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# The Management of Capital Assets Life Cycle in Petrochemical Industry

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ABSTRACT

**Objective**: The capital asset management is proposed to be a key to solve the problems and manage the affairs. The organizations which focus on new products, expand their services, and create efficiently their supply chain now face with emerging markets and excess expensive capacities. These efforts aim to reduce the costs of capital assets which are considered as one of the expensive costs. **Methodology**: However, this study aimed to analyze the life cycle management pattern of capital assets in petrochemical industry to investigate the costly factors in production, operation, sale, waste, and etc. and proper management and efficiency factors to increase efficiency and introduce asset control tools such as RFID. **Results**: The findings showed that the mismanagement of useful lifecycle of assets was one of the factors which increased the cost. **Conclusion**: Also, there was significant relationship between management of useful lifecycle of assets and planning of management.

## 1. Introduction

One of the main goals of accounting is provision of information for decision-making and planning. In important decisions, the managers actually rely on management accounting information (Brent & Labuschagne, 2006). Therefore, the decision-making process associated with management accounting information is very important. The leadership and control of daily operations require a variety of information about the production process or provision of services. For example, in leadership of operational activities, the manager requires the information of goods and services costs to use them in pricing decisions (Komonen et al., 2012). The management accounting reports rarely solve the management decision problems. However, this information often draws the attention of managers to topics which require their management skills. For example, suppose that the electricity cost of a profit unit to be substantially higher than the budgeted amount. This does not show or justify the actual costs exceed from budget amount or does not even provide suggestion to select specific solution, but it attracts the attention of manager to the issue (Arntzen et al., 1995).

Considering high capital costs and high interest rates expectations of stakeholders, today, the good management and increased volume of investments and productivity of organizations are important (Van der Lei et al., 2012). The assets' useful life cycle management is one of the factors which determines the role of investment in strategically important assets and increases the organization's ability to respond to market changes, because the activities of asset-based organizations are sensitive to a considerable extent to market demands (Campbell et al., 2016). This technology increases the level of access to assets, considering the changes in market. Since the production level depends on number of contracts which are concluded between customers, this system increases the ability of organization to respond to market opportunities including share of goods, products, product pricing, and etc. In this regard, the managers should identify the short-term and long-term periods for maintenance of assets; this will be realized by a proper planning (Kleindorfer et al., 2005). Considering this, the final outcome of asset management is increasing efficiency, reducing maintenance and capital costs, and improving the sensitivity of market. Therefore, the asset's useful life cycle management has important benefits which are mentioned briefly in following:

1. Increased asset life
2. Optimized maintenance planning
3. Reduced downtime of assets
4. Reduced availability and productivity of assets
5. Improved real-time work of assets

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6. Reduced operating costs of maintenance
7. Improved maintenance schedule
8. Reduced accidents caused by failure to maintain
9. Increased strategic use of planning activities
10. Reduced working capital in operating assets.

Considering the above, the RFID system may be used to accomplish asset life cycle management completely by computer and software. However, this study aims to investigate: whether there is a clear model for life cycle management of assets. The research hypotheses are as follows (Mohseni, 2003):

- 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.

## 2. Materials and methods

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 (Labuschagne & Brent, 2005).

**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 (Vanier, 2001).

## 3. Discussion and results

Demographic characteristics Gender:

**Table 2. Frequency and percentage of managers' gender**

| Gender | Frequency | Percentage |
|---|---|---|
| Female | 10 | 12,35 |
| Male | 71 | 87,65 |
| Total | 81 | 100,00 |

### *3.1 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 | -- | 100,00 | -- |

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.

### *3.2 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 | 100,00 |

According to above table, the percentage of operational managers, financial managers, and senior managerswas48.15, 32.10, and 19.75, respectively.

### *3.3 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 |

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), thereis significant relationship between asset's useful life cycle management and management decision-making (Woodward, 1997). 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 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 (Schuman & Brent, 2005).

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 |

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 (Komonen et al., 2006).

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 |

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.

## 4. Conclusion

### *4.1 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).

### *4.2 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).

### *4.3 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).

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