Research Paper

The Model for Managing Capital Assets' Lifecycle in Petrochemical Industry

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Available online at: www.IJSMD.Com

Abstract

Undoubtedly, all companies and investors aim to gain maximum efficiency and benefit. The company assets including personnel, equipment, and production tools get depreciated due to day-to-day work and this is not pleasant to investors. The assets' useful lifecycle management may play a key role in increasing productivity. However, this study aimed to investigate cost creating factors in production, operation, sale, waste, and etc., proper management, productivity factors, and assets' control tools such as RFID. Then, using parametric and non-parametric statistical methods, it was investigated that whether there was a model for short-term and long-term planning to achieve maximum efficiency in Assaluyeh and Mahshahr's Petrochemical Industries. The findings showed that the mismanagement of useful lifecycle of assets was one of the factors which increased the cost. Also, there was significant relationship between management of useful lifecycle of assets and planning of management.

Keywords: Capital Assets, Management of Life Cycle, Petrochemical Industry.

Introduction

The era of using traditional management practices has gradually ended and new horizons appear in the form of intelligent and expert systems, learning organizations, order in chaos theories, and other innovative ideas.

Perhaps, the management may be considered as one of the most important activities in human's today social life. In fact, these activities realize the mission and goals of organizations, exploit the available resources, and convert the human talents from potentiality to actuality. In the process of performing their duties, the managers conduct activities such as planning, organizing, monitoring and control, motivation, communication, guidance, and decision-making. These activities shape management and lead to coordination and achieving goals.

There are many definitions for management. Some define it as tasks such as planning, organizing, coordinating, and etc. One of the management and economics scholars (Herberta. Simon) states that the management is decision-making and considers this task as the best and most original role of manager. Henry Mintzberg considers tasks and roles such as leadership, information resource, decision-making, and relationship with other organizations for manager. Considering above, this study aims to investigate: whether there is a clear model for assets' useful lifecycle management. The research hypotheses are as follows:

- First sub-hypothesis: There is significant relationship between asset's useful life cycle management and management decision-making.
- Second sub-hypothesis: There is significant relationship between asset's useful life cycle management and management planning.
- Third sub-hypothesis: The lack of proper management of asset's useful life cycle is one of the factors which increases the cost.
- Fourth sub-hypothesis: The cost of maintenance is not calculated correctly in accordance with accounting standards in Iran.
- Fifth sub-hypothesis: The mismanagement of assets' useful lifecycle leads to creation of unusual wastes.
- Main hypothesis: There is a systematic model for managing assets' useful lifecycle.

Methodology

This was applied descriptive correlational field study. The research tools included interviews, questionnaires, and documents review. The stratified sampling method was used for selecting the sample.

Table 1: Population and sample size

Groups	Population size	Sample size
Senior Managers	50	16
Financial Managers	80	26
Operational managers	120	39
Total	250	81

The reliability of questionnaire (24 questions) was determined to be 0.73. Since the calculated validity was above 0.70, therefore, it was concluded that the questionnaire as valid. The descriptive (frequency, tables, percentages, central tendency and dispersion indices including mean, median, standard deviation, variance, etc.) and inferential (one-sample Z and t tests and Friedman test) statistics were used for analyzing the data.

Findings

Demographic characteristics

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Gender:

The table 2 shows the frequency and percentage of managers' gender.

Table 2: Frequency and percentage of managers in terms of gender

Gender	Frequency	Percentage
Female	10	12.35
Male	71	87.65
Total	81	100

According to above table, 87.65 percent are men and 12.35 percent are women.

Education level:

The table 3 shows the frequency and percentage of managers' education level.

Table 3: Frequency and percentage of managers in terms of education level

Education level	Frequency	Cumulative frequency	Percentage	Cumulative percentage
Diploma / Associate	3	3	3.70	3.70
Bachelor	56	59	69.14	72.84
Master and higher	22	81	27.16	100,00
Total	81	--	100	--

According to above table, the percentage of bachelor, master or higher, and associate and diploma degree was 69.14, 27.16, and 3.70, respectively.

Organizational position:

The table 4 shows the frequency and percentage of managers' organizational position.

Table 4: Frequency and percentage of managers in terms of organizational position

Organizational position	Frequency	Percentage
Senior manager (CEO, member of board of directors, deputies, etc.)	16	19.75
Financial manager (financial assistant, chief accountant)	26	32.10
Operational manager (technical manager, maintenance manager, etc.)	39	48.15
Total	81	100

According to above table, the percentage of operational managers, financial managers, and senior managers was 48.15, 32.10, and 19.75, respectively.

Hypothesis test

Here, the research hypothesis and questions are examined. The statistical indices and hypotheses test are provided in table 5.

Table 5: Statistical indices and hypotheses test

Variables	Number	Mean	Middle	Minimum	Maximum	Standard deviation	Standard error	Z	df	P
First sub-hypothesis	81	3.88	4.00	1.60	5.00	0.60	0.07	13.10	80	0.00
Second sub-hypothesis	81	3.90	4.00	2.40	5.00	0.54	0.06	14.91	80	0.00
Third sub-hypothesis	81	3.14	3.17	2.00	4.17	0.57	0.06	2.15	80	0.03
Fourth sub-hypothesis	81	60.49	50.00	25.00	100.00	23.34	2.59	4.05	80	0.00
Fifth sub-hypothesis	81	61.57	62.50	37.50	79.17	8.49	0.94	12.27	80	0.00
Main hypothesis	81	60.79	60.44	41.78	75.33	7.56	0.84	12.84	80	0.00

The mean of all hypotheses is more than determined average (= 3). Therefore, it appears that the managers are agree and strongly agree with issue which are covered in sub-hypotheses and confirm them. According to test results, the calculated t or Z value for first hypothesis is 13.10; this is significant with 80 degrees of freedom at a confidence level of 99% (a= 0.0). Therefore, the null hypothesis is rejected and it may be said that at a confidence level of 99% (a= 0.0), there is significant relationship between asset's useful life cycle management and management decision-making. The calculated t value for second

hypothesis is 14.91; this is significant with 80 degrees of freedom at a confidence level of 99% (a= 0.0). Therefore, the null hypothesis is rejected and it may be said that at a confidence level of 99% (a= 0.0), there is significant relationship between asset's useful life cycle management and management planning.

The calculated t value for third hypothesis is 2.15; this is significant with 80 degrees of freedom at a confidence level of 99% (a= 0.05). Therefore, the null hypothesis is rejected and it may be said that the mismanagement of assets' useful lifecycle is one of the factors which increases the cost. The calculated t or

Z value for fourth sub-hypothesis is 13.10; this is significant with 80 degrees of freedom at a confidence level of 99% (a= 0.0). Therefore, the null hypothesis is rejected and it may be said that at a confidence level of 99% (a= 0.0), there is significant relationship between asset's useful life cycle management and management decision-making. The calculated t value for fifth sub-hypothesis is 4.05; this is significant with 80 degrees of freedom at a confidence level of 99% (a= 0.0). Therefore, the null hypothesis is rejected and it may be said that at a confidence level of 99% (a= 0.0), the maintenance costs are not calculated correctly according to accounting standards in Iran.

The calculated t value for main hypothesis is 12.84; this is significant with 80 degrees of freedom at a confidence level of 99% (a= 0.0). Therefore, the null hypothesis is rejected and the main hypothesis is confirmed.

The other proposed questions may also be answered according to collected data. In the following, the effect of demographic characteristics (gender, organizational position, and education level) on first and second hypotheses is considered.

A) Comparison of factors in terms of gender:

For this purpose, the statistical indicators of women and men were calculated for each sub-hypothesis. Then, the t-test was conducted among independent groups to compare the mean scores of two groups. The statistical test results are provided in following table.

Table 6: t-test results to compare the factors in men and women

Variables	Men			Women			T	df	p
	Mean	Number	Standard deviation	Mean	Number	Standard deviation			
First sub-hypothesis	63.90	71	10.05	69.67	10	8.81	-1.72	79	0.09
Second sub-hypothesis	64.60	71	9.26	68.00	10	7.24	-1.11	79	0.27
Third sub-hypothesis	52.23	71	9.60	52.50	10	9.21	-0.08	79	0.93
Fourth sub-hypothesis	59.15	71	23.62	70.00	10	19.72	-1.38	79	0.17
Fifth sub-hypothesis	60.97	71	8.55	65.83	10	7.03	-1.72	79	0.09
Main hypothesis	60.17	71	7.48	65.20	10	6.95	-2.01	79	0.048

According to above table, the calculated t value is only significant in main research hypothesis at confidence level of 95% (a =0.05); it is not significant at sub-hypotheses. Therefore, it may be said that there is no significant difference between attitudes of men and women on issues which are proposed in first to third sub-hypotheses. The following figure reflects the comparison between groups.

B) Comparison of factors in terms of organizational position:

In this regard, the one-way analysis of variance (ANOVA) was used to compare the mean scores of three groups (senior, financial, and operational managers). The statistical test results are provided in following table.

Table 7: one-way analysis of variance results to compare the factors in terms of organizational position

Factors	Between groups			Within groups			F	P
	SS	df	ms	ss	df	ms		
First sub-hypothesis	716.96	2	358.48	7340.10	78	94.10	3.81	0.03
Second sub-hypothesis	88.64	2	44.32	6491.88	78	83.23	0.53	0.59
Third sub-hypothesis	1257.06	2	628.53	5951.45	78	76.30	8.24	0.00
Fourth sub-hypothesis	7924.13	2	3962.07	35656.11	78	450.13	8.67	0.00
Fifth sub-hypothesis	475.49	2	237.74	5288.40	78	67.80	3.51	0.03
Main hypothesis	921.58	2	460.79	3653.70	78	46.84	9.84	0.00

According to above table, the calculated f value for second hypothesis is not significant at 95% confidence level (a= 0.05). In other cases, the calculated f value is significant at confidence level of 95 percent. Thus, it may be said that there is a significant difference between senior, financial, and operational managers in terms of first, third, and main hypotheses. The following figure shows the comparison between groups.

Conclusion

Conclusion of first sub-hypothesis:

This hypothesis stated that there is a significant relationship between asset's useful life cycle management and decision-making. After testing this hypothesis, it was confirmed at confidence level of 99%. In other words, it was found that the assets' useful lifecycle management plays a large role in decision of manager to acquire assets. As a result:

(There is a significant relationship between asset's useful life cycle management and decision-making).

Conclusion of second sub-hypothesis:

This hypothesis stated that there is a significant relationship between asset's useful life cycle management and planning. After testing this hypothesis, it was confirmed at confidence level of 99%. In other words, it was found that the planning plays a large role in assets' useful lifecycle. As a result:

(There is a significant relationship between asset's useful life cycle management and planning).

Conclusion of third sub-hypothesis:

This hypothesis stated that the mismanagement of assets' useful lifecycle is one of the factors which increases the cost.

After testing this hypothesis, it was confirmed at confidence level of 95%. In other words, it was found that the mismanagement of assets' useful lifecycle is one of the factors which increases the cost. As a result:

(The mismanagement of assets' useful lifecycle is one of the factors which increases the cost).

Conclusion of fourth sub-hypothesis:

This hypothesis stated that the maintenance costs are not calculated correctly in accordance with standards in Iran. After testing this hypothesis, it was confirmed at confidence level of 99%. In other words, it was found that the maintenance costs are not calculated correctly in accordance with standards in Iran. As a result:

(The maintenance costs are not calculated correctly in accordance with standards in Iran).

Conclusion of fifth sub-hypothesis:

This hypothesis stated that the mismanagement of assets' useful lifecycle leads to creation of unusual wastes. After testing this hypothesis, it was confirmed at confidence level of 99%. In other words, it was found that the mismanagement of assets' useful lifecycle leads to creation of unusual wastes. As a result:

(The mismanagement of assets' useful lifecycle leads to creation of unusual wastes).

Conclusion of main hypothesis:

This hypothesis stated that there is a systematic model for managing assets' useful lifecycle. After testing the sub-hypotheses, it was found that after applying the actions referred to in sub-hypotheses, a systematic model may be created for managing assets' useful lifecycle. As a result, after applying the actions referred to in sub-hypotheses, a systematic model may be created for managing assets' useful lifecycle. It should be noted that there was not seen any systematic model in objective observations and field study.

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