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Evaluation of Construction Firms Using Human Performance Factors: An Overview

Pooja Sunil Sagar¹, Madhura C. Aher²

PG Student: Dept. of Civil Engineering, NDMVP's K. B. T. College of Engineering Nashik MH, India¹

Assistance Professor, Dept. of Civil Engineering, NDMVP's K. B. T. College of Engineering Nashik MH, India²

ABSTRACT: Construction is one of the labor-intensive sectors in which human capital is viewed as the organization's greatest asset. However, it has long been recognized that human resources are also the most difficult resource to handle in an organization relative to all other resources needed to complete a project satisfactorily. In the general construction market, difficulties frequently occur as a result of the lack of sufficient number of qualified workers and personnel to complete the work expected. This form of difficulty can be handled and certain challenges can be dealt with effectively using human resources management strategies to prevent labor shortages. This research focuses on the compilation of several site surveys of various groups and perspectives in human resources. With regard to data collection, AHP is used to assess the enhanced human capital in construction.

KEYWORDS: Construction firm, Human performance factor, Analytical hierarchy process.

I. INTRODUCTION

Human resources are one of the most critical resources for an organization to work properly. Human resources can also be called human capital. Human resources. The term capital refers to land, wealth, property owned by a person or organization. Human capital refers to the cumulative experience and expertise of a company's total employees that can be used to accomplish long-term objectives. An employee is an uncommon resource, unchanging, un-replaceable and important. According to the stage of growth in the company, the management of human resources is needed. This increases the efficiency and overall wealth of an enterprise through efficient management of human resources. Human resource management in modern times plays an important role in fostering a productive workforce. As the construction industry has an incredibly large workforce, the identification of various facts influencing human performance is repetitive, which means that this study aims at identifying factors affecting human strength's actual performance and the various assessment methods.

II. LITERATURE SURVEY

[1] Varun.V. et.al, respectively. The proposed 2016 International Journal for Scientific Ingeniery and Analysis Element and Methods for Performance Evaluation of Human Resource in Construction Industry (IJSER).

In order to maximize competitiveness, corporate wealth and to preserve the worker-manager balance, the Author explored efficient management of human resources. The study discusses reasons for human capital assessment in building industry and different methods used for making multi-criteria decision making to assess human resources. The management of human resources is an art of inspiring people to accomplish organizational objectives. However, with its very large workforce, the construction industry is a tedious activity to define and satisfy the needs of the employees. The aim of the study was to identify the different factors influencing workers' actual performance in the construction industry and the different analytical methods used for their assessment.

[2] Aragon's Antonio. al. suggested the mediating impact on information management and company efficiency in AEDEM of strategic human resource practices. Elsevier 2014 released.

An integrative model, which explores strategic human resources activities as a catalyst for knowledge management, was discussed by the author. The findings show that techniques for information management have a positive impact on firm performance through selected staff, rigorous preparation, active engagement, thorough performance assessment and performance-based reimbursement through some high job performance activities. This research offers empirical evidence supporting the concept of the need for strategic human resources activities at enterprise level as a coordination tool for information management strategy.



[3] Shakhosseini in. [2]. al. suggested selection and distribution of human capital to Elsevier B.V building programs based on competencies. 2011. 2011.

The author defined policies and practices on human resource management, construction companies need to identify the skill requirements of the project workforce and hire the team required to complete project assignments. Possible applicants are usually interviewed and the most talented ones picked. It would be helpful to have accurate computing modeling, which could take into account the different candidate competencies and then highlight the most qualified individual with high accuracy. This paper provides a perfect adaptive model for choosing various types of professional workers. Humans are categorized in four main staff types: project manager, engineer, technician and employee. Then the skills requirements model is built for each key staff. Decision-making takes place in two steps, the Fuzzy Analytical Hierarchy (AHP) Method for the Assessment of Competency Criteria, and the Adaptive Neuro-Fuzzy Inference System (ANFIS). Finally, the device is trained by a hybrid learning algorithm.

[4] Akiko Ueno has suggested creating a conceptual model to demonstrate how HRM activities are mutually supportive to increase the quality of services reported by Elsevier. This is an article in 2014 on open access under CC BY-NC-N

Six HRM activities, crucial to support service quality, were clarified by the author. Firstly, to explain individual ties between the six HRM practices and to research the mutual support of such practices, and secondly, to establish a model that includes the interrelationships among the six HRM practices. Each individual relationship has previously been taken into account isolatedly in the literature. This paper therefore consolidated the different interrelationships into a single model. The six HRM activities are related in this new conceptual structure, so that each can work together to enhance the quality of the service.

[5] Barg at Jason E. al. proposed analysis of the Hindawi Publishing Corporation Journal of Construction Engineering Volume 2014 Encouragement Workers in Construction

Fifty two papers written in this study, dealing closely with the productivity of workers. Twenty-two of these works were not presented as they were not specifically relevant to the morale of building workers. Tabled, categorized and analyzed the 30 articles dealing with this subject. Of the articles 9 discussed model motivation, five addressed environment/culture for employees, nine addressed rewards and empowerment for the workers and seven addressed management of workers.

III. HUMAN PERFORMANCE FACTORS

3.1 Adaptability

Adaptability is a predisposition to consciously maintain an integration of person and the environment and constitutes the attitudes, competencies and behaviors that individuals use to fit into different professions. Career adaptability relates to the professional duties, traumas, events, situations and transitions that individuals find themselves having to deal with, as well as the psychosocial strategies needed to cope.

3.2 Job knowledge

Job knowledge can be referred as a specific set of responsibilities to a particular job. The collective job knowledge of an organization is a human resource asset which has an immense value. Employees who do not have proper knowledge of how their job fits into overall picture of their organization show carelessness and inability to take clear decisions.

3.3 Judgment

Judgment is defined as the application of the accumulated knowledge and experience gained through a relevant accounting or auditing training, by making use of the ethical standards, resulting in making informed decisions about the courses of action that are appropriate in specific circumstances.

3.4 Productivity

Productivity is a measure of the efficiency of a person, machine, factory or system in converting inputs into useful outputs. Productivity is an average measure of efficiency of production it can be expressed as the ratio of output to input used in the production process. The operational procedure of construction industry is complicated in nature. This industry consists of professionals involved in different phases of construction project like development, finance, concept development and review, detailed engineering, procurement, construction and startup.



3.5 Motivation

Motivation is intangible, a hypothetical construct that is used to explain human behavior. Motivation is commonly sourced from intrinsic or extrinsic motives. Intrinsic motivation involves people doing an activity because they find it interesting and derive spontaneous satisfaction from the activity itself. Extrinsic motivation, in contrast, requires an instrumentality between the activity and some separable consequences such as tangible or verbal rewards; hence, satisfaction comes not from the activity itself but rather from the extrinsic consequences to which the activity leads.

4 Analytical Hierarchy Process

A structured technique for dealing with complex decisions. Based on mathematics and psychology, it was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. The AHP provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions. It is used around the world in a wide variety of decision situations, in fields such as government, business, industry, healthcare and education.

The purpose of the AHP is to assist people in organizing their thoughts and judgments to make more effective decisions. The Analytic Hierarchy Process (AHP) provides the objective mathematics to process the inescapably subjective and personal preferences of an individual or group in making decisions. Fundamentally, the AHP works by developing priorities for alternatives and the criteria used to judge the alternatives. First priorities are derived for the criteria in terms of their importance to achieve the goal, and then priorities are derived for the performance of the alternatives on each criterion. These priorities are derived based on pair-wise assessments using judgments, or ratios of measurements from a scale if one exists. Finally, a weighting and adding process is used to obtain overall priorities for the alternatives as to how they contribute to the goal.

IV. RESECH METHODOLOGY

Data Collection

The data was collected from different construction firms from owners, project engineers, managers through questionnaire survey. The questionnaire survey consisted of detailed information about the firm and human performance factors .Respondents were asked to rate factors of human performance on descriptive scale which was presented to them. The firms were classified according to their experience criteria in construction industry into 5 different classes. Classification of firms is as follows:-

Table 1: Classification of Firms

Sr.No.	Class	Experience
1	A	Up to 3 years
2	B	Ranging between 4 to 6 years
3	C	Ranging between 7 to 9 years
4	D	Ranging between 10 to 12 years
5	E	More than 12 years

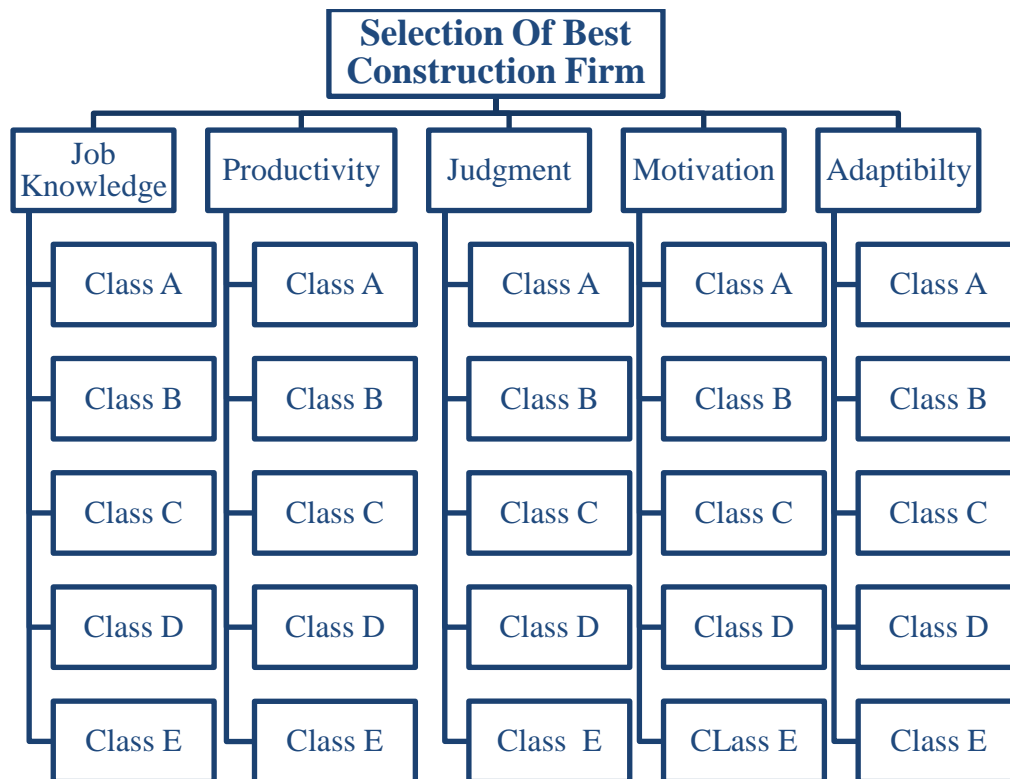


Figure 1 : Hierarchy for Selection of Firm

1 Analytical Hierarchy Process

Analytical Hierarchy Process may be termed as a structured technique for dealing with complex decisions. Based on mathematics and psychology, it was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. The AHP provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions. It is used around the world in a wide variety of decision situations, in fields such as government, business, industry, healthcare and education. The purpose of the AHP is to assist people in organizing their thoughts and judgments to make more effective decisions. The Analytic Hierarchy Process (AHP) provides the objective mathematics to process the inescapably subjective and personal preferences of an individual or group in making decisions. Fundamentally, the AHP works by developing priorities for alternatives and the criteria used to judge the alternatives. First priorities are derived for the criteria in terms of their importance to achieve the goal, and then priorities are derived for the performance of the alternatives on each criterion. These priorities are derived based on pair-wise assessments using judgments, or ratios of measurements from a scale if one exists. Finally, a weighting and adding process is used to obtain overall priorities for the alternatives as to how they contribute to the goal.

2 AHP is a Heuristic Algorithm

The Analytical Hierarchy Process is termed as an “Heuristic Algorithm”. An “algorithm” is “a procedure for solving a mathematical problem(as of finding the greatest common divisor)in a finite number of steps that frequently involves repetition of an operation; broadly: a step-by-step procedure for solving a problem or accomplishing some end, especially by a computer.”

A “heuristic algorithm” is one that “provides good approximate but not necessarily optimal solutions to a given model [or problem]. Often (but by no means always) in employing such an algorithm one may be able to precisely measure the ‘goodness’ of the approximation.”(Analytical Hierarchy Process, Jeff Kunz)

3 AHP Procedure

Step 1 : Developing the weights for criteria.

- Developing a single pair-wise comparison matrix for the criteria;
- Multiplying the values in each row together and calculating the nth root of said product;
- Normalizing the aforementioned nth root of products to get the appropriate weights;



- Calculating and checking the Consistency Ratio (CR).

Step 2 : Develop the ratings for each decision alternative for each criterion.

- Developing a pair-wise comparison matrix for each criterion, with each matrix containing the pair-wise Comparisons of the performance of decision alternatives on each criterion;
- Multiplying the values in each row together and calculating the nth root of said product ;normalizing the Aforementioned nth root of product values to get the corresponding ratings;
- Calculating and checking the Consistency Ratio (CR).

Step 3 : Calculate the weighted average rating for each decision alternative. Choose the one with the highest score.

V. CONCLUSION

Human performance factors were identified by studying the papers. Evaluation of these factors is then done by Analytical Hierarchy Process. From analysis the most important factor which is preferred by all construction firms can be worked out. Adaptability, Job Knowledge, Judgment, Motivation, Productivity are the human performance factors derived from the study. Job Knowledge is highly rated by all classes and proves to be the most important factor which firms consider in human performance among all other factors. Class A gave more importance to Job Knowledge and gave least importance to Motivation. Class B gave more importance to Productivity and gave least importance to Adaptability and Motivation. Classes which are highly experienced gave more importance to Job Knowledge, while Adaptability was given least importance. Class E emerges to be the best class as it scored the highest in analytical hierarchy process evaluation. It was followed by Class D, then Class C, then Class B and finally Class A. Thus experience plays a vital role in construction industry as firms which are highly experienced scored more compared to firms which possess less experience.

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