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Identification of Factors Inhibiting Human Resource Development and Productivity Improvement in Indian Construction Firms

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Abstract: *The motive of this research is to boost human resource development approach, decline the mismatch between required and available skilled labor and to discuss the significance of ignoring the appeal of craftsmen. Perhaps most important, the consultants can provide the supervisor and crew with the training that will yield the greatest productivity improvements. Productivity is a serious issue for the construction industry, which because of its large size has a dramatic impact on the economy. Productivity remains an intriguing subject and a dominant issue in the construction sector, promising cost savings and efficient usage of resources. The focus of this research is to identify the most significant problems that inhibit the growth of the local construction firms, and The identification of factors irrespective to labor and HRM, and the measures required thereon to Based on those factors a questionnaire has been prepared in labour's point of view.*

Keywords: *Human resource management, Labours, Engineers, Entrepreneurs, Response, RII, SPSS etc.*

I. INTRODUCTION

A. General

Human Resource Management or HRM is the process of organizing people in a company/firm as well as regulating the existing interpersonal relationships. These two processes are clue in the success and growth of a business. Human resource management is process of an arrangement of workforce, or human resources. It is responsible for the appealing, selection, guiding, assessment, and rewarding of employees, while also overseeing organizational leadership and culture and ensuring compliance with employment and labor laws. HR now focuses on strategic initiatives like mergers and acquisitions, talent management, succession planning, industrial and labor relations, and diversity and inclusion. In start-up companies, The ultimate focus of HRM is the people within an organization. Regular planning, monitoring and evaluation are important for the success of HRM. Successful implementation ensures that all employees know their role, career path and also feel part of an organization which is able to manage and reconcile their expectations as well as those of the organization and its objectives. The primary objective of this research is to study the impact of human resource management applied among construction laborers and to detect the current scenario followed in human resource development in Civil Engineering field and finally analyzing the factors affecting human resource management system in the construction industry.

B. Need for Human Resource Management

- 1) To improve the quality of human resource management practices.
- 2) To decrease the total cost and duration of the project.
- 3) To eliminate unnecessary labor cost involved in the construction.
- 4) Identify the practices that have the potential to improve construction productivity based on industry experience.

C. Objective

- 1) To study the impact of human resource management among construction laborers.
- 2) Identify HRD factors and rank the important measures required to solve the identified problems and thus accelerate the growth of local construction firms.

D. Background (Literature Review)

Academics have performed numerous areas of research related to construction productivity specific to human factors and external issues. For instance, Dozzi et al. (2000) documented factors that affected the motivation of construction workers. He further

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investigated issues that directly related to the worker during shift: overtime, overstaffing, change of orders, crowding, multiple shifts, working environment and safety. The effect of overtime for construction productivity has been a widely discussed topic. Most of the issues investigated in that study were based on previous studies and data obtained from elsewhere. A list of researchers interested in labor productivity and scheduled overtime include: National Electrical Contractors Association (1974), Business Round Table Study (1986), Thomas and Raynar (1997), Adrian (1988), and Haneiko and Henry (1991). It was Thomas (1992) who made a significant observation when studying a variety of construction literature when he found that the data used by various researchers was sparse, old and based on small sample sizes that were developed from questionable or unknown sources.

Having reviewed each of the above studies, the researchers felt that a comprehensive study had not been performed with supporting data to positively recommend best practices to improve the construction productivity for a specific type of construction in a specific location. The following are overall observations based on the previous studies of construction productivity and justify the view of the proposed research objectives;

- 1) The documented research studies were mostly based on the data obtained from other researchers, studies, which cannot be positively applied for a specific type of a construction project. Thomas (1992) justified the same view that many studies referenced other studies which give a false appearance of originality
- 2) The published data is out of date and of no relevance to a particular location or to a particular type of construction. For example, the weather pattern of Denver Colorado in the 1970's may not have the same effect as in Alberta in the 22nd century.
- 3) Most of the studies did not investigate by actually monitoring the construction operations to justify the validity of the findings.
- 4) A lot of factors involved in the process of construction have changed. The present day weather patterns have changed quite dramatically so that it is impossible to compare them to even 10 years within the same state or province. The skill of the laborers have changed quite a lot over the years due to apprentices, training opportunities, union and non-union influence, the work demands, etc. Hence, the overtime, and human issues that lead to construction productivity cannot be easily judged by the same data or information that was documented a decade or more ago.
- 5) Once the research were complete, it is evident that no follow up of the work was done for Recommendations to develop best practices to improve construction productivity. Researchers have devoted countless hours to document the problems and factors that affect productivity but were not extensive in pursuing further to recommend hypothetical solutions or to actually monitor the effects based on the recommendations.

II. PILOT STUDY

A. Research Approach

A comprehensive study was conducted to identify various factors under the headings of labor, management and external factors that effect construction productivity. The factors that were being considered for the pilot study under the three headings are given below. During the pilot study, 50 industry experts, consultants, and contractors with an average of more than 10 years of construction industry experience were interviewed for the following purposes:

- 1) Develop a prioritized index of the factors identified under the human resource development and external category.
- 2) Identify the Top Factors from all the factors irrespective of whether or not they belong to human, management and/or external factors.
- 3) Gauge the amount of impact that the Top Factors have on the measurement of productivity.
- 4) Identify the practices that have the potential to improve construction productivity based on industry experience.

The following factors were considered for the pilot study under the three headings. There were a total of 8 factors in the HRD category, 8 factors in the External category and 35 factors in the Management category:

Table 1: Factors in terms of Human, External and Managerial Factors

<i>HRD Factors</i>	<i>External Factors</i>
Worker motivation	Union rules and influences
Worker boredom and fatigue	Adverse weather conditions
Worker attitude and morale	Noise, dust, radiation
Workers physical limitations	Congested work area

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Worker absenteeism	Changes in drawings and specifications
Team-spirit of the crew	Changes in contract
Worker learning curve	Demand of over-quality work
Worker experience and skills.	Nature of project (size and complexity).

Table 2: Managerial Factors

<i>Management Factors</i>	
Protective gear	Salary and benefits
Unrealistic schedule	Site layout
Overtime	Necessity to re-do work
Multiple shifts	Discontinuity in crew makeup
Excessive shift length	Failure to utilize workers skills
Disrespectful treatment of worker	Incompetent personnel
Parking facilities	Poor inspection programs
Unsafe working conditions	Inadequate equipment
Inadequate supervision	Composition of the crew
Out-of-sequence work	Constructability
Interruption and disruption	Adequate site facilities for worker
Lack of co-operation between crafts	Inadequate communication
Lack of worker training and education	Cleanliness of construction site
Lack of procedures for construction methods	Subcontracting
Changes in foremen	Non availability of materials and tools
Non availability of information, equipments	Lack of detailed planning

B. Methodology

The method of data collection is through structured questionnaire survey and examination of existing records on human resource development activities within the local construction firms, for deciding which factors are most important and less important. The specific questions related to the measurement of productivity are as follows:

- 1) Identification of the Top Most Important Factors from all categories.
- 2) Indicate whether these factors are measured or monitored, and if so, whether this is done on a regular basis (daily/weekly/monthly).
- 3) What are the barriers to measure these productivity factors?
- 4) Methods of measurement practices.
- 5) Adequacy of the existing measurement/monitoring method for these factors
- 6) The subjective judgment about the impact of these factors on construction productivity
- 7) How to mitigate the appearance of these factors to return to the expected productivity standards
- 8) Whether or not the company maintains an accurate and regularly updated database to incorporate productivity for future projects.

Overall research methodology, Ranking systems used for prioritization, and answers to all of the questions which are related to factors and comprehensive results of the research can be found by using RII (Relative Important Index) and SPSS (Statistical Package for Social Scientist). The research approach should include information about Factor Analysis and also the component of factor analysis. Factor analysis is the process which is to be carried out in the SPSS software. Statistical Package for Social Scientist i.e. SPSS software is used to analyze the responses received. Factor analysis is related to PCA (Principal component analysis). It is a widely used method for factor extraction which is the first phase of EFA[9]. Factor weights are computed to extract the maximum possible variance, with successive factoring continuing until there is no further meaningful variance left[9]. The factor model must then be rotated for analysis. Common factor analysis, also called principal factor analysis (PFA) or principal axis factoring (PAF), seeks the least number of factors which can account for the common variance (correlation) of a set of variables.

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Image factoring is based on the correlation matrix of predicted variables rather than actual variables, where each variable is predicted from the others using multiple regressions.

Alpha factoring is based on maximizing the reliability of factors, assuming variables are randomly sampled from a universe of variables. All other methods assume cases to be sampled and variables fixed.

Factor regression model is a combinatorial model of factor model and regression model; or alternatively, it can be viewed as the hybrid factor model, whose factors are partially known.

III. RELATIVE IMPORTANT INDEX BY SPSS

Relative Weight Analysis is a useful technique to calculate the relative importance of predictors (independent variables) when independent variables are correlated to each other. It is an alternative to multiple regression technique and it addresses multi co-linearity problem and also helps to calculate the importance rank of variables. It helps to answer "Which variable is the most important and rank variables based on their contribution to R-Square".

A. Background

When independent variables are correlated, it is difficult to determine the correct prediction power of each variable. Hence, it is difficult to rank them as we are unable to estimate coefficients correctly.

Statistically, multi co-linearity can increase the standard error of the coefficient estimates and make the estimates very sensitive to minor changes in the model. It means the coefficients are biased and difficult to interpret.

B. How it works

It creates a set of new independent variables that are the maximally related to the original independent variables but are uncorrelated to each other. Because these new transformed independent variables are uncorrelated to each other, the dependent variable can be regressed onto this new set of independent variables producing a series of standardized regression coefficients.

Construction projects are vital for the growth of a nation and so is the need to make all-out efforts in ensuring the successful outcome of a project. In the next section, we discuss some of the attributes that are considered key to ensure the productivity and improvement of a project.

IV. DATA COLLECTION AND ANALYSIS

In the survey analysis of collected data is to be done on SPSS (Statistical Package for the Social Sciences) software. The analysis will include the Factor analysis of the data etc.

Relative Important Index is used for the ranking of the factors. ANOVA (Analysis of Variance) cannot be used on this type of survey because it is for the hypothesis testing.

Simple analysis is done on data collected in round of survey. Ranking of the factors are done on the basis of RII Relative Important Index = $\left[\frac{\sum W}{A \times N} \right]$

Where w is the weight given to each attribute by the respondents and ranges from 1 to 5, A is the highest weight (i.e., 5 in this case), and N is the total number of respondents.

For Example ; In combined analysis if there are 60 total responses, the sum of all responses for particular factor, (consider PM competency factor) is 258 then calculation for RII will be

$$RII = 258 / (5 \times 60) = 0.8600$$

So RII factor for PM competency is 0.8600

The range for the RII is 0.2 to 1.0

Statistical Package for Social Scientist (SPSS) software is used in the analysis of the factors. Analysis is done separately on responses from consultancy, contractor and experts also combined analysis is done in order to compare.

V. RESULTS AND INTERPRETATIONS

The analysis of the projects directs towards outcome of the project which will include the outcome from round of survey i.e. most important factors. Overall data will be analysed by using SPSS software and then result will be concluded, that is which factor are most important and which one is less important.

The ranking of the factors for the after round are done according to RII as explained in previous sections. and then we decide the which is the most important factor in HRD that widely affects on productivity and growth of construction industry.

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VI. CONCLUSION AND FUTURE WORK

This study helps to identify the rankings of the HRD as well as external factors for the construction projects according to project management consultancy and contractor point of view. The factors can be further categorised in to groups. i.e. excellent, good, average, poor, very poor. As on 1 to 5 ratings. From the analysis of ranking based on contractor and consultant groups, the results are mixed, so we can conclude that Consultant and Contractor do have the different approach or opinion on factors which can affect productivity of the project.. And after comparing that results will be more sophisticated. It is suggested that the critical factors identified in the analysis above should be followed during the execution of the project.

A. The future work will be

- 1) Investigate the Top Factors identified to determine their individual impact on construction productivity and combined impact on construction productivity, by using SPSS.(i.e. ranking)
- 2) Investigate the top barriers and drivers which are affects on implementation of HRD in individual firms
- 3) Develop a conceptual model with a set of guidelines based on the studied multiple factors and to improve the construction productivity under various conditions.
- 4) Develop recommendations to deal with these issues investigated and to improve construction productivity

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