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# APPRAISAL MODEL OF ORGANIZATIONAL PERFORMANCE BASED ON BSC (STUDY CASE: AMIRKABIR PETROCHEMICAL COMPANY)

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## ABSTRACT

This research aims to evaluate the organizational performance of Amirkabir Petrochemical Company (AKPC) based on balanced scorecard (BSC). This is a practical survey study by purpose with the employees and customers sample volumes estimated by Cochran's sample size formula at 233 and 105 respectively. In the area of development and learning, the statistical population included 591 office directors, specialists and employees holding different education levels working in different parts (including administrative, financial, technical, engineering, and operational) of AKPC. In the area of customer, the statistical population also included 144 major AKPC customers. Data were collected by analyzing the available documents (library system) and standard questionnaires. They were then analyzed through the inferential and descriptive statistics (Chronbach's alpha, Kolmogorov–Smirnov test, and one-sample t-test) by SPSS. Findings revealed that based on BSC in three areas of internal, customer and financial processes, the real AKPC performance corresponded with the anticipated performance. However, the same was not true of the learning and development area.

*Keywords: Performance Appraisal, Balanced Scorecard, Strategy, Strategy Plan*

## INTRODUCTION

The traditional performance appraisal system mostly relied on financial measures and the companies' financial affairs accounted for such assessments. In the era of economy, financial parameters were good indicatorsfor evaluating companies' prosperity. The competitive advantages, in those days, were virtually based on reduced end cost directly arising from saving on mass production. More complicated economic relationships and business matters at the threshold of 21th century but weakened companies' reliance on financial measures to evaluate their performances and to keep track of their weaknesses and strengths. And the deficiency of mere dependency on financial measures consequently further appeared than before (Kaplan and Norton, 1996).

During 90s, Robert Kaplan and David Norton developed a set of measures that they refer to as a "balanced scorecard." Including both process and results measures, these measures give top managers a fast but comprehensive view of the organization's performance to know how successful the organization is in realizing its strategic objectives.

Since performance appraisal is the most effective tool for any organization to be assured of the correct steps taken toward long-term strategic objectives, this model can substantially help organizations to implement their strategies without any deviation (Nils Yoran, 2005).

As the number of measures is an important matter in balanced scorecard, measures should be selected showing comprehensively how strategic objectives are reachable and there should not be numerous measures (Shahmoradi, 2004). Accordingly, this question is posed that how AKPC is balanced performance measured and evaluated?

### Research Literature

### One-Dimensional Approaches to Performance Appraisal

Focusing more on financial side of organizations, these approaches are mostly applied to the companies of industry era. Some of most important ones are summarized as follows (Atkinson, 1997).

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## Human Resource Accounting

According to Sekmen, human resource accounting (HRA) aims to identify and report economic value made by human resources for an organization in order to provide input for making financial and managerial decisions. Researchers have found three types of measuring models for HRA:

1. Cost models to consider human resource related costs;
2. Human resource value models incorporating non-monetary behavior into the economic value of money models; and
3. Monetary emphasis models calculating descending estimates of future salaries.

However, none of the above HRA models bring long-term prosperity for organizations. Interestingly, most of these systems were developed in service organizations.

### Economic Value Added

The economic value added is the difference between the return on capital and the cost of financing the firm's capital. The positive economic value added indicates an estimate of a firm's economic profit created for shareholders.

The negative economic value added, on the other hand, refers to capital loss. This is similar to traditional accounting measures with two major differences. First, it considers the cost of total capital. Second, it is not limited by traditional accounting principles.

### Activity-Based Costing

Activity-based costing (ABC) is a costing methodology that identifies activities in an organization and assigns the cost of each activity with resources to all products and services according to the actual consumption by each. This model assigns more indirect costs (overhead) into direct costs compared to conventional costing. Adding a percent to cover sale and management costs, the conventional costing model completes product cost calculations. This model assigns no cost to reworks, delays, inventory, bottlenecks, etc. Such accounting method is favorable when there are less varied products and high costs assigned to labor force and materials. But, as products now come in a great many varieties and manufactured by mechanized systems, no great share is allotted to labor force and materials. However, applying this costing model highlights activities with no value added including inefficiencies. This is a function that the conventional method lacks.

### Intellectual Capital

Intellectual capital (IP) is generally a combination of physical and monetary assets, intellectual capital and a collection of intangible resources. The term is defined as employees' knowledge, skills and capabilities. Such structural capital arises from human resources manifesting as innovation, business processes, and relation with dealers, and etc.

### Multi-Dimensional Approaches to Performance Appraisal

### Beneficiary Approach

The beneficiary approach depicts the organizational performance on realizing the primary objectives (founders' and shareholders' goals) as a result of internal processes of organizations. A comprehensive system of measures assessing and monitoring processes in terms of accomplished goals should be developed to help organizations improve their performance and reach their primary objectives. From such perspective, it is not helpful to improve organizational performance by monitoring how primary objectives are achieved, because the primary objectives are the final results of organizational performance regarding the secondary objectives. Additionally, organizations move toward inactive modification rather than focusing on causes and their determining factors.

### Balanced Scorecard

Viewing through four financial, customers, internal processes and learning and development perspectives, the balanced scorecard seeks to create a balance between financial goals as the results of earlier performances in two sides of customers and internal processes and the goals of other perspectives. Accordingly, a balance is created between retrospective measures (financial indices) and forward-looking measures (the indices of three other measures) (Sandstrom and Toivanen, 2002).
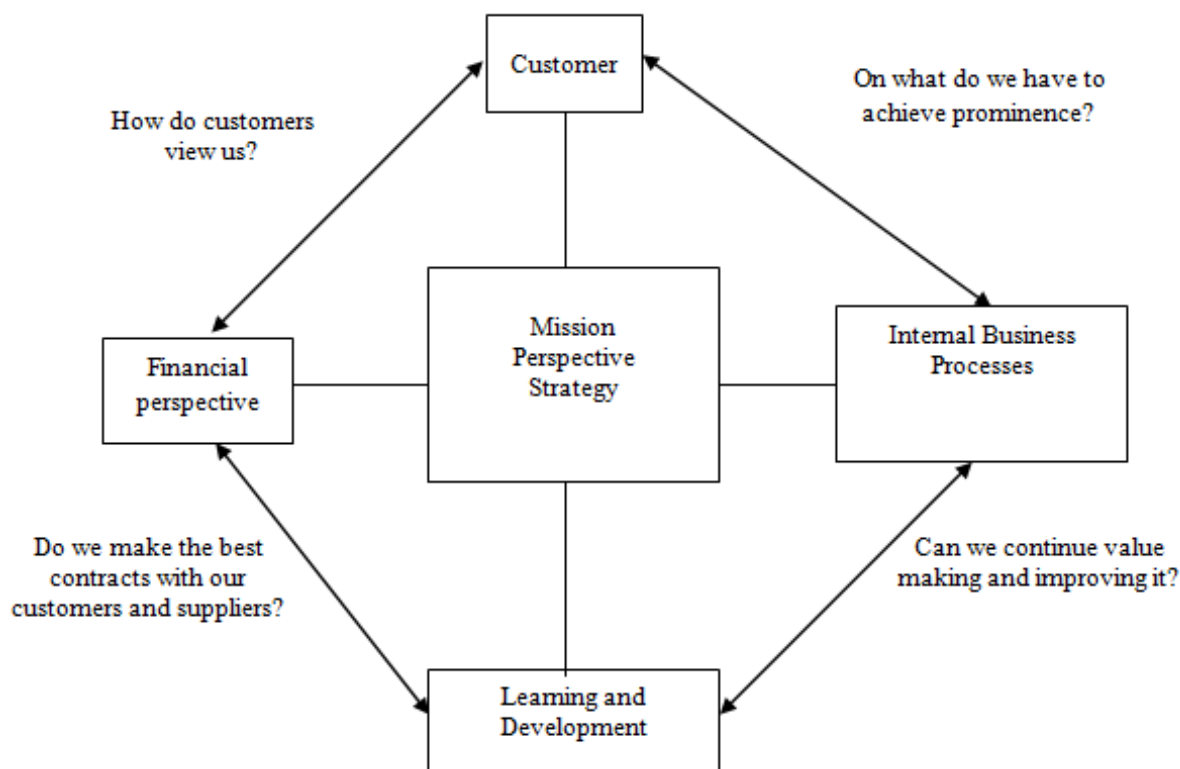
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**Figure 1: A conceptual framework for BSC**

Balanced scorecard is a framework translating strategic objectives to a collection of relevant criteria (relevant measures). Its major logic forms a four-sided approach encompassing conventional and financial indices.

However, it does not see it as sufficient because financial indices refer merely to retrospective results. Whereas, a measuring system should specify which performances and investments are effective in financial prosperity and improving customer-oriented relationships and which are not (Kaplan and Norton, 1996).

Balanced scorecard states that to help an organization develop or at least perform acceptably at competition market; it should have a good financial performance (sale, revenue, profit, cash flow). Results obtained from financial perspective take their root from customer side formed by factors such as customer satisfaction, customer-based productivity, keeping customers, attracting new customers, and organization image. This is while the organizational position is based on internal processes from customers' perspective.

Costs, quality and timing, in fact, are contributing factors in keeping customers and raising their satisfaction. Finally well-accomplished processes highly depend on organizational abilities and inabilities in terms of learning and development (managing physical, communication, human, and information assets). An appropriate balance should be created between these four perspectives to help organizations grow and develop. The other sides, especially processes, development and learning, should be financially fed (Kaplan and Norton, 1996).

***Introducing BSC Sides***

The balanced scorecard maintains the conventional financial indices. But financial indices are just a story of last events, which is a sufficient story for the organizations of industrial era. The financial indices are insufficient but are measures to direct and evaluate the companies of information era on making value by investing on customers, suppliers, personnel, processes, technology and innovation. BSC complements financial indices of last activities by indices determining future performance. These are organizational

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strategies and perspectives that specify the purposes and measures of scorecards. These purposes and measures view organizational performance from four sides: financial, customer, internal processes, and development and learning (Kaplan and Norton, 1996).

## 1. Financial Side

Financial side measures economic outcomes arising from implementing strategies. As with financial performance in previous programing systems prior to strategic programing and controlling systems that could be measured by indices such as operating profit, return on capital and value added, with balanced scorecard as an approach to measure performance and a tool for control, financial performance is also measured by the same indices (Kaplan and Norton, 1996). BSC emphasizes on the fact that in the different stages of an organization life (growth, stability, and making money), the financial indices would be completely different and making purpose regardless of this would put some distance between organizations and their long-term objectives (Kaplan and Norton, 1996).

## 2. Customer Side

In customer side, managers first determine customer and market sectors in which they are to compete with each other. Determined sectors include existing and potential customers and markets (Kaplan and Norton, 1996). This side encompasses several leading and secondary measures. The former includes customer satisfaction, keeping existing customers, attracting new customers, customer productivity and market share in market and customer sectors. And the later comprises factors making value for customers and determining the leading indices accordingly (Kaplan and Norton, 1992).

Factors making value for customers are categorized in three groups (Kaplan and Norton, 1996):

1. Characteristics of a product or service include waiting time, price, quality, functionality, and distinction;
2. Customers' mind impression of an organization and its authenticity and reputation including people's impression of product quality and organizational integrity and authenticity; and
3. Relation with customer including trustiness, quick respond to customers and after-sales service.

## 3. Development and Learning Side

Organizational learning and growth are secured by three basic resources of human force, information systems and organizational instructions and procedures. How to reach peculiar capabilities and capacities are assessed based on learning and development side of BSC. To evaluate objectives relating to this side, factors such as the availability of information for customers and of internal processes for managers and employees, the alignment of personnel's motivations with organizational missions and purposes, and the organizational procedures are measured (Kaplan and Norton, 1996).

## 4. Internal Processes Side

According to internal processes side, managers first determine those internal processes which should be focused on in order to implement strategies (such processes enable organizations to make value, keep and attract customers, and satisfy shareholders' expectations) (Kaplan and Norton, 1996). Any business enterprise defines a collection of processes for making value for its customers and producing profit for shareholders. BSC selects Porter's value chain model as a general model to apply in this regard which includes three processes of innovation, operation and after-sales services (Kaplan and Norton, 1996).

### Research Hypothesis

Hypothesis 1: the BSC true performance mean for any of studied measures in the area of customers is less than the predicted performance.

Hypothesis 2: the BSC true performance mean for any of studied measures in the area of local processes is less than the predicted performance.

Hypothesis 3: the BSC true performance mean for any of studied measures in the area of development and learning is less than the predicted performance.

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Hypothesis 4: the BSC true performance mean for any of studied measures in financial area is less than the predicted performance.

## MATERIALS AND METHODS

This is a practical study by purpose and a descriptive survey by nature. Here, AKPC's performance is measured by BSC in which a view of the company based on major criteria of each area, key performance indicators and predicted purposes of studied measures and comparing them with the company's true performance is provided for management to make wise decisions to improve and construct appropriate infrastructures of developing performance and secure its organization against challenges and build up its competitive power.

In the area of customer, the customer satisfaction questionnaire containing 21 questions was used to measure customers' satisfaction of product qualities, after-sales services, and etc. However, in the area of development and learning, learning questionnaire aiming to study the organizational learning was practiced.

In the area of development and learning, the statistical population included 591 office directors, specialists and employees holding different education levels working in different parts (including administrative, financial, technical, engineering, and operational) of AKPC. In the area of customer, the statistical population also included 144 major AKPC customers. The employee sample volumes estimated by Cochran's sample size formula at 233 and 105 respectively.

Data were analyzed through the inferential and descriptive statistics (Chronbach's alpha, Kolmogorov–Smirnov test, and one-sample t-test).A significance level of 0.05 wasassumed for all hypotheses ($\alpha = 0.05$).

*Data Analysis*
*First Hypothesis*
The statistical hypothesis is as follow:
H0: $\mu \leq \mu_0$
H1: $\mu > \mu_0$
Where $\mu_0$ is the variable mean of the statistical society and $\mu$ is a constant based on which the hypothesis is verified or rejected. Here, customers' satisfaction minimum equals to 73.5. This means that the questionnaire respondents are 70 percent satisfied.
$H_0$: the BSC true performance mean for any of studied measures in the area of customers is equal to and more than the predicted performance.
$H_1$: the BSC true performance mean for any of studied measures in the area of customers is less than the predicted performance.

**Table 1: Testing hypothesis 1**

| 0.95% confidence level | | Test Value = 73.5 | | | | |
|---|---|---|---|---|---|---|
| High level | Low level | Mean difference | Significance level | Degree of freedom | t-test | |
| 0.35 | -3.51 | -1.58 | 0.109 | 104 | -1.617 | Customer satisfaction |

As based on the company's objective, the predicted satisfaction of AKPC products equaled to 73.5, the test value, confidence level and the degree of freedom were calculated at 73.5, 0.95, and 104 respectively with t = -1.617. Also, the significance level of 0.109 was estimated. Given the significance level was greater than 0.05, $H_0$ was confirmed and $H_1$ was rejected. This means that in the area of customers, the true performance mean was equal to and greater than the predicted performance.

*Second Hypothesis*
The statistical hypothesis is as follow:
H0: $\mu \leq \mu_0$
H1: $\mu > \mu_0$

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$H_0$: the BSC true performance mean for any of studied measures in the area of internal processes is equal to and higher than the predicted performance.

$H_1$: the BSC true performance mean for any of studied measures in the area of internal processes is less than the predicted performance.

The studied measures were divided into 13 isolated processes as follows:

**Table 2: Information relating to internal processes**

| Processes | Predicted Value | True Performance |
|---|---|---|
| Increasing production | 0.32 | 0.280 |
| Decreasing pauses and improved maintenance management | 6.41 | 6.370 |
| Reducing energy consumption and chemical and waste materials | 5.71 | 5.040 |
| Keeping target customers | 2.49 | 1.904 |
| Optimizing wastes and wastewater | 0.72 | 0.716 |
| Improving supply chain | 5.20 | 5.014 |
| Improving innovation and research | 1.04 | 0.519 |
| Developing customer-based relationship | 1.24 | 0.934 |
| Building up company's authenticity and reputation | 0.93 | 0.934 |
| Improving working security culture | 2.49 | 1.705 |
| Improving employees' working health | 1.64 | 1.641 |
| Reducing industrial pollution | 0.31 | 0.311 |
| Reducing accidents | 1.164 | 1.35 |

Given the statistical data were less than 30, Kolmogorov–Smirnov test was exercised to test data normality and to see whether the statistical data follow a normal distribution. Thus, data were tested after being entered into the software. Results are presented in the following table.

**Table 3: Testing true data normality and predicting the second hypothesis**

| True Value | Predicted Value | Kolmogorov–Smirnov test |
|---|---|---|
| 13 | 13 | Number |
| 2.040 | 2.296 | Mean |
| 2.046 | 2.107 | Standard Deviation |
| 1.067 | 0.857 | Kolmogorov–Smirnov test |
| 0.205 | 0.455 | Test Level |

According to the software output, data test level relating to prediction measures equals to 0.455 being greater than the significance level of 0.05. Therefore, the data distribution follows the normal distribution function. On the other hand, data test level relating to true measures equals to 0.205 being greater than the significance level of 0.05. Thus, the data distribution follows the normal distribution function. Now with data following the normal distribution, t-test is used to test the statistical hypothesis relevant to the statistical population.

**Table 4: Testing hypothesis 2**

| 0.95% confidence level | | Test Value = 2.29 | | | | |
|---|---|---|---|---|---|---|
| High level | Low level | Mean difference | Significance level | Degree of freedom | t-test | |
| 0.98 | -1.48 | -0.24 | 0.669 | 12 | -0.439 | Internal processes |

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Regarding the above table, the test value, confidence level and the degree of freedom were calculated at 2.29, 0.95, and 12 respectively with t = -0.439. Also, the significance level of 0.669 was estimated. Given the significance level was greater than 0.05, $H_0$ was confirmed and $H_1$ was rejected. This means that in the area of internal processes, the true performance mean was equal to and greater than the predicted performance.

*Third Hypothesis*
The statistical hypothesis is as follow:
$H0: \mu \leq \mu 0$
$H1: \mu > \mu 0$
$H_0$: the BSC true performance mean for any of studied measures in the area of learning and development is equal to and higher than the predicted performance.
$H_1$: the BSC true performance mean for any of studied measures in the area of learning and development is less than the predicted performance.
Given the learning level of organization was predicted at 70% for the first half of 2014, the test value was equal to 210. The questionnaire included 60 questions which was valued at 1 to 5 by Likert scale. This meant that the total score was 300 with 70% of which equaled to 210.

**Table 5: Testing the third hypothesis**

| 0.95% confidence level | | Test Value = 210 | | | | |
|---|---|---|---|---|---|---|
| High level | Low level | Mean difference | Significance level | Degree of freedom | t-test | |
| -20.16 | -29.77 | -24.96 | 0.000 | 232 | -10.236 | Development and Learning |

Regarding the above table, the confidence level and the degree of freedom were calculated at 0.95 and 232 respectively with the significance level of 0. Given the significance level was smaller than 0.05, the true performance mean was less than the predicted performance.

*Fourth Hypothesis*
The statistical hypothesis is as follow:
$H0: \mu \leq \mu 0$
$H1: \mu > \mu 0$
$H_0$: the BSC true performance mean for any of studied measures in financial area is equal to and higher than the predicted performance.
$H_1$: the BSC true performance mean for any of studied measures in financial area is less than the predicted performance.
The studied measures were divided into 7 isolated processes as follows:

**Table 6: Information relating to financial area**

| Processes | Predicted Value | True Performance |
|---|---|---|
| Increasing share value | 3.40 | 3.006 |
| Improving liquidity | 3.10 | 2.748 |
| Increasing revenue | 3.23 | 2.462 |
| Improving productivity | 4 | 4 |
| Penetrating into market | 6.58 | 6.005 |
| Improving asset efficiency | 2.50 | 2.165 |
| Reducing costs | 4.20 | 4.050 |

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Given the statistical data were less than 30, Kolmogorov–Smirnov test was exercised to test data normality and to see whether the statistical data follow a normal distribution. Thus, data were tested after being entered into the software. Results are presented in the following table.

As data were smaller than 30, the hypothesis was analyzed by testing the normality of relevant data. Table 7 shows that each of data relating to the predicted and true measures follow from normal distribution.

**Table 7: Testing true data normality and predicting the fourth hypothesis**

| True Value | Predicted Value | Kolmogorov–Smirnov test |
|---|---|---|
| 7 | 7 | Number |
| 3.858 | 3.490 | Mean |
| 1.322 | 1.322 | Standard Deviation |
| 0.567 | 0.676 | Kolmogorov–Smirnov test |
| 0.904 | 0.750 | Test Level |

**Table 8: Testing the fourth hypothesis**

| 0.95% confidence level | | Test Value = 3.85 | | | | |
|---|---|---|---|---|---|---|
| High level | Low level | Mean difference | Significance level | Degree of freedom | t-test | |
| 0.826 | -1.749 | -0.461 | 0.414 | 6 | -0.877 | Financial area |

Regarding the above table, the significance level of 0.414 was estimated. Given the significance level was greater than 0.05, $H_0$ was confirmed and $H_1$ was rejected. This means that in financial area, the true performance mean was equal to and greater than the predicted performance.

**RESULTS AND DISCUSSION**
*First Hypothesis*
As seen in table 1, the significance level of 0.109 was estimated for customer satisfaction which was greater than 0.05. $H_0$ was then confirmed and $H_1$ was rejected. This means that in the area of customers, the true performance mean was equal to and greater than the predicted performance.
*Second Hypothesis*
Regarding table 4, the significance level of 0.66 was estimated for internal processes which was greater than 0.05. $H_0$ was then confirmed and $H_1$ was rejected. This means that in the area of internal processes, the true performance mean was equal to and greater than the predicted performance.
*Third Hypothesis*
Given table 5, the significance level of 0was estimated for learning and development which was smaller than 0.05. $H_0$ was then rejected and $H_1$ was accepted. This means that in the area of learning and development, the true performance mean was less than the predicted performance.
*Fourth Hypothesis*
Regarding table 8, the significance level of 0.414 was estimated. Given the significance level was greater than 0.05, $H_0$ was confirmed and $H_1$ was rejected. This means that in financial area, the true performance mean was equal to and greater than the predicted performance.
*Suggestions*
*Suggestions Relating to the First Hypothesis*
As the true organizational performance in the area of customers corresponds to the predictions, the organization should preserve the current trend to build up and increase customers' loyalty and at the same time has to provide its major customers with special promotions, hold seminars in which customers participate and create variety in its product portfolio and sale methods. It is recommended to establish

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customer relationship management (CRM) system to raise customer satisfaction. Loading, delivering and packaging processes are also suggested to be revised to accelerate delivering process. It is important, on the other hand, to analyze prices, to match with domestic market and analyze product market.

## Suggestions Relating to the Second Hypothesis

The true organizational performance in the area of internal processes also corresponds to the predictions. The organization has to keep the current status to increase and continue its production on schedule, and seriously consider the feasibility of raising production, making needed modifications, optimizing production and using preventive maintenance systems in units. Computerized maintenance management system (CMMS) is recommended to improve maintenance management. It is also necessary to improve sale process, creating the needed infrastructure to handle stored stock in order to improve supply change. An investigation on new grades and producing colored granules has been considered in the company's innovation and research programs. Several health, safety, and environment (HSE) training courses can also be held to enhance the work safety.

## Suggestions Relating to the Third Hypothesis

The true organizational performance in the area of learning and development was less than predictions. This side is the foundation of organizational performance in others areas. If the organizational performance is weak, it cannot be expected from the organization to have positive function in other areas in long-term. So, the first matter comes to the minds is to train human resources. It is, thus, recommended to reinforce managers and employees by holding the needed courses inside or outside of the complex to make better the organizational performance in this area. It is also a good idea to measure educational needs and holding specialized courses by professional experts. Holding co-thinking sessions and scientific conferences inside the complex and improving the suggestion system could also be helpful. It is, on the other side, suggested to establish a comprehensive software system, implementing video conferences, installing and launching an organizational portal to develop the integrated information technology system, and establishing an organizational model to expand the interested developmental systems could be considered. Implementing a succession-oriented plan and customers respect plan are also suggested.

## Suggestions Relating to the Fourth Hypothesis

The true organizational performance in the area of internal processes also corresponds to the predictions. Therefore, the company should keep the current status and at the same time implement some measures, including translating foreign currency mortgages to Rialones, making long-term contracts to supply feed, and investing in natural gas liquid (NGL) to improve its asset efficiencies and build up its liquidity.

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