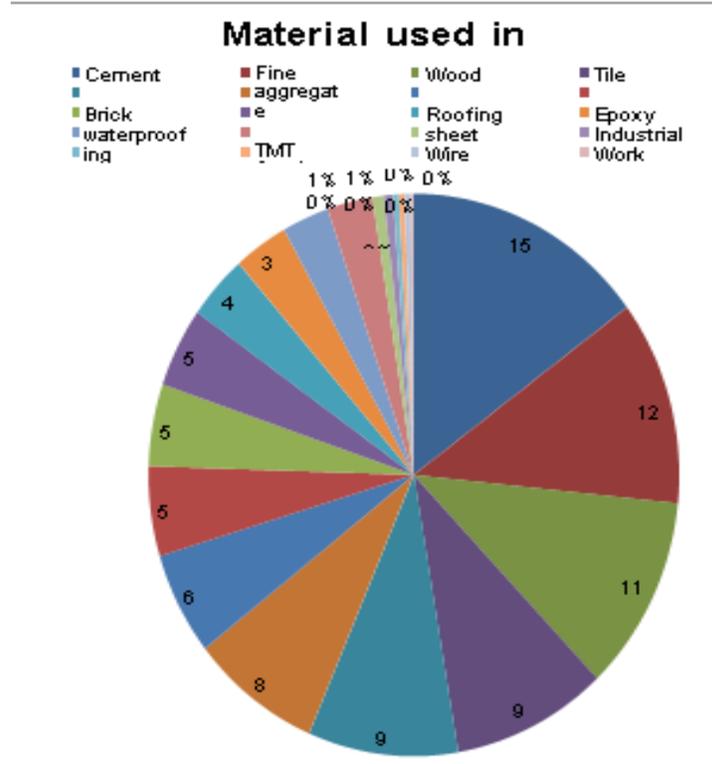
DAILY PROGRESS REPORT

The aim of this research is to study about the price fluctuation of building materials and prediction of their price in future. The major factors that greatly effect on the market price of the materials are increasing transportation charges,

electricity charges, labor cost charges, equipment charges, material charges, local service taxes, demand for residential building, power cuts and natural calamities like flood, earthquake etc. The study conclude that the material price only be increasing as it cannot be controlled due to the rising labour charges, high taxes and increasing electricity bills.

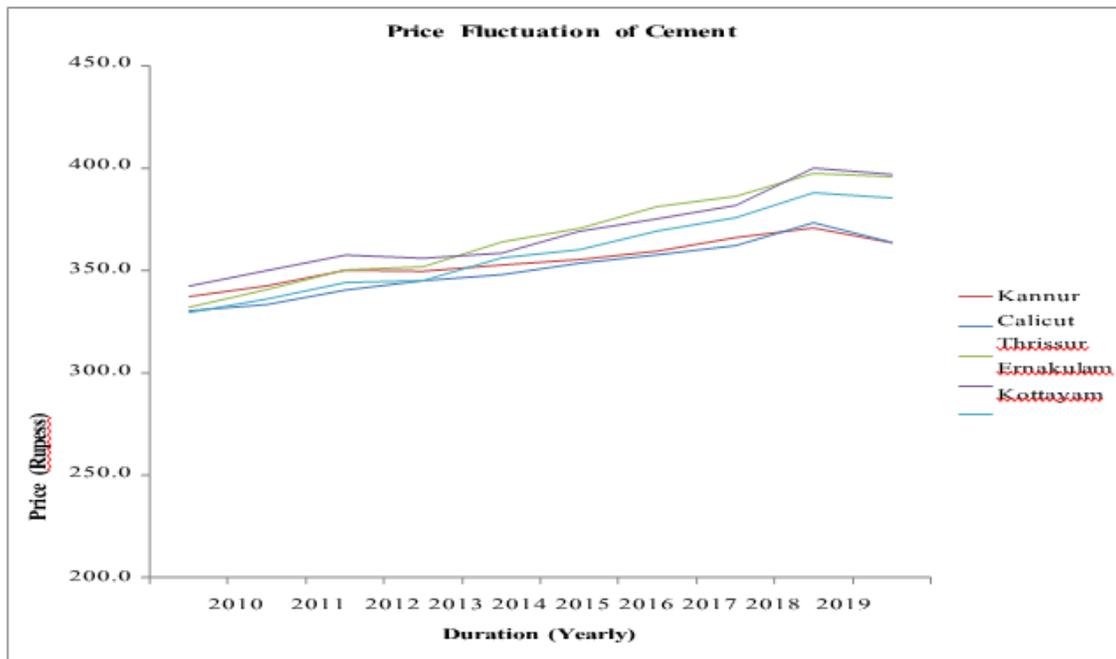
PRICE VARIATION OF MATERIALS 2010 TO 2019

From the above data collections from different companies in different places from Kerala, we get the price fluctuation from 2010 to 2019 for 'A'-class materials. According to that we made a graph, in the graph 'x'- axis is the duration in years and 'y'- axis is the price in rupees of the material for each unit price.

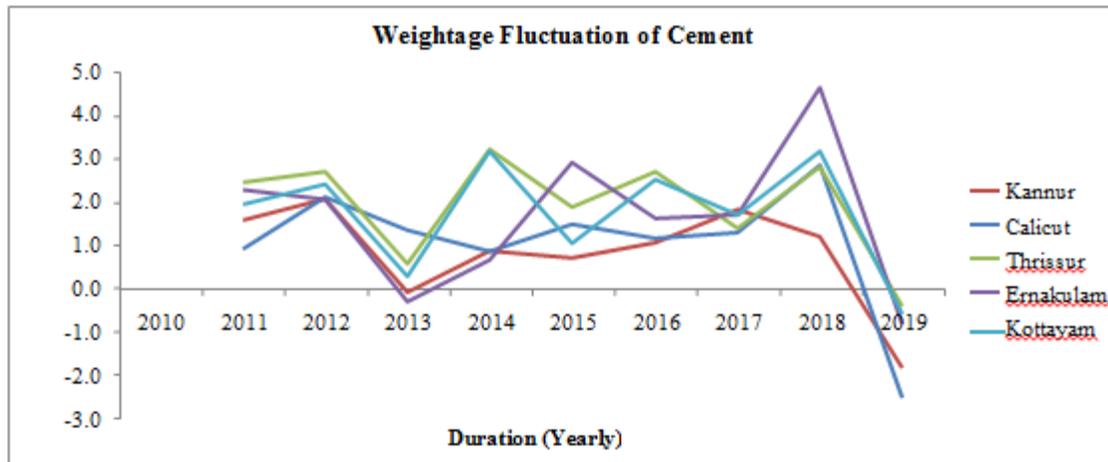


Materials used by percentage for a even project in Kerala, Kottayam, Ernakulam and Thrissur are affected by the most natural calamities. Kannur and Calicut shows only a little hike compared to other districts due to the high availability of materials.

Coarse aggregate is available according to the places, Kannur have many quarry as compared to the other districts. Their availability also depends on the natural calamities.



Here this an example for price variation and future forecast among a building material (cement)



Here we can see the variation and weightage graph for specified building material cement

Prediction of material price from 2020 to 2025

Using SPSS (Statistical Package for the Social Sciences) forecasting tool. The above data collections from different companies in different places of Kerala. We get the price fluctuation from 2010 to 2019 for 'A'-class materials. Using the data, we will forecast the price for the future. In the 'SPSS' forecasting tool, we consider the maximum upper confidence limit price for each material because in Kerala the material price fluctuation is always hiking day by day. The reason behind these importing of materials and frequently happening natural calamities, that's why we considered the upper confidence limit price. According to that, we made a graph, in the graph 'x'- axis is the duration in years and the 'y'-axis is the price in rupees of material for each unit price. We can see the price hike of each material in future years.

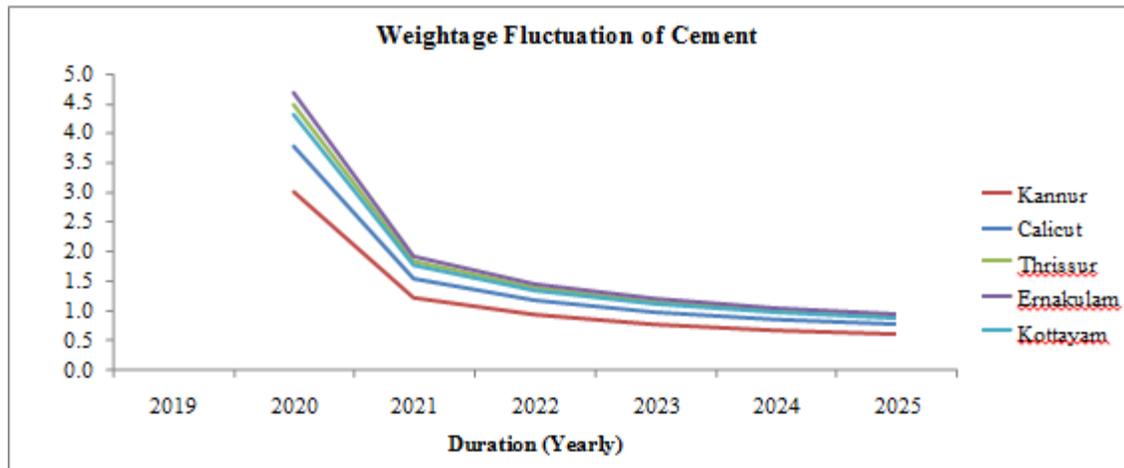
The weightage of the future material price for each year is also calculated according to equation(1). From the values we made a graph according to this, it will be positive when the material price increased for the coming-years or it will be negative when the material price decreased

for coming years. In the graph, the 'x'- axis is the duration in years and the 'y'-axis is the weightage in percentage.

Future Prediction of Cement

Cement bag price prediction from 2020 to 2025 in different places in Kerala. Mostly the transportation charges differ and the city priorities (city limit) effect the prediction of material price. So there is a price hike, each year the price will vary according to the materials. It's slightly increasing the price according to the confidence limit consideration. In this also we considered the weightage of material price percentage to understand the increasing rate of future years. Figure shows the price fluctuation and weightage fluctuation of cement respect

Every material observed like this except tile brick every item showing an increase in price nature for coming years especially in growing cities like Kottayam Ernakulam and Thrissur. These districts are mainly affected by floods and other calamities. Price of one cement bag is touching nearly up to 450Rs.although district wise each district shows variant in all nature due to availability and other integrated matters



CONCLUSION

Increment in the cost (inflation) of building materials, import obligations and trades impact the costs of materials in the market. Fluctuation in costs of building materials brings down Gross Domestic Product ('GDP'), this prompts significant expenses and low interest for structures in the market, and resoundingly affect the land business. The primary elements influencing the expense of building material in a development venture is Shipping charges or Transportation, Taxes ('GST', State tax, or Road tax), Fuel charges, Labor wage rate, Insurance price hike, Material Standardization (Brand Value), Non availability of material. The alternates of conventional materials to suggest for the future to reduce the material price and to get more available in market. The various important factors which influence an increase in the cost of Construction materials in Kerala are

- Increase in transportation charges
- Increase in electricity charges
- Increase in labor cost charges
- Increase in equipment charges
- Increase in material charges
- Increase in Lending rate for various Small scale industries ('SSI') sector.

Prices of building materials increased more frequently with larger magnitudes. Different techniques for determining heightening rate are checked on and a methodology is suggested that expressly considers the arbitrary varieties in the acceleration rate. A computer model has been intended to fuse the impact of cost escalation on

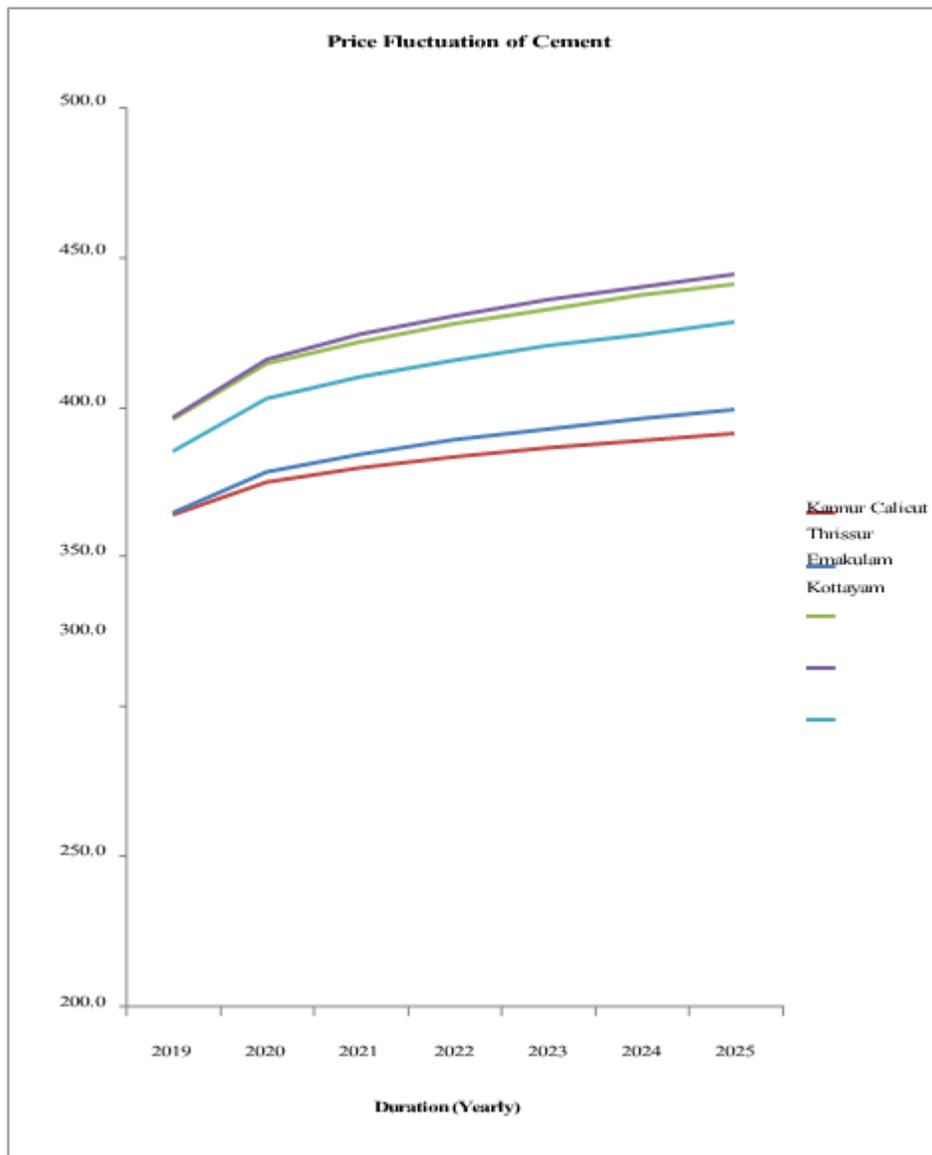
huge development programs comprising of a few undertakings spreading over a time of quite a long while. This computer model mulls over the vulnerability and inconstancy of both schedule (delays) and acceleration factor in an incorporated probabilistic methodology. The displaying of cost acceleration factor is finished by thinking about its fluctuation and its connection. Development ventures costs are accepted to be profoundly helpless to a mix of inner and outside components. One of these elements is the costs of development materials and the danger of their change. This paper investigates this hazard by factually estimating the recorded unpredictability of the costs of key development materials; From these studies we have noted that every year most of the materials have a price hike. Only the tile price is getting lower every year.

From 2017 to 2019, there is a huge hike and drop in different months because of the GST implementation and natural calamities. The study of cement from 2010 to 2019 commonly shows a difference in price hike of 0% to 3% in every year. The study of steel from 2010 to 2019 commonly shows a difference in price hike of 3% to 13% in every year. The study of fine aggregate from 2010 to 2019 commonly shows a difference in price hike of 5% to 15% in every year.

The study of coarse aggregate from 2010 to 2019 commonly shows a difference in price hike of 2% to 10% in every year. The study of brick from 2010 to 2019 commonly shows a difference in price hike of 0% to 5% in every year. The study of

tile from 2010 to 2019 commonly shows a difference in price drop of 1% to 4% in every year. The study of teak wood from 2010 to 2019

commonly shows a difference in price hike of 1% to 5% in every year.



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