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AN EMPIRICAL STUDY ON HUMAN RESOURCES MANAGEMENT IN CONSTRUCTION DEPARTMENT OF EPC CONTRACTORS IN PETROLEUM INDUSTRIES

Abstract:

Field survey is carried out in eight large companies involved in a petroleum refinery megaproject in Iran to investigate the effects of human resource management plans on client satisfaction. On the job training of staff as well as economic incentives are applied as the main topics of HRM plans. About 200 questionnaires have been completed along the EPC contractors as well as project client and management consultant. The results of each improving plan inspected during a six-month period and the results are compared. It has been found that there is a meaningful and significant dependence between knowledge based stimuli and client satisfaction. By comparing the financial based and knowledge based incentives, it was found that the technological factors are more important and the results and conclusions are more sensible rather than economic factors. Details of research procedure and differences between economic and technical factors are discussed.

Keywords:

Human Resource Management, Construction Department, EPC Contractor, Knowledge based incentives, Economic Incentives, Client Satisfaction

Introduction

The method of management of human resources can have important effects on each individual department of an EPC contractor as any functional organization (Lingard et al. 2008). In petroleum megaprojects, where combining multiple stages of the project is really complicated, forecasting of effectiveness in human resources management plans can be lead to save of time and costs in a high scale. The special effects of economic concerns shall also be applied in any performance assessment in human resources management plans.

In EPC contractors, some of various patterns such as employee training and development that can improve the organization effectively may be needed to change in companies with various multi functional tasking plan. Based on some related studies, one of the main factors that affect the efficiency of HRM plans and can be completely differ in various departments in an EPC contractor is the economic environmental conditions. Especial studies in manufacturing companies show the different levels of effectiveness in each enhancement programs on staff management according to the role of staff as well as other features (Katou and Budwar, 2007). The similar researches about the effect of role of staff on improving level of HRM plans illustrated the same results especially in small business firms. So, based on a summarization of literature, it can be concluded that the predicted effects of a human resource planning in a multi task project oriented organization such as EPC contractor shall be generally investigated considering different level of effects in each department of the organization.

Research Methodology

This research set out to investigate the human resources management practices in construction departments of companies involved in an industrial mega project. A survey design was developed and questionnaires adopted based on it and distributed to eight different companies with various roles in the project. The project scope of work was upgrading a petroleum refinery in central province of Iran. Total investment of the project is about 1.5 billion USD. The main and major role of companies was commonly engineering, procurement, and construction (EPC). The project is named as IRUP (Iranian Refinery Upgrading Project) hereafter.

To determine adequate sample specification to be a real represent of the population in all companies, random selection method is applied (Borget et al, 1996). So, in each stage of the completion of the questionnaires, any staff in the target population has equal chance of being selected as a participant. An outline of main and specific roles for all participants is listed in Table 1. It shall be noted that the working department of the employees has be considered in sampling procedure. The sample consisted of 195 participants in EPC contractors which evenly distributed in eight companies. Moreover, 25 participants from client body including main employer as well as management consultant (MC) of the project is questioned to recognize the changes in client satisfaction after improving of the human resources factors in EPC contractors. All of data were collected in particular division of the companies that directly involved in IRUP.

Table 1. Participants features including organizations and specific role in the project

Participant's Role	Frequency	Percent
EPC Contractor, Construction Dept.	195	100
Officer	9	4.6
Yard Laborers	38	19.5
Structure Eng.	47	24.1
Grading Eng.	18	9.2
Construction Coordinator	29	14.9
Construction Inspector	19	9.7
Field Engineer	21	10.8
Group Manager	14	7.2
Client Staff	25	100
Client Field Supervisor	6	24.0
Management Consultant Supervisor	11	44.0
Group Manager	8	32.0

Required time for completion of questionnaire was about 20 minutes. Before distribution of questionnaire, the respondents were completely advised that participating in the research is voluntary, how they have to answer to the questions in a fuzzy manner from 1 to 9, and when the forms will be collected. They were blind about main goals of the research.

As a basis structure of the questionnaires, two main groups of factors as independent variables of the research are defined to represent the status of human resource management in the company. First group consist of knowledge-based factors including on the job training schedule applied during last six months for EPC contractor staff. Also, knowledge management system as well as technical supporting system implementing in the company during a 6-month time period ending to research time is considered in this group. Second group consist of economic factors of HRM including pay for performance system, reward and incentive program, and staff welfare scheme which were applied in the companies in six-month duration before completing of questionnaires. Based on this basic frame explained before, questionnaires have two main sections.

At the first section of questionnaire, the main question as a context was "is there any effective human resources management in your company especially considering knowledge-based factors?". Ten detail questions included in this part of questionnaire about the quality, applicability and usefulness of company on the job training program. Some main topics of questions were the appropriate diversity of training subjects, adequacy of courses according to IRUP requirements, qualification of trainers, duration, intervals, and intermission of training courses, considering interdisciplinary trainings, and professional level of vocational courses.

Qualification of knowledge management system of company and staff loyalty about it is also considered in the first part of questionnaire. It shall be noted that these context questions are changed to positive statements to be able to analyze the answers based on Likert scale pointing.

At the second section of questionnaires, the main statement as a context was "there is an effective human resources management in your company especially considering economic

factors” Again, ten detail statement included in this part of questionnaire about the adequacy of financial stimulate of staff, performance appraisal system, rewarding values and time intervals, ranking method of staff in rewarding program, and interacting between salaries and promotional plan is considered in the second part of the questions. All of the statements set up as positive.

So, in a 9-point scale of answering, 9 mean that “I strongly agree” and on the other side, 1 mean that “I strongly disagree”. 5 mean neither agree nor disagree with it. Points between 1 and 5 present somewhat disagree in a range and similarly, points between 5 and 9 show somewhat agree. This scaling pattern which advocate by some practitioners, add more granularity to raw data gathered from participants.

Another simple-form questionnaire is prepared only for client staff to evaluate the main goal of the research as its major dependent variable: client satisfaction. Five simple positive statements about the quality level of each EPC contractor in IRUP are included in the questionnaire. Observing contract essentials, actual high performance of the companies in engineering, procurement, and construction progresses in each month and in total, no lag of the progresses between plan and actual statuses, and excellent ethical and professional behavior of EPC contractors from client point of view considered in the statements of this special questionnaire.

Data Analysis

Each specific question or statement can have its response which may be analyzed individually. But in this research, for raw data analysis, all of the related statements in a same group have been summed and one concluded point is determined for each group. We evaluate the results as a whole. The raw data received from participants are treated and descriptive data is produced. For treating Likert scale response data, integer part of the average of all responses in each group is selected as whole point for the group. The participants’ responses received from questionnaires completed by EPC contractors staff have been summed into two main groups named as “technological factors” and “economic factors”. On the other hand, the raw data gathered from IRUP client side have been summed as client satisfaction based on client staff point of view about each of the eight EPC contractors.

This data summarized for each EPC contractor and named as “HRM effectiveness” because the main expected result from an effective human resource management in each EPC contractor is surly client satisfaction. Then, the relationships between these groups of data are investigated. Data analyzed to inspect the correlation between each of group data gathered from EPC contractors in one side and client satisfaction as evaluated effectiveness of human resource management in each contractor in the other side. Descriptive data in each group is applied for analysis.

It shall be noted that all of the technical requirements for summing of multiple Likert question responses together is completely provided in data analysis. So, there is not any statistical dangerous about the results and the concluded judgments. In all questions, the same scale point is applied. Interval scales are used to provide a defendable approximation where coding clearly indicates the order of magnitudes for differences between items. In

all items and statements, an individual latent specification of the company is measured. The measured specification cannot directly be estimated, but clearly can be inferred by participants based on some other measurable and directly observable specifications in the company.

Based on this quantitative approach, data analysis is done using correlation analysis method. Correlation factor between various descriptive data series is calculated and based on the values of factors, the importance of any independent variable on the main dependent variable is analyzed. There are two independent variables which affect the one main dependent variable. This analysis is separately carried out for each division of the companies including engineering division, procurement department, and construction division. The raw data is gathered separately from all three parts of each company. So, the descriptive data can be analyzed separately in these various divisions.

For determination of correlation factor in each analysis stage, a linear trend line with zero intercept is considered. The best value of correlation factor (i. e. 1), means that the independent variable or HRM studied factors have strong effects on the dependent variable or client satisfaction. This means that the studied factors role on effective management of human resources is statistically significant.

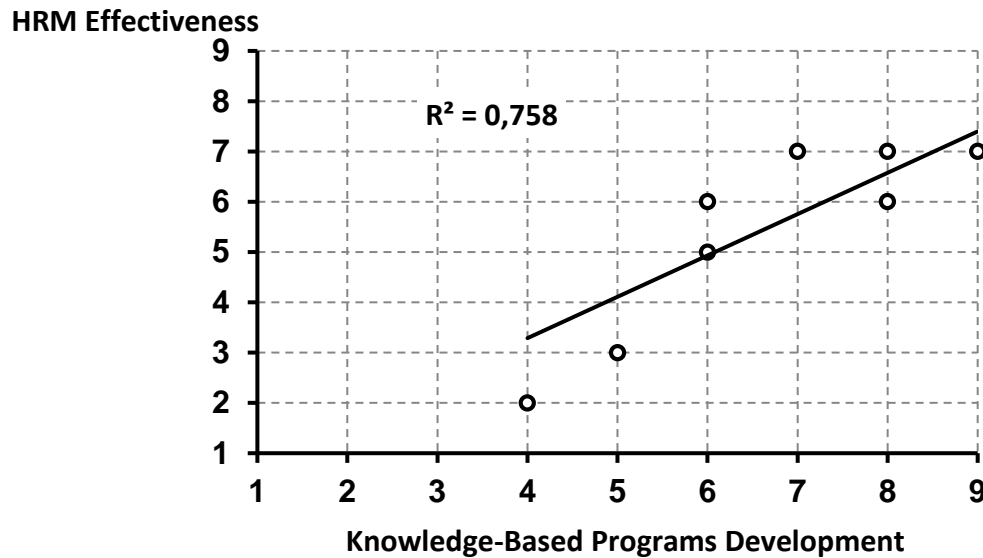
On the other extreme, zero value for correlation factor means that there is not any significant or meaningful relation between studied factors and increasing of HRM effectiveness and considering these factors in staff management in the company may leads to waste of time and cost. A range between zero and one for correlation factor can be paraphrased based on these two extreme definitions. The results of data analysis as well as comprehensive description of it are presented in the next session.

Results and Discussion

Based on the correlation method of analysis, the results can be categorized in two main parts. Firstly, the importance of HRM factors in knowledge based situation is investigated in construction staff of the companies. In second part of the results, similar investigations are carried out for construction division of the contractor especially for financial based factors. Replies received from a wide range of the participants in the project site are analyzed separately and the results are presented at the last part of the discussion.

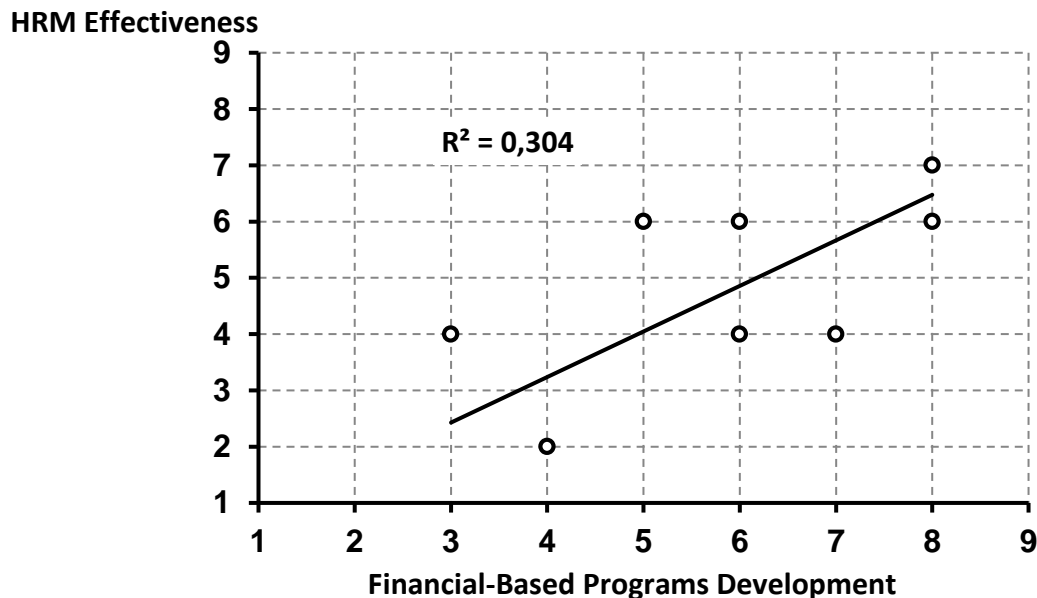
As illustrated in Figure 1, the influences of economic factors on human resources management plans are investigated in construction employees of EPC contractor along eight companies involved in a same mega project named as IRUP. It can be seen that significant correlation between economic factors and organizational performance was found especially in employees with yard-based role. It shall be noted that knowledge based factors named as technological programs, with lower costs and implementing time duration, lead to more efficiency rather than economic factors.

Figure 1: Correlation between HRM effectiveness and knowledge-based factors affect the staff in Construction Department of EPC contractors



It can be paraphrased about the results that an acceptable correlation can be seen between client satisfactions and financial based factors in HRM programs. In companies with more caring about economic issues in construction division, more client satisfaction is achieved. For comparison and more investigation, the same results related to economic or financial based HRM plans efficiency measurement came from processed data gathered from construction department of the companies are illustrated in Figure 2.

Figure 2: Correlation between HRM effectiveness and financial-based factors affect the staff in Construction Department of EPC contractors



As it can be concluded from the figure, reliable relative cannot be seen between client satisfaction and economic HRM programs at least in our study area. Significant relation with high values of correlation factors are achieved between external technological incentives in construction staff and client satisfaction. It seems that enhancing the technological prospects in project site, can directly upgrade the efficiency of construction team.

Conclusion

In eight organizations with engineering, procurement, and construction responsibilities involved in a megaproject in Iranian petroleum refinery industries, the external factors which can affect the human resource management efficiency is statistically investigated especially in their construction department. Correlation method is applied to analyze the raw data gathered by questionnaires from employees in all companies. The data is analyzed in EPC contractors to inspect the relationship between external factors affect the personnel and organizational success. Client satisfaction is measured here as a main signal of success. The factors are also categorized into the two main groups named as economic or financial based factors and technological or knowledge based factors.

It is concluded that the effects of improving technological and knowledge based supports and backing of staff is significantly related to client satisfaction. It seems that the effects of this type of supports can be more efficient comparing to economical supports of construction employees.

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