Factors Affecting the
Productivity of the
Construction Industry in
Ernakulam

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Abstract
Building industry faces difficulties with respect to profitability related issues and the issues are commonly connected with work proficiency. Numerous development organizations have confronted constant issues, for example, lacking wellbeing, unsatisfactory working conditions and inadequate effectiveness. These issues have been portrayed as components influencing the effectiveness of development and influencing the yield of the organization. The objective of this examination is to recognize factors impacting development profitability in Ernakulam locale dependent on polls gave to laborers and representatives. At that point, the survey examination is performed by esteem file and positions the factors as indicated by the worth list. This paper classifies efficiency factors into four gatherings: 1.safety, 2.quality, 3.man force factors, 4.management variables, 5. Spot, materials and factor-related assets, 6. Configuration related elements and 7.external variables. The polls are flowed to top administration and mid-level administration. This exploration will be created as an underlying examination of Ernakulum development industries more top to bottom investigation.

Keywords
Factors affecting Productivity, Productivity Lose in construction industry.

I. Introduction

Building is the world's biggest and requesting industry. Building industry is a critical aspect of any country's monetary creation. Improving and improving strategies and procedures to build the development business' financial presentation is significant for any nation. Building efficiency progress is consequently one of a few nations and governments overall's primary need zones. Development is evidently a vital activity in each economy; it influences and is influenced by the country's Gross Domestic Product (GDP). HR today assume a key part in each association's efficiency gain, making it unrivaled in mechanical rivalry. With its effective and ideal applications, all the upsides of efficiency development can be acquired. Development is a fundamental public economy division for nations around the globe, as it has truly taken up a huge segment of the country's absolute work and its significant commitment to a country's income overall. Building industry, nonetheless, actually faces various issues with low effectiveness, helpless security and satisfactory quality. Efficiency improvement is significant for each organization. Understanding effectiveness has consistently been significant in the structure business. Efficiency is the most huge factor affecting the general yield of each little , medium or enormous development industry. Numerous elements straightforwardly sway the productivity of the development business. Profitability has become a standard watchword. It’s imperative to India's development industry government assistance. At the miniature stage, on the off chance that we have expanded effectiveness, it in the long run lessens or diminishes venture unit expenses and gives the best generally venture yield. Initially, it was just used to rank staff by their abilities. The individual who created quicker or harder will have higher efficiency. New hardware in this modernized condition to expand productivity.

Ernakulam District

The present work is to examine factors affecting Ernakulum's construction industry productivity. One of Kerala’s developed districts. Ernakulam district established on April 1, 1958. Drawn from a Tamil word Erayanarkulam, the word Ernakulam means Lord Shiva’s abode. The district included “COCHIN 's largest metropolitan area.” Ernakulam district is the state's highest income yielding district and Kerala ‘s commercial capital.
The district occupies an area of 3068 km² on India’s western coastal plains. The district of Ernakulam has all the geographical factors that support the growth of industry and is at the forefront of all other districts in Kerala in the industrial sector. Availability of all types of transport facilities viz. road, rail, canal, sea, air is a unique factor in this district. Ernakulam is Kerala’s largest commercial hub. Its M.G. Road is host to some of Kerala’s biggest companies. This district is Kerala’s “most advanced” district. Kerala’s construction sector helps to raise GDP by 10-11%.

**Definition of Productivity**

The word profitability was instituted in 1766 when it was first referenced by (Quesnay, Veggi 1987). Over a century later, in 1883, profitability is described as "personnel to create" when alterations that were made in the depiction "the connection among creation and means used to deliver that creation."

Besides, the American Association of Cost Engineers depicts profitability as a "relative proportion of work execution, either great or poor, contrasted with a settled base or ordinary" (Salmon et al. 2000) while (Arditindmochtar 2000) considers efficiency as "the proportion between all out yield communicated in dollars and all out information sources additionally communicated in dollars" (honer and duf 2001) Output unit would change the idea of profitability.

"Profitability" alludes to the connection among yields and sources of info (Borcherding and Liou, 1986). Yield and information change across ventures. Frequently, the idea of productivity contrasts when applied to different businesses. Work is one of the business ‘s key prerequisites. Work efficiency by and large relates work expenses to the amount created (Borcherding and Liou, 1986). At the end of the day, the idea of work profitability is the entirety of merchandise and ventures created in time by a beneficial factor (labor) (Drewin, 1982).

In 1883, Littre portrayed profitability as "the personnel to create," the capacity to deliver (Jarkas, 2005). The Organization for European Economic Cooperation (OEEC) presented in 1950 the idea of efficiency as a remainder by partitioning yield by one of the information factors (Sumanth, 1984). Contingent upon estimation objectives and information accessibility, different effectiveness ideas are found. The U.S. Division of Commerce depicted profitability as "creation dollars per input individual hour" (Adrian, 1987). At the task site, contractual workers are characterized efficiency regarding work efficiency and in the accompanying manners.

\[
\text{Labour Productivity} = \frac{\text{OUTPUT}}{\text{LABOUR COST}}
\]

or

\[
\text{Labour Productivity} = \frac{\text{OUTPUT}}{\text{WORKHOUR}}
\]

There is no standard definition of productivity and some contractors use the inverse of above,

\[
\text{Labour Productivity} = \frac{\text{LABOUR COST}}{\text{WORKHOUR}}
\]
II. Objective

The goal of this investigation centers around seeing from the development business about different elements influencing the development profitability sway, and recommends fitting estimates that can be taken to improve efficiency. The point is upheld by the target expressed beneath.

- Study and talk about different components influencing profitability in development industry.
- Analyze and compute the Important Index of those components.
- To make suggestions to improve efficiency in development.

III. Research Methodology

"Study research is described as gathering information by posing individuals' inquiries" (Fowler, 1993). In this examination, the information assortment measure utilized had two fundamental strategies: polls and individual meetings. A survey was picked as the investigation's generally proficient and reasonable information assortment apparatus. The poll was finished up to be characterized as a self-managed strategy, an appropriate answer. Information was gathered from writing audits from books, diaries, papers, course meetings, and sites that stress building profitability. A review was given to development venture workers from different exchanges. The poll was set up with four key components affecting the structure, efficiency and their sub factors.

IV. Analysis Methodology

For measuring the factors which affecting construction productivity, an ordinal measurement scale or rating scale 1 to 5 was used and as shown in below

| Strongly disagree | Disagree | Average | Agree | Strongly agree |
|-------------------|----------|---------|-------|----------------|
| 1                 | 2        | 3       | 4     | 5              |

Then the importance index was derived for each factor using the following formula:

\[
\text{Importance index} = \frac{n_1 \times 1 + n_2 \times 2 + n_3 \times 3 + n_4 \times 4 + n_5 \times 5}{n_1 + n_2 + n_3 + n_4 + n_5}
\]

Where,
- \(n_1\) = the number of respondents who answered “strongly disagree”
- \(n_2\) = the number of respondents who answered “disagree”
- \(n_3\) = the number of respondents who answered “average”
- \(n_4\) = the number of respondents who answered “agree”
- \(n_5\) = the number of respondents who answered “strongly agree”

After that rank the factors according to the importance index. The higher value of importance index is ranked as first and same as on.

Terms of Survey Analysis

A survey is a surveying strategy with a lot of inquiries and different prompts to gather data from respondents. While regularly worked for measurable reaction examination, this isn’t generally the situation. SirFrancis Galton designed the poll. Polls have points of interest over some different types of studies since they are cheap, require less exertion from the examiner than verbal or phone reviews, and regularly have organized reactions that make information arrangement simple.

Survey Questionnaires

The information for this overview 7 factor are thought of and these elements are taken from various writing surveys. The elements are,
The information will gather significant data on the current status of the organization’s activities and give knowledge to the ID of key components influencing efficiency, alongside potential activities for development.

Survey Results Analysis

For the investigation of components, the significance record of each factor is found and positioned as first and same as on the higher estimation of the significance list. Subsequent to breaking down the data from the polls, some particular examples were distinguished with respect to the key variables affecting effectiveness, as summed up in the table underneath, it depicts the significance file to express the rating of the most significant impacting objects. From the table underneath, we unmistakably comprehend the main positioned outside related factor has significance file 0.851 so the most significant factor impacting efficiency is my study outer factor. Material and technique, at that point the board factor, at that point labor connected, etc.

Table 2 Ranking of Factors

| SL.NO | FACTORES            | IMPORTANT INDEX | RANK |
|-------|---------------------|-----------------|------|
| 1     | External related    | 0.851           | 1    |
| 2     | Site material and tools related | 0.668        | 2    |
| 3     | Management related  | 0.501           | 3    |
| 4     | Manpower related    | 0.492           | 4    |
| 5     | Safety related      | 0.461           | 5    |
| 6     | Quality related     | 0.428           | 6    |
| 7     | Design related      | 0.309           | 7    |

External Related Factor

Table 3 Ranking of External Factors

| External Factors | Importance index | Rank |
|------------------|------------------|------|
| Corruption       | 0.981            | 1    |
| Natural disaster | 0.872            | 2    |
| Proper security  | 0.7              | 3    |

From the table, we can obviously comprehend the debasement factor appraised higher with 0.981. The review says 98 percent unequivocally can’t help contradicting defilement component. This outcome advocated as Ernakulam region positions most elevated as far as its capacity to screen defilement. Building exercises are helpless against defilement, especially in acquisition. The remaining 2% are going through this cycle. The subsequent factor affecting profitability is catastrophic event. Quake, soil disintegration, and so on, Ernakulam area has less issues. The main issue is substantial downpour in blustery seasons, easing back building works. This issue is occasional. At that point the following viewpoint is security, in this 60% says they’re not given legitimate security, and the 40% says they’re given security. Be that as it may, these 60% individuals have no enormous security-related issue. From this we may presume that outer components don’t antagonistically influence development productivity in Ernakulam area.
Site Material and Tools Related

Contingent upon their essentialness, the table underneath sums up the site material and apparatus related factor. The outcomes in the table underneath show 8 site material and apparatus related factors and were appraised by their importance. Discoveries recommend that bad quality materials with a record of 0.882 are the most noteworthy of all material and apparatus impacts. This 96% emphatically can’t help contradicting the utilization of good-quality crude materials and 4% utilize bad quality crude materials in little works

| Factor                              | Importance index | Rank |
|-------------------------------------|------------------|------|
| Low Quality Raw Materials           | 0.882            | 1    |
| Delay due to Interference with Other Crew Members | 0.860            | 2    |
| Congested Work Area                 | 0.847            | 3    |
| Rework                              | 0.645            | 4    |
| Work Stoppages due to Equipment Break Down and Planning Errors | 0.645            | 4    |
| Delay in Material Delivery          | 0.627            | 5    |
| Material Shortage                   | 0.545            | 6    |
| Quality Measures                    | 0.3              | 7    |

Postponement because of obstruction with group individuals is appraised in material/apparatuses class position 2. This is essentially because of the absence of contact among the team individuals, which may bring about deferral in their work. In spite of the fact that not thought about a significant issue, the reasons given were restricted work territories, inordinate quantities of individuals appointed to a region, and absence of group coordination. Next basic factor is blocked workspaces. 70% state they haven’t blocked and 30% state the normal. Clogged workspaces frequently cause delay. The following significant viewpoint is modify. 60% recommend their Construction site is improved. 40% state there’s no revamp there. Staff recommended that the essential driver of modify was customer change orders. The auxiliary reason was then plan mistakes and absence of undertaking portrayal. Occupation stoppages because of hardware break Down or arranging blunders coordinated the 0.645 worth list. 50% consented to work stoppages because of gear disappointment. The primary clarification for hardware issues was a lack of gear for the building site. Second, when required, gear was blocked off, harmed or disappointment, and not supplanted when harmed.

Postponement in material conveyance was positioned 5th.30 percent concur with this statement, 20% state normal and 40% oppose this idea. In this 60%, sixth spot goes to material deficiency. Everybody says there’s a lack of stream sand, however M sand supplanted this issue. At that point the last factor is quality measures.95 percent accept that all crude materials take quality measures.

Management Related

| Factors                                                      | Importance Index | Rank |
|--------------------------------------------------------------|------------------|------|
| Stop work orders because of infringements of government regulations | 0.863            | 1    |
| Payment delay problem from top management                    | 0.618            | 2    |
| Lack of employees                                            | 0.609            | 3    |
| Weekly toolbox meeting & inspection from top management       | 0.509            | 4    |
| Top management pressurize for deadline work                  | 0.454            | 5    |
| Yearly salary increments to employees                        | 0.445            | 6    |
| Employees enjoy project benefits                              | 0.436            | 7    |
| Periodical meetings                                          | 0.427            | 8    |
| Proper transportation facilities                              | 0.427            | 9    |
The Stop work arranges because of government administrative encroachments with a list of 0.863 are positioned 1. 95 percent can't help contradicting this contention, which has no legislature related issue. Installment defer issue isn't such a great amount of influenced since there is no such deferral from top administration. 70%. The issue is connected to absence of staff. Everybody claims they utilize other state representatives, so they don't get gifted laborers. 70% of organizations have no week after week tool kit meeting and top administration assessment. For work, however in a charming way just works completed in time. Representatives get yearly boosts in compensation and appreciate the venture benefits. Only 30% of an association held occasional gatherings don't hold intermittent gatherings. Appropriate transportation offices are given to office-to-site workers. Occasional gatherings and appropriate transportation offices have a similar position with criticalness file 0.427.85 percent concur that administration is given rewards essentially at celebrations and even concur with the board gave legitimate homegrown offices.

**Manpower Related**

| Factors                                           | Importance Index | Rank |
|---------------------------------------------------|------------------|------|
| Labour Disruption Like Manpower Shortages, Strikes| 0.763            | 1    |
| Communication Problems With Foreign Workers       | 0.681            | 2    |
| Construction Accidents                            | 0.645            | 3    |
| Labour Turn Over                                  | 0.573            | 4    |
| Absenteeism                                       | 0.573            | 4    |
| Recruitment Of Workers                            | 0.536            | 5    |
| Alcoholism                                        | 0.518            | 6    |
| Motivational Programs                             | 0.495            | 7    |
| Age Factor Of Workers                             | 0.427            | 8    |
| Punctuality                                       | 0.390            | 9    |
| Do The Specification And Implementation Match      | 0.290            | 10   |
| Proper Resting Hours                              | 0.272            | 11   |

80 percent disagree with the labour-disruption argument, including shortages, strikes. There’s no such problem in district Ernakulam. Just 50% have contact issues with foreign workers.45% accept that incidents occur on their construction site, not sometimes. 70% Corporations have labour Turnover. Turnover. Salary (better compensation deals or salary expectations) was the significant reason provided by employees for the company’s high turnover. Other factors were family issues, the preference for working near to home, etc. Rank with value index 0.573. Labor turnover affects more than absenteeism. 80% Believe that employee recruiting is challenging. 75 percent say alcoholism uses more staff. Usage of alcoholism mostly seen under owns state workers and other state workers using pan products. 90% Businesses arrange motivational activities for workers. Every business is worried about employees’ age factor. Mostly businesses prefer employees below the age of 70.90% accept that there are employees holding punctuality. All businesses often have proper rest hours.
A 40 percent association doesn’t show wellbeing announcement board for representatives it would cause mishaps. 60% Businesses have a security investigator’s position, however no one is there to check laborers’ wellbeing. Just significant structure firms directed laborer security examination. In my review, security gatherings, wellbeing preparing, security hardware and medical aid offices are totally offered in development firms, yet these are not really directed on building site.

### Safety Related

Table 7 Ranking of Safety Factors

| Factor                        | Importance Index | Rank |
|-------------------------------|------------------|------|
| Safety bulletin board for workers | 0.572            | 1    |
| Safety inspector              | 0.536            | 2    |
| Safety meetings               | 0.427            | 3    |
| Safety training               | 0.417            | 4    |
| Safety equipment’s            | 0.327            | 5    |
| First aid facilities          | 0.263            | 6    |

40% of organizations have quality overseers, 50% of firms don’t have quality controllers, and 10% state the normal. Similarly purpose they state they have quality controller, yet there is no assessment on building site. Next perspective is the effectiveness motto with 0.486. Medium to enormous Size organizations are aphorism quality. “Let them quit working yet keep quality” is the trademark for Puruvankara Construction Company. ISO necessities have a third spot record 0.363. Most associations follow ISO rules and quality controls.

### Quality Related

Table 8 Ranking of Quality factors

| Factors                        | Importance Index | Rank |
|-------------------------------|------------------|------|
| Quality inspector             | 0.6              | 1    |
| Quality motto                 | 0.486            | 2    |
| ISO standards                 | 0.363            | 3    |
| Proper quality measures are taken in your firm | 0.263 | 4 |

### Design Related

All plan factors highly affect profitability and were positioned by their significance in table 4.8. 70% organizations are received new strategies in development techniques other 30% are embraced traditional techniques. All most organizations use Auto cadd, MS venture like customary software’s, they are not prepared to concentrate new programming instruments like bolt programming, 3dx max, Sketch up, primavera and so forth. Plans are done by IS codes. 98% organizations follow IS codes. Practically all drawings are reasonable and it is appropriately checked before usage.

Table 9 Ranking of Design Factors

| Factor                        | Importance Index | Rank |
|-------------------------------|------------------|------|
| New techniques                | 0.445            | 1    |
| Usage of software tools       | 0.361            | 2    |
| Designs are carried out by IS codes | 0.295 | 3 |
| Drawings are understandable   | 0.238            | 4    |
| Before implementation is it properly checked | 0.209 | 5 |
Comparison among Different Companies

A differentiation is made between 4 organizations and their ventures pick the organizations. Recorded organizations are,

- Developers Sobha Ltd.
- Puruvankara Ltd.
- Reputation Ltd.
- Squad group

From the figure beneath, we can obviously comprehend that elements vary in 4 firms. The X-pivot shows the boundaries and the Y-hub shows the file. Esteem Ltd considers plan contemplations more than Sobha engineers. Puruvankara Ltd and unit party considered simply 16%. Quality advances taken nearly the equivalent in four firms. Puruvankara Ltd received more assurance than detachment classes, driven by engineers Prestige ltd and Sobha. Labor is more in Sobha engineers than units. The executives factor is viewed as more in Puruvankara Ltd than Brigade class and Reputation Ltd. In Puruvankara Ltd, site material and device related elements consider more than Prestige ltd and Brigade bunches followed. Concerning outside components, Brigade bunches started things out with simply 10%.

V. Conclusion and Suggestions

In today's world, the construction industry is a crucial industry. It helps grow and achieve society's goal. Building productivity study and information are very significant because they cause losses to governing agencies and also affect the construction industry's economy. This study helps classify the causes of possible factors influencing building productivity in Ernakulam district. This study found issues with construction efficiency and revealed significant factors. These results should enable construction stakeholders to easily recognize their strengths and weaknesses, and apply new strategies to reduce the negative influence of variables, resulting in improved productivity.

The result indicates that Ernakulam’s key factors affecting construction efficiency are:

- Reworking
- Workforce shortage
- Pressuring
- Job turnover
- Trouble hiring employees
- Alcohol
- Inappropriate protections.

Furthermore, 51 factors considered in the analysis were divided into seven categories, ranked according to their importance index.

- Factors external
- Site material and associated factors
- Management considerations
- Power-related factors
- Causes of protection
- Factors of consistency
- Build similar factors.

**Improving Construction Efficiency**

There are several obstacles to enhancing productivity, and these obstacles are:

- No target alignment
- Difficulty assessing productivity
- Labor concentration shortage
- Failure to continue change

**Guidelines**

The Building Efficiency

- Systematic workflow
- Comprehensive pre-fund preparation
- Pre-monsoon job stop plan
- Full machinery and automation
- Prompt payment to staff
- Timely monitoring.
- Advance content acquisition and management
- Adequate preparation for employees
- Preserve disciplines.

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