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The Effect of Production Management on Increase Productivity Operations Management of Shahid Hashemi Nejad Gas Refinery (Khangiran)

Seyed Gholam Hossein Hashemi Nassab*[1], Mohamad Reza Khoda Shenass[2]
Parisa Aramesh[3],Seyed Mahdy Hashemi Nasab[4]
[1]Shahid Hashemi Nejad Refinery
*Email: hh.nasab@yahoo.com
[2]English Language Teaching, Science and Technology University
[3] Transport Organization
[4]MA in Management

Abstract

Until the year 2012, AD was considered the world's second largest gas reserves. Recently new sources of rich gas have been exploring and discovering and are expected to take up the top position of the world's gas reserves. Gas consumption in Iran has increased dramatically in recent years. Industry can find a way to lower gas used as fuel, at least not as important that the gas has been named as the core of development. Gas Shahid Hashemi Nejad Refining Company in the northeast of the country is responsible for providing gas for the six provinces of Iran. This refinery is responsible to produce gas continuously in order to define their plans for 2015 as being Iran's top Oil and Gas company. This study tried to investigate the effect of production management to increase productivity operations management of Shahid Hashemi Nejad Gas refinery. In an interview with the manager of the refinery operation management, it was considered as the effective factor in productivity of the refinery. 95% of the managers of the refinery (all of them were male) were chosen to answer a questionnaire including 20 questions. Finally, based on the gathered data, it was concluded that the production management increases the productivity of the refinery.

Keywords: Shahid Hashemy Nejad Gas Refinery, operation management, Development Center, Stable production ,production management, productivity

Introduction

What the world several decades ago could be distinguished from the world of the uncertain, complex, growing competition, and changing fast evolution and development of knowledge management is also a big change. Due to the intense competition and the speed and volume of information and the challenges facing today's organizations and evaluating the importance of having a Model home has a special significance. Research and scientific studies indicate that in recent years it dramatically increased productivity. Miraculous increase in output are compared to the general improvement of the management system of institutions and policies and implementing scientific research procedures in organizations. No doubt, the growth rate of productivity growth and economic development of communities depends on various factors and inputs used in production of goods and services. Basically maintaining and increasing organizational efficiency and optimal use of resources create a password competing advantage. Relationship dynamics between the economic competitiveness of ours is quite evident. Productivity is the latest challenge to the management. Peter Draker believe that study and background check reports that leading organizations such as employee, HR management capabilities and rehabilitation varieties.

Several factors affect the productivity of the organizations involved in the management productivity. Organization that is able to identify key factors and appropriate control measures its plans to take advantage of the promotion and improvement plans. All companies and organizations, including the production of oil industry operations management is an important part of it.

Fortunately, most of these companies have realized the importance of operations management because they have realized the potential effect of management operations to improve efficiency and service to clients simultaneously gives. In this article the results of research on the effect of production management to improve the efficiency of refinery operations management review offers.

Review of related literature

Operations Management

Manufacturing is a set of correlated operations and activities, which includes product design, material selection, planning, production, inspection, management, and marketing of the products for the manufacturing industries. Manufacturing production is a series of processes adopted to fabricate a product, and such processes exclude the activities for designing, planning, and controlling the production .

Khangiran is the major gas field in North East Iran, near the Turkmenistan border, and it supplies gas to North Eastern provinces through Hasheminejad refinery plant. This gas field has been operational since late 1970s and consists of 65gas wells, 3 gas gathering centers and a central measuring station which is the connection point to the refinery.

Current products of Khangiran gas refinery

As can be seen in the figure below, sour gas is imported to refinery. By Utility (UTILITY) acid gas from which the sulfur is converted to units of sulfur.

The sulfur produced is sent to a sulfur granulation unit. Where the granular sulfur, sulfur becomes and eventually be sent to the molding. Sweet gas is sent by pipeline to use. Petroleum liquids in the distillation unit to four products, including solvents, naphtha, crosine and diesel oil .

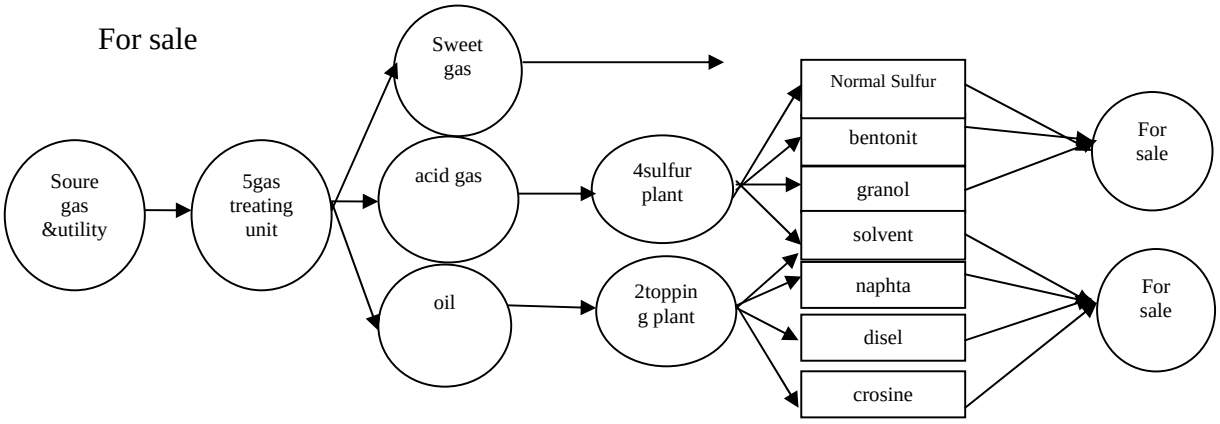

Figure 1: Current products of Khangiran gas refinery

Shahid Hashemi nejad Gas refinery produces%10 of the required gas of Iran. It is the only gas refinery in the east of Iran. Thus, its constant production and productivity makes it as an important and strategic one in Iran. This refinery is the biggest and the oldest manufacturer of Sulfur in Iran, the Sulfur is exported to other countries. The condensation products are sent to oil refineries and petro chemical companies to be changed to other products and goods. Since the oil and gas resources are nearly to be finished, the responsibility of the management is to use appropriate strategies and plans to increase the rate of productivity and decrease the rate of wastages.

Production Management

Production Management involves the planning, organizing and controlling of the whole production process. The interrelation of these activities and operations involved in producing the goods and the services is called a production system. Production means application of processes. (Technology) to the raw material to add the use and economic values to arrive at desired product by the best method, without sacrificing the desired quality. We have three ways of production including (i) Production by Disintegration: By separating the contents of Crude oil or a mixture the desired products are produced. For example the crude oil is disintegrated into various fuel oils. Similarly salt production is also an example for product produced by disintegrated. We can use Mechanical or Chemical or both technologies to get the desired product, so that it will have desired use value. (ii) Production by Integration: In this type of Production various components of the products are assembled together to get the desired product. In this process, physical and chemical properties of the materials used may change. The examples are: assembly of two wheelers, four wheelers and so on. (iii) Production by service: here the chemical and mechanical properties of materials are improved without any physical change. The example for this is Heat Treatment of metals. In real world, a combination of above methods is used.

In general, production is the use of any process or procedure designed to transform a set of input elements into a set of output elements, which have use value and economic value.

Definition of Production Management

It may be defined as: (i) the performance of the management activities with regards to selecting, designing, operating, controlling and updating production system.

(ii) It is the processes of effectively planning, coordinating and controlling the production that is the operations of that part of an enterprise, it means to say that production and operations management is responsible for the actual transformation of raw materials into finished products.

(iii) Production management is a function of management, related to planning, coordinating and controlling the resources required for production to produce specified product by specified methods, by optimal utilization of resources.

(iv) Production management is defined as management function which plans, organizes, coordinates, directs and controls the material supply and processing activities of an enterprise, so that specified products are produced by specified methods to meet an approved sales programme. These activities are being carried out in such a manner that Labour, Plant and Capital available are used to the best advantage of the organization.

Objective of Production Management

The objective of Production Management is to produce the desired product or specified product by specified methods so that the optimal utilization of available resources is met with. Hence the production management is responsible to produce the desired product, which has marketability at the cheapest price by proper planning, the manpower, material and processes. Production management must see that it will deliver right goods of right quantity at right place and at right price. When the above objective is achieved, we say that we have effective Production Management system.

Research questions

Generally, the study aimed to determine the management strategy of Khangiran Gas Refinery of Iran for four aspects. Specifically, the study sought to answer the following questions:

What is the demographic profile of the respondents in terms of age, educational attainment, and length of service?

What is the level of management strategy of the employees as regard in increasing productivity in terms of the production management?

Is there a significant relationship between management strategy and the profiles of the respondents?

What are the problems encountered in Khangiran Refinery based on the suggested solutions?

Based on the results of the study, what are the management model would you propose?

Conceptual Framework of the Study

The main goal of this study was to determine the management strategy of Khangiran Gas Refinery of Iran for four aspects. The researcher uses the input, process and output model. The conceptual paradigm presented in the succeeding page shows sets of inputs which is the profile of the respondents in terms of age, educational attainment and length of service, and the management practices of production, marketing, human resource and financial which are subjected to a process. These are designed to attain certain outputs to satisfy the objectives of the study. In the context of the study, the factors in the operation management of Khangiran Gas refinery are included to define its paradigm as shown in the diagram. Under the process, the presentation starts with the evaluation, data gathering, and analysis using appropriate statistical treatment. The developed conceptual framework as a model to find out about the ways of increasing productivity in refinery by operation management. Finally, it is expected that given the proper process, management model for gas refinery will be proposed. The research paradigm of the study is shown on the next page.

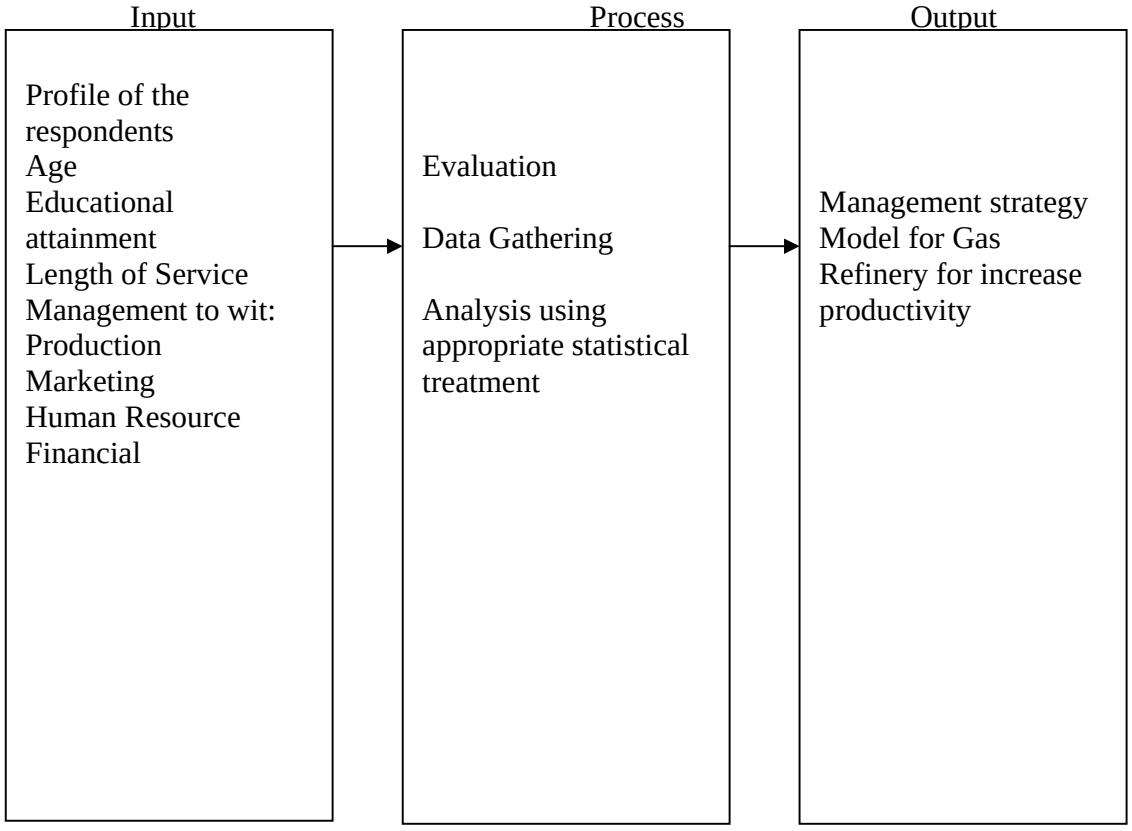

Figure 2: The Research Paradigm

Research Design

The researcher used a cross-sectional survey design. A cross-sectional survey design involves obtaining information from a wide section of respondents at once without need to follow up the respondents for further information (Amin, 2005). Thus, data collection was done over a short period. Quantitative and qualitative approaches were used with the view of triangulation as being appropriate for the study.

Participants of the study

The respondents of the study were ninety seven (97) employees of Khangiran Gas Refinery; age range of them is between 30 to 60 years old. Convenience sampling technique was utilized in the study because all of the respondents were easily available and identified.

Instrument of the study

The data gathering instrument used in the study was self-made questionnaire with 80 items. According to Amin (2005), questionnaires are pencil and paper instruments designed to gather data from individuals about their knowledge, attitudes, beliefs and feelings. They are useful in gathering data, which is descriptive of current events, conditions, or attributes of a population at a particular point in time. The questionnaire are also useful in generating reliable and valid data from a high proportion of a population within a reasonable time period at a minimum cost and is a relatively cheap and quick means of obtaining information. As a form of data collection instruments, questionnaires offer anonymity and increase the likelihood of obtaining accurate information when sensitive information is required. The research instrument included two parts.

Part I deals with the demographic profile of the respondents that includes respondents' age, educational attainment and length of service.

Part II deals with the level of effectiveness of the operation management of Khangiran Gas Refinery in increasing its productivity in terms of production management; marketing management; human resource management and financial management.

Validity of Research Instrument

Validity refers to the extent to which an instrument measures what it purports to measure (Amin, 2005). To ensure validity of research instruments, the draft instrument was subjected to scrutiny by the supervisor, other lecturers in the department and colleagues who had knowledge in research and industry. Their comments and recommendations were used to improve the final copy of the instruments. The instruments were also subjected to rating by experts and the content validity index (CVI). The CVI, which was 0.79 for the questionnaire was greater than 0.7. Thus, the questionnaire was considered as valid for the study.

Procedures

After the approval of the proposed study, the researcher obtained permission letter from the Khangiran Gas Refinery, which was used to seek permission of managers in charge in order to administer a questionnaire to employers of Khangiran Gas Refinery, and heads of departments. The raw data were field edited, later coded and analyzed. The researcher analyzed quantitative data from questionnaires using descriptive statistics, whereby data collected were subjected to frequencies and percentages, because it is easy to interpret, understand and compare frequencies. Correlation analysis was used to test the relationship of operation management by production management, marketing management, human resource management, and financial management of the Khangiran

Gas Refinery. It was worth mentioning that all the analysis in this study was done by the use of SPSS software.

Data analysis methods

All measures used in this study were written in English and Persian and reviewed by managers in production management, marketing management, human resource management, and financial management. They were measured on 5-point Likert type scales, ranging from highly effective, effective, moderately effective, less effective, and not effective. After the pilot testing for the reliability and validity of the questionnaire, some of the items were clarified or changed to be more representative of the intended constructs. The researcher removed an item if it did not contribute strongly to the alpha value and if its content was not essential for the construct. After purifying a scale, the researcher averaged the entire variable representing the construct; therefore, any variable measured by the scale can range in value from one to five, where five is the most desirable value.

ANOVA: ANOVA (analysis of Variance was used to test the hypotheses that the means among two or more groups are equal, under the assumption that the sampled populations are normally distributed. The researcher opted for the 5% level of probability with 95% reliability to determine the degree of significance of findings. The study established at the level of 0.05 level of significance.

One-Sample Kolmogorov-Smirnov Test: The One-Sample Kolmogorov-Smirnov Test procedure compares the observed cumulative distribution function for a variable with a specified theoretical distribution, which may be normal, uniform, Poisson, or exponential. The Kolmogorov-Smirnov *Z* is computed from the largest difference (in absolute value) between the observed and theoretical cumulative distribution functions. This goodness-of-fit test tests whether the observations could reasonably have come from the specified distribution.

Regression Model: Regression models are used to predict one variable from one or more other variables. Regression models provide the scientist with a powerful tool, allowing predictions about past, present, or future events to be made with information about past or present events. The scientist employs these models either because it is less expensive in terms of time and/or money to collect the information to make the predictions than to collect the information about the event itself, or, more likely, because the event to be predicted will occur in some future time.

Results and Discussion

This chapter presents the analysis and interpretation of data congregated from the respondents. The specific problems stated in the study are answered chronologically. The data are presented in tabular forms with the corresponding textual presentation and interpretation.

Profile of the Respondents

Table 1. Age of the Respondents

Age	Frequency	Percentage
30-40	49	%50.51
41-50	39	%40.21
51 & under 60 years old	9	%9.28
Total	97	%100

Table 1 presents the age of the respondents. Most of the respondents belong to 30 to 40 years old with 49 or 50.517% of the overall respondents, followed by age bracket 41-50 with 39 to 40.21% and those ages 51 & less than 60 years old are the least with 9 or 9.28% of the overall respondents. This indicates that the most of the respondents of the study are younger.

Table 2 . Educational attainment of the respondents

Education	Frequency	Percentage
Master Degree	20	%20.62
Bachelor Degree	77	%79.38
Total	97	%100

Table 2 shows the education attained by the respondents. Majority of the respondents had the highest education of bachelor degree with 77 or 79.38% while the rest 20 or 20.62% of the respondents already had their master degree. It indicates that all of the respondents had their formal education.

Table 3. Experience level of the respondents

Length	Frequency	Percentage
10-20	47	%49.47
21-30	39	%41.05
Above 30	9	%9.47
Total	97	%100

Table 3 shows the years of service of the respondents rendered in working at Khangiran Gas Refinery. Majority of the respondents had 10 to 20 years of service in the company with 47 or 49.47%, followed by 39 or 41.05% of the respondents rendered their 21 to 30 years in service to this company, while the least respondents had been working for above 30 years with 9 or 9.47%. It indicates that since most of the respondents are younger, it depicts in this table that most of them had at least 10 to 20 years in service.

Level of Management Strategy

Table 4 shows the level of management strategy of the employees as regard to increasing productivity in terms of production management. Twenty statements were included in the table and the highest weighted mean was “basic repairment of operational units is done regularly.” with 4.35 means score and verbal interpretation of “effective” while lowest mean was 3.05 with verbal interpretation of “moderately effective” for the statement “providing extra materials is simple and easy.”. It indicates employees tended to secured that the operation units is always well functioning by doing basic repairment regularly. Having simple malfunction in the operation units may affect the production of the company, thus it seemed that most of the respondents rated the factor doing basic repairment regularly “effective” in increasing productivity. On the other hand, it can be noticed that, for the respondents, providing extra materials is simple and easy is moderately effective for them in increasing the productivity. It can be seen that respondents have less perception that providing extra materials when needed was easy and simple in their company thus, for them this way of production management is only moderately effectively for them. Overall, the

table shows in terms of productive management, management strategy was “effective” in increasing productivity. This can be verified by the total grand mean of 3.76. It shows that the level of management strategy in terms of productive management was “effective” for the respondents. the production management is doing well to increase the productivity of the company by assuring all operation units was well function through doing basic repairment so that no hassle on continue producing the products of the company.

Table 4. Level of management strategy of the employee with regard to increasing production in terms of production management

Items	Factors	Weighted Mean	Verbal Interpretation
	Production monitoring is done continuously.	4.19	Effective
	Before any changes appropriate context is made.	4.02	Effective
	The process of saving new materials is effective.	3.96	Effective
	Future development is planned for new productions.	3.73	Effective
	Constant trying of producing high quality materials.	3.91	Effective
	There are enough human resource and experts to reach the goal.	3.74	Effective
	Education development is developed among the employers.	3.30	Moderately Effective
	Providing extra materials is simple and easy.	3.05	Moderately Effective
	Creating new techniques of producing is developed carefully.	3.31	Moderately Effective
	Producing and developing new materials.	3.57	Effective
	Funding development is specified for research unit.	3.64	Effective
	The products satisfied costumers	3.41	Moderately Effective
	Useful and effective plans are selected in order to preventing wasting time and money.	3.59	Effective
	In evaluation process, the amount of time and energy is considered.	3.68	Effective
	In evaluation of projects, the degree of dependency to other countries is considered.	3.85	Effective
	Use of new technology is done.	3.62	Effective
	The employers are expert enough to work in that department.	4.20	Effective
	Basic repairment of operational units is done regularly.	4.35	Effective
	After repairment, producing is done without stopping.	4.14	Effective
	All the repairments are done carefully.	4.03	Effective
	Grand Mean	3.76	Effective

Investigating the research hypotheses

As it was mentioned in the previous chapters, this study aimed to discover the effective elements of increasing the productivity of the Shahid Hashemi nejad Gas refinery. There is independent variable production management. It is worth mentioning that productivity of the refinery is the dependent variable.

Hypothesis 1: There is a positive significant relationship between the production management and productivity of the operations management refinery.

To investigate this hypothesis the researcher calculated the correlation coefficient between production management and productivity of the refinery, but due to the dependent and independent variables it is appropriate to use the linear regression model instead of correlation coefficient. The fitted model for this hypothesis is as follows: $Y_i = \beta_0 + \beta_1 \text{Production management}_i + \varepsilon_i$

Table 5. The regression model of this hypothesis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.661[a]	.701	.701	09.36547	1.023
a. Predictors: (Constant), Production management					
b. Dependent Variable: Y					

According to table 8, the correlation coefficient between production management and productivity of the operations management refinery is 0.661, thus there is a significant relationship between these two variables. In other words, the increase of the production management leads to the increase of the refinery productivity. Based on data presented in table 5 the coefficient of determination is 0.701 which indicates that 70.1% of the changes in dependent variable (productivity of the refinery) are originated from the independent variable (production management).

Table 6. ANOVA for the effectiveness of regression model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	598796.422	1	598796.422	5362.596	.000[a]
	Residual	23658.327	95	85.156		
	Total	622454.749	96			
a. Predictors: (Constant), Production management						
b. Dependent Variable: Y						

In fact, this table evaluates the following hypotheses:

$$\begin{cases} \beta_1 = 0 \\ \beta_1 \neq 0 \end{cases}$$

Acceptance of the mentioned hypothesis indicated that the regression coefficient would not be zero. Given that p-value=0.00 is less than 0.05 (p-value <0.05), so the efficacy of model would be accepted at 95% level of significance.

In the next table (table 7) coefficients of the regression model are presented and showed that with the increase in the production management the productivity of the refinery will increase.

The significance level of production management is 0.00 which is lower than 0.05, so there is a significant relationship between the production management and productivity of the refinery at

95% level of significance. Thus the following model can be presented for the first hypothesis: $Y_i = 34.899 + 4.235 * \text{Production management}_i$

Table 7.Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.469	2.105		7.517	.000
	Production management	4.235	.009	.661	54.453	.000

This model showed that by increasing one unit of production management, 4.235 units will be added to the productivity of the operations management refinery. Consequently, there is a positive significant relationship between the production management and productivity of the refinery. With careful planning and evaluation of projects, wasting time and money can be prevented and having powerful maintenance system and evaluating them before using them lead to better productivity and quality productions of the refinery.

Conclusions and Recommendations

This chapter presents the summary of findings, conclusion and recommendations made by the researcher in answer with the statement of the problem.

Explanation of the strategy plan for the Khangiran gas Refinery for increase productivity

According to the presented strategic model, first of all, organizational culture of the refinery is explained for the new workers, and common ideas and values are presented to them. Those who are not able to adapt themselves to the goals and values are omitted at the beginning of the employment. At the same time the newly employed workers participate in training courses, the salary and rewarding systems are being introduced to them by the experts. By doing such plans and programs the base of human resource development is enhanced. In an organization, those who have job satisfaction and organizational commitment get the management positions which leads to better managing of human resource, financial, marketing and production processes. By developing customer-manager interaction system, the managers are able to interact with the consumers directly and be aware of the weak and strong points of their products and goods. Moreover, they can ask the costumers ideas in producing new goods such as Sulfur and condensates, in this way organization will be the first in the oil and gas industry. Regarding the social responsibility, the manager and workers of the organization try to decrease environmental contaminants of the refinery, and by using modern equipment the health of the workers is also promoted. All these tasks will result in high quality products, customer satisfaction. The costumers' satisfaction can be understood from interviews and questionnaires, and selling rate of products and reduction of wastings.

Conclusion

The respondents in the study were ninety seven (97) adult male employees of Khangiran Gas Refinery Iran. All of the respondents were male. Majority of them were bachelor degree holder while the rest were masteral graduates. Almost half of the respondents have a length of service from 10 to 20 years in the gas refinery

The level of management strategy of Khangiran Gas Refinery in terms of production management, marketing management, human resource management and financial management

revealed an interpretation of “effective” in increasing production in the gas refinery which means that all the respondents in the study have effective knowledge on the operational management in increasing productivity. Significant relationship between the production management and productivity of the operations management refinery

There was a positive significant relationship between the production management and productivity of the refinery because the increase of the production management leads to the increase of the refinery productivity, therefore the null hypothesis was rejected.

Recommendations

The following are hereby recommendations based on the summary of findings which revealed moderate level of effectiveness.

According to the respondents who were all high managers of the refinery human resource management was the most effective variable in productivity of the refinery. Among the four variables, production management, human resource management, marketing management, and financial management, the human resource management was the most effective one and the financial management was the least management. As you know in order to produce a good five important sources are required; human resource, method, raw material, equipment and investment. Among the existence of the full-skilled and semi-skilled workers would help to high productivity of the refinery. Thus, the most important strategy for an organization should be related to this issue.

Regarding the notion of the production management the followings are recommended:

Knowledge and information management is an important element which should be considered through the way of reaching the organization goals. Applying knowledge management leads to better decisions, more flexibility, more profit, saving energy, more productivity, making new job positions, and increasing motivation among workers.

Regarding the manufacturers the cooperative model should be presented. In this model cooperation and sharing ideas are the key terms. There two types of manufacturers, one who produce the important not strategic resources which are called independent manufacturers, and those who produce strategic goods which are called dependent manufacturers. It is worth mentioning that the success element of the Japanese factories is related to the use of this model, cooperation model.

Today, successful companies are those which use up-to-date technology and knowledge and produce high quality goods and products. Their products are based on customers’ needs. The managers of the refinery should consider these new technologies and by using them and creativity try to decrease the wasting of the refinery and increase its productivity.

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