

# Use of Balanced Scorecard Procedure in an Aircraft Maintenance, Repair and Overhaul Firm

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**Abstract:** - In today's conditions, the importance of preserving the current order and seeking opportunities for the future is increasing. Balanced Scorecard is a method that relates business strategies to implementation targets and checks whether the strategies achieve the expected results by monitoring the variables representing these relationships. The purpose of this study is to determine, conduct, analyze and evaluate the targets by four perspectives as Financial Perspective, Customer Perspective, Internal Process Perspective, Learning and Growth Perspective in an Aircraft MRO (Maintenance, Repair and Overhaul) Organization.

**Key-Words:** - Balanced scorecard, management system, maintenance, repair, overhaul

## I INTRODUCTION

The deficiencies of the cost accounting model in achieving a strategic competitive advantage in the global competitive environment has pushed the enterprises into new searches. As a result, a new performance measurement approach called Balanced Scorecard has been developed as a result of the synthesis of post-modern management techniques and cost accounting model [1].

Balanced Scorecard Model was developed in line with the need for a measurement and management system that preserves traditional financial measures; ensures financial and non-financial measures and targets are included in the management system by giving an equal weight at the same time and integrating all these measures affecting the future performance [2].

Balanced Scorecard Model; Influenced by management approaches such as Quality Assurance,

Total Quality, Customer Focused Production and Organization, Change Management, Process Management, Competition Management and has emerged as a strategic management approach with more radical views from its sources [3].

## II BALANCED SCORECARD MODEL

Balanced Scorecard Model is a performance measurement method, developed to help businesses using traditional performance measurement systems overcome the problems businesses encounter [4].

Balanced Scorecard can be defined briefly as the expression of a company's vision, mission and strategy by transforming them into physical measures. In other words, Balanced Scorecard is a performance measurement method that the company's short and the financial with the long-term objectives and the correlation between non-financial performance indicators, causal explaining in the relationship and in a balanced way [5].

Balanced Scorecard is a strategic planning tool designed to meet the expectations and needs of customers and examines the links between targets, objectives and strategies. Balanced Scorecard is a system that enables the integration of dimensions by trying to explain the strategic dimensions of the business and to balance between strategic measurements and significantly affects the way managers evaluate their businesses. The key is to link the various forms of measurement to the strategy [6].

Balanced Scorecard approach uses a wide range of performance measurement criteria that support priority management values such as customers, quality, profit, human resources, innovation, flexibility and learning. For this reason, Balanced Scorecard is not only a performance measurement system, but also a management system that can direct the energy, skills and specific information of employees to achieve long-term strategic targets in an enterprise [7].

Balanced Scorecard method suggests that although traditional financial measures are used exactly, measures will become inadequate measuring the overall performance of the business. Due to the fact that financial measures only contain information about the activities of the company in the past period. However, these measures are not enough for businesses trying to increase their future performance by investing in customers, employees, technology and all managerial processes in the information age [8].

Balanced Scorecard Model ensures that the financial indicators of the past performances of the enterprises are integrated with the indicators of the factors that will form the source of their future performances, non-financial indicators. The main ones of these indicators are; high quality products and services, motivated and skilled employees, innovation and efficiency in organizational processes. The targets and dimensions of the Balanced Scorecard are determined by considering the mission, vision and strategy of the enterprise. In order to operate this process, Balanced Scorecard evaluates business performance from four different angles. The four different angles mentioned form the perspectives of the Balanced Scorecard. These can be listed as follows [9]:

- Financial Perspective
- Customer Perspective
- Internal Process Perspective
- Learning and Growth Perspective

The creation of the Balanced Scorecard within the business should encourage different units to associate their specific financial objectives with the organizational strategy. Financial purposes are the focal point in the Balanced Scorecard Model. Each measure chosen needs to be part of cause-effect relationships that will create an improvement in financial performance. Balanced Scorecard Model should address all aspects of its business strategy, starting with long-term financial targets, defining a set of financial activities, customers, internal methods and lastly, business employees and systems to achieve those targets.

Every business should determine the financial measures appropriate to their financial purpose and corporate strategies while creating the financial perspective of their Balanced Scorecards. Financial targets and strategies should play a dual role. In other word, the financial perspective should both define the

financial performance planned to be obtained from the strategy to be implemented and should be the final target of the other perspectives in the Balanced Scorecard Model.

In the customer perspective of the Balanced Scorecard Model; the defined customer and market segments represent the resources that will constitute the income component of the financial targets of the business. Customer perspective enables businesses to align the basic measures of customer results as satisfaction, loyalty, continuity and gain with the target customer and market segments. The quality, service levels and satisfaction rates of the goods obtained by the customers are the most important indicators that the customers constantly observe the businesses and change their shopping habits according to these qualities.

Businesses that cannot understand the needs of their customers have noticed that their competitors gain competitive advantage by offering products and services that are more suitable for their customers' preferences. If businesses want to improve their financial performance in the long term, businesses should transform their structures to produce products and services that their customers value. After that, managers should determine the mission and strategy of the enterprise according to the market and customer targets foreseen in the customer perspective of Balanced Scorecard Model. Because businesses must first define their market share and decide in which customer segment they will compete mostly. In other words, determining the product and service profiles to be offered to the target customer segments is the most important factor that will enable Balanced Scorecard Model to improve its customer dimension targets and measures.

The third perspective of the Balanced Scorecard is the internal process perspective. Internal process perspective includes a number of activities within the business such as innovative activities, production and marketing operations, and customer service. Internal process perspective monitors and controls the operability and efficiency of internal methods and processes. Internal process perspective enables the determination of incompatibility and possible deviations between the standards determined during the planning phase and the outputs obtained after the organizational processes. In applying the internal process perspective, managers need to identify the methods that are most important to the business achieving its targets for customers and shareholders.

The fourth perspective of the Balanced Scorecard, the learning and growth perspective aims to achieve the targets of other dimensions. The perspective deals with issues such as employees' abilities, competence

of information systems, motivation and empowerment. In this perspective, connections are established with issues such as the status of the employees in the workplace, problems related to the business and demands from the business management.

The learning and growth perspective is related to the establishment of targets and measures that will provide institutional learning and development. With the purposes determined in terms of financial perspective, customer perspective and internal process perspective, the areas where the enterprise should gain an advantage in order to achieve a performance that will enable it to make a breakthrough. Targets in the learning and growth perspective provide the necessary infrastructure to achieve high targets determined in other dimensions.

### III IMPLEMENTATION OF BALANCED SCORECARD METHODOLOGY

Turkish Technic Inc. is an aircraft maintenance, repair and overhaul company and additionally is a 100% subsidiary of Turkish Airlines. Turkish Technic provides maintenance services for Turkish Airlines' aircraft and components, as well as 3rd Party aircraft and components. Turkish Technic Inc. has been using the KPI method for years. There are organizational targets and also targets on the basis of sub-units such as directorship and department. Organizational targets are prepared annually. Unit targets such as directorship and department can be prepared daily, monthly, quarterly, semi-annually or annually. Each unit prepares its own targets. In case of problems, they can get help from the Process Development Department. In the table that emerges as a result of the target predictions, the actions to be taken are determined and the actions to be taken in case these targets are not realized.

When creating a Balanced Scorecard, the mission and vision that the objectives serve should be explained first. In this way; Balanced Scorecard can be created in connection with mission and vision. The company's mission is to steer the sector by continuously improving its competencies with its product variety, service quality and competitive position in the aviation maintenance and repair sector. The vision of the company is to be one of the top 3 maintenance centers on a global scale by offering innovative solutions in the field of aviation technical services.

There are perspectives, performance measures, periods, targets and outcomes in 4 separate tables. Each subject heading is specified separately in the tables. In Performance Measures, the formula about how to measure the targets, calculations and the places to be obtained are mentioned. The period can be monthly, quarterly, semi-annually or annually. Targets are stated in terms such as percentage, number and time. At the end of the period, they can see whether the targets are realized or not through the outputs. If the target is not achieved, pre-planned steps are taken to prevent this situation.

Financial, customer, internal process, and learning and growth perspective targets, which are obtained from Turkish Technic Inc. are represented in Table 1-4, respectively.

TABLE I. INTERNAL PROCESS PERSPECTIVE TARGETS

Customer Perspective	Performans Measures	Period	Target	Outcome
Error Rate of Reaching to the Customer	Datas from Different Units	Monthly	☐ 📄	2,18
Meeting Customers' Demands on Time	(The Date that Customer Request is Closed - The Date that Customer Request is Received)	Monthly	☐ 📅	85%
Return of the Aircraft within 30 Days from the Date of Return Notified by the Customer	(The Return Target Date Reported by the Customer - The Actual Return Date)	Monthly	☐ 📅	93%
Customer Satisfaction	Customer Satisfaction KPI Value	Annually	☐ 📅	91%
Ensuring that Customer Components Order Opening TAT is Less Than 1 Day	(Time to Open Order - Time to Receive)	Daily	☐ 📅	0,94
Submission of Component Maintenance Offers to the Customer	Average of Submission Times of Bids	Daily	☐ 📄	1,38

TABLE II. LEARNING AND GROWTH PERSPECTIVE TARGETS

Internal Process Perspective	Performans Measures	Period	Target	Outcome
Failure Rate in Assembly	Malfunction in the Assembly / Number of Work Orders Opened	Monthly	☐ 📅	0,48%
KAB Maintenance Operations TAT Average	Number of Maintenance / Total Number of Maintenance Completed at the End of the Period	Monthly	☐ 📅	97,26%
Accident Frequency Rate	Number of Accidents x 1.000.000 / (45 x 4 x Number of Employees)	Monthly	☐ 📅	13,8%
Safety-Related Repetitive Events	Up to 3 Safety-Related Recurrent Events Per Year	Annually	☐ 📄	1,58
Aircraft Maintenance Operations TAT Average Deviation	Total TAT deviation / Total TAT planned	Monthly	☐ 📅	2,98%
Average Received Time	(Received Date-Arrival date)	Daily	☐ 📅	2,38

TABLE III. FINANCIAL PERSPECTIVE TARGETS

Perspective	Measures
Learning and Growth	Employee Satisfaction Feedbacks Appropriate Working Conditions Continuous Professional Education Speed of Adapting to New Standards or Regulations Promulgated Developing Employees' Skills Motivation of Employees Technological Leadership New Product Leadership

TABLE IV. CUSTOMER PERSPECTIVE TARGETS

Financial Perspective	Performans Measures	Period	Target	Outcome
Nationalization Rate Increase	[(Relevant Year's Nationalization Rate / Previous Year's Nationalization Rate) -1]	Annually	☐ 📅	8,90%
R&D Revenue	R&D Projects Revenues	Annually	☐ 📅	14,8 million
Ratio of Poor Quality to Total Sales	Total Cost of Poor Quality / Total Sales	Monthly	☐ 📅	0,41%
Ratio of 3rd Party Turnover to Total Turnover	[(3rd Party Turnover of Related Year / Total Turnover of Related Year) -1]	Annually	☐ 📅	21,60%
Revenue / Stock Ratio	Annual Total Income / Year-End Total Stock Value	Annually	☐ 📅	98,10%
Digitization Index	Digitization Index Survey	Annually	☐ 📅	87,30%

#### IV RESULTS

Balanced Scorecard reflects the relationship between short and long term targets, performance and result indicators to the corporate strategy in a balanced way within the cause- effect hierarchy. Balanced Scorecard ensures the harmonization of targets and behaviors as a key to ensuring the effectiveness of organizations, managers and works in order to achieve results that can be achieved in difficult times.

In other words, Balanced Scorecard is considered as a new management approach that enables companies that fail to turn their corporate strategies into action, to implement their strategies, to associate their strategies with targets for implementation, to check whether the strategies have achieved the expected results and to achieve success by monitoring variables representing these relationships.

Balanced Scorecard is considered as a model that approaches performance measures in a holistic manner, focuses on the customer and the market, develops a shared strategy understanding, the method is easy to use, makes mutual commitment felt in different organizational areas and the method is suitable for flexibility and adaptation for each organization.

Companies can benefit from Balanced Scorecard as a management system, not as an evaluation model. Balanced Scorecard makes organizational strategy and consensus possible. Balanced Scorecard provides a strategic link between long term, short term targets and annual budgets; makes it easier to make decisions and adapt to achieve targets; ensures that strategic researches towards targets are carried out regularly and systematically; provides the necessary information for the evaluation and development of the target and additionally Balanced Scorecard makes easy to get feedback. Balanced Scorecard is a management approach that makes companies successful in transforming organizational strategies into action.

Implementation of Balanced Scorecard, organizations define and analyze their reason for being, mission and values. After mission and values are defined, organizations define their visions with long-term perspectives. They decide on perspectives and criteria. Their targets are determined and leveled. Periodic evaluations are carried out.

Turkish Technic Inc. has been determining its targets with KPI values for years. Turkish Technic Inc. has many targets; the organization maintains and controls them on a system. Although the company is not fully used the Balanced Scorecard method, they are considered to be used. In this study, the targets were examined with the help of the Balanced

Scorecard method. Implementation of the Balanced Scorecard method; the daily, monthly and annual targets of the company can be controlled in a more understandable and simple way. Balanced Scorecard method is easy to compare with previous years. Targets can be easily revised.

There are perspectives, performance measures, periods, targets and outcomes in 4 separate tables. Each subject heading is specified separately in the tables. In Performance Measures, the formulas about how to measure the targets, calculations and the places to be obtained are mentioned. The periods can be monthly, quarterly, semi-annually or annually. Targets are stated in terms such as percentage, number and time. At the end of the period, they can see whether the targets are realized or not through the outputs. If the target is not achieved, pre-planned steps are taken to prevent this situation.

Six targets were presented for each perspective examined with the Financial Perspective, Customer Perspective, Internal Process Perspective, Learning and Growth Perspective. For each perspective, the outcome was obtained and compared after the period ended. Actions have been taken and implemented for those who cannot achieve the target. Targets such as Nationalization Rate Increase, R&D Revenue and Customer Error Rate could not be achieved. Research should be done on why the targets are not achieved. After analysis, kaizens should be applied and improved according to the outputs.

#### V CONCLUSIONS

Balanced Scorecard is a method that every company should use to determine, review, analyze and evaluate its strategic targets in the way of their mission and vision. By comparing the Balanced Scorecards of two different years regarding future works, questions such as whether the targets have changed, the actions taken in cases where the targets are not realized and whether the target has been achieved in the next year can be asked.

With the help of experts, weighting can be made to what targets are most important in the company. As a result of weighting, targets can be selected with multiple decision-making methods and a Balanced Scorecard can be created by separating them into perspectives. Whichever perspective is more important in the organization, perspective can be weighted. As a result of the targets; outcomes can be realized. The targets in perspectives can be examined and analyzed. In the continuation kaizens formed for improvement can be applied and controlled.



## ACKNOWLEDGEMENT

This work has been financially supported by Galatasaray University Research Fund Grant Number FBA-2021-1050.

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