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Measuring and Evaluating Performance within the Strategic Management Perspective: A Study on Performance Measurement of A Seafood Company

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Abstract

Today's business world is more complex and has uncertain conditions which influence the companies to create effective strategies for the dynamic market. Strategic management has now evolved to such a point that its primary value has evolved to help the organization to operate successfully in intensive competition environment that globalization process has been brought to (Hunger & Wheelen, 2011). Considering these complicated conditions and processes, performance measurement has become a popular concept in strategic management.

In this study, a company operating in the seafood industry in Izmir was analyzed. As measurement indicators the data about working hours, the amount of faulty products and the production capacity of workers and etc. were taken for analysis. The study aims to investigate these indicators in detail and state the critical factors that influence the performance of this co mpany.Data were compared with each other and with average production rates in the sector. The results obtained from the study will be presented to the managers to improve their production process.

Keywords:Performance, Strategic Management, Performance Measurement System,SeafoodIndustry

1. Introduction

Strategic management is an organized development of the resources of the functional areas; financial, manufacturing, marketing, technological, manpower etc. in the pursuit of its objectives (Ritson, 2011). As Peter Drucker once said: "If you can't measure it, you can't manage it". Companies should measure the success of their strategies and make corrections to get desired outcomes. The strategic objectives for the organization as a whole should at least specify: the market position and competitive standing that the organization aims to achieve, annual profitability targets, key financial and operating results to be achieved through the organization's chosen activities, and any other milestone (Nedelea and Păun, 2009; Ülgen and Mirze, 2004).

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Strategic Performance Measurement (SPM) is vital for all companies. Some authors indicate that SPM can be both functional and dysfunctional for companies. Since SPM can help company managers or other interest groups to define and achieve their strategic objectives, plans and critical decisions. In this study, the functional side is considered. Possible positive impact of SPM on company performance should also be taken into account.

In the study, the theoretical background about strategic management perspective, performance measurement and evaluation is followed by presenting the methods that are used for evaluating performance. The study focuses on Turkish seafood industry. The data from a company are operating in Izmir examined and the results are discussed. A final section offers conclusions and comments. Given the exploratory nature of this paper, some future research areas are suggested in the conclusions that complete the article.

2. Literature Review

In the current global competition, companies want to gain competitive and to improve their competitive advantages. Generally the competitive advantages of the companies, especially manufacturing companies, depend on the performances of their production process.

Porter (1996) defines in his article "what is strategy" that strategy is a crucial tool of companies to differentiate from competitors and create a sustainable advantage for the company. However Porter mentioned that operational effectiveness and strategy are not the same. Companies should perform different activities from rivals or similar activities in different ways. Also Mintzberg (1987) describes the strategy as both plans for the future and patterns from the past. According to the studies of Gonzalez et al (2012), theorists usually have the same opinion that strategy refers to the long term future of the whole company, not its parts. Moreover, it is also usually accepted that strategy is about achieving a "unique positioning of a company in the market" (Gonzalez et al, 2012). Strategy is dynamic and it is developed from the means of a continuous, interactive learning process throughout the companies. Strategic planning is said to result in a better match between external environment variables and the changing internal organizational conditions of the company (Schmidt, 2010).

Performance measurement is one of the fundamental management functions. Evaluating performance, reviewing changes in the surrounding environment and making adjustments are normal and necessary parts of the strategic management process (Chaneta, 2007). Performance measures should include a mix of both outcome measures as well as performance drivers. These need to be linked to financial measures. Also there will be a monitoring system should be continuous – managers should be able to see how a change in one perspective affects the other perspectives (Martinsons, Davison & Tse, 1999).

The ways and means of measuring performance is perceived as being an increasingly important field of research for both companies and academics. Since the early 1990s, companies have invested increasing amounts of money and other resources to measure their performances. As stated in Folan and Browne's study, many of the most popular recommendations concerning performance measures date from the late eighties and early nineties when PM as a concept was being formed. According to the studies of Folan and Browne performance measurement should (Folan and Browne, 2005):

- Be kept physical (i.e. quantitative)
- Be taken as close to the customer as possible
- have top management support
- involve employees in their development (particularly customer satisfaction measures)
- ensure that those measures use dare relevant to managers and employees in performing their day-to-day jobs
- be part of a feedback loop that links them to manager and employee performance appraisals
- primarily use non-financial performance techniques
- vary between locations;
- change over time as the company needs change;
- be intended to foster improvement rather than just monitoring.

Performance measurement systems (PMS) are concise sets of metrics (which may be financial and/or nonfinancial, long and/or short term, internal and/or external, ex post and/or ex ante) that support the decision-making processes of an organization by gathering, processing, and analyzing quantified information about its performance and presenting it in the form of a succinct overview (Bisbea and Malagueno, 2012; Gimbert et al, 2010). Authors of the selected papers considered Strategic Performance Measurement (SPM) as a means to: implement and reformulate strategy; communicate key objectives and corporate priorities; provide strategic alignment; support process improvement; and encourage incremental innovation. Previous studies have looked at other roles of SPM, such as: promoting specific behaviors and attitudes at different organizational levels; responding to rules and regulations; providing greater accountability within and between organizations; communicating financial and non-financial results to key stakeholders, etc. (Micheli and Manzoni, 2010: 469). SPMs help translate strategy into objectives and measures that can be clearly communicated, thus facilitating the closure of the gap between the strategic vision of the company and the management of its operating activities (Bisbea and Malagueno, 2012).

Based on the literature review it can be said that a well-developed performance measurement system could be used to achieve companies' strategic aims.

In recognition of the need for more relevant, better structured and integrated performance measurement systems, a number of frameworks and models for performance measurement have been developed, such as (Bititci et al.; 2000) :

- balanced scorecard
- SMART ± strategic measurement analysis and reporting technique
- performance measurement for world class manufacturer
- performance measurement questionnaire
- performance criteria system
- Cambridge performance measurement design process
- Integrated performance measurement systems reference model.

3. General Overview of Turkish Seafood Industry

Turkey is surrounded by seas on three sides and it has so great an absolute advantage in terms of seafood with this geographical location. Considering that the sea food sector has a direct or an indirect relationship with such sectors as transportation, tourism, environment, health, food, manufacturing, etc., its importance for employment in our country may be better understood, and one may say that our sea food has an indispensable importance in covering the animal protein deficiency and in creating an added value and employment through their production and exportation (http://www.turkishseafood.org.tr/index.php/en/).

In Turkey as the rest of world, since 2000s, farming-based production increased its share to a great extent against fishing-based production of seafood. According to data derived from TUİK it is supported that seafood industry in Turkey is progressing. While the share of the production through culture fishery was 9.7% in the total production of the seafood industry in 2002, it reached 26.8% in 2011.

As the consumption rate of seafood in 2002 was 627.847 tons/year, in 2011 that rate has increased to 703.545 tons/year. Turkey is a country that both exports and imports seafood. A positive international trade balance can be stated for Turkey for seafood industry. The import rates of seafood have increased from $ 18.754.783 to $ 173.886.517 between 2002 and 2011. Also the export rates have increased from $ 96.728.389 to $ 395.341.929 between 2002 and 2011. These rates clearly prove that within the last decade the industry was in a progress. Despite that progress, the experts and managers with in this industry have the idea that the contribution of the industry to the national economy has not reached a sufficient level yet.

In this respect, it is believed that efficient management of handling processes of seafood for the companies within the sector is crucial for making use of the advantages of the sector effectively. As mentioned before creating correct performance measurement and performance management systems in accordance with the strategies defined is crucial for achieving sustainable success for the companies.

4. Methodology

4.1. Research Goal

Strategic management has gained importance in recent years due to significant contributions to company success through providing a roadmap. Strategic management involves setting goals for organizations and aims to increase profitability and efficiency to achieve these goals by using performance management systems. In this study, operation performance metrics of a seafood company was taken into the analysis and compared with the sector data and the critical factors that have an influence on the performance of this company were stated. Five different cases for various performance outputs were discussed (1.very poor performance-5.very good performance).The study aims to investigate these indicators in detail and find out the effects of strategic decisions on performance.

4.2. Sample data Collection and Research Methodology

The data used in the study were obtained from the seafood company. A performance measurement questionnaire was conducted in the company for three months and the performance data from this measurement were used. Totally data set contains 662 samples. For the analyses, workers performance for each shift time, production capacity of machines, production capacity of sector average etc. were used as key indicators. The data about the current state of the company was compared within the same set of data with a purpose to investigate the development of the company in a certain time period. Comparisons were made with the industry average values. The outcomes were evaluated to create an optimal model to improve the processes (Parnell, 2003). To find the maximum and minimum affecting factors on the process and productivity logistic regression model was used.

Logistic regression is a widely used statistical approach. Logistic regression is useful when the dependent variable is categorical (e.g., presence or absence) and the explanatory (independent) variables are categorical, numerical, or both (Dong et al, 2011). Logistic regression has been utilized for predicting the occurrence of an interesting event or estimating the probability score for occurrence of an interesting event. This model provides the information on the effects of the explanatory variables regarding the dependent variable. However, when the logistic regression model includes significant interaction effects, the main effect becomes complicated to explain (Kim, 2009). Logistic regression is a kind of generalized linear regression model that widely used for prediction of the probability of occurrence of an event. In linear regression model, the linear predictor function Y is written as,

$$h_\beta(x) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + .. + \beta_n x_n = \beta_0 + \sum_{i=1}^{n} \beta_i x_i$$

where h_β indicated the event, x_k and β_k indicated the *k*th predictor and its weight coefficient in the model (Lin et al, 2010).

In this equation, due to the range of x changes in the range of - ∞ and + ∞, the value of the hypotheses shows that the value of x can take every possible value. In logistic regression analysis, the value should be in the range of [0, 1]. in a sample data set in the form of (xi, i), i = 1,2, .., N and providing the condition that $xi \in R$, $yi \in \{0,1\}$, logistic regression equation is as follows:

$$h_\beta(x) = \frac{1}{1 + e^{-z}}, \qquad 0 \leq h_\beta(x) \leq 1, \qquad z = \beta^T x_i$$

This equation can also be stated as follows :

$$logit(h_\theta(x)) = \log\left(\frac{h_\theta(x)}{1 - h_\theta(x)}\right)$$

The importance of this transformation is to provide $h_\theta(x)$ to have all desired properties of linear regression. In terms of the parameters of logit $(h_\theta(x))$ is linear, continuous ve it can change in the range of -∞ and +∞ based on the value is taken by x (Hosmer and Lemeshow, 1989).

4.3. Analyses and Results

In this study, a logistic regression analysis was used to measure the performance of the company. Feature vectors that used for logistic regression were, as follows;

1. Fish Type
2. Amount of Glaze
3. Finished Product Calibration
4. Process Type
5. Number of Employees
6. Unrefined / Raw Weight (Kg.)
7. Output (kg/pcs)
8. Shift manager in charge
9. Duration (minute)
10. Unrefined Weight (kg / man-hours)
11.Output Weight (kg / man-hours)
12. Waste (%)

In multiple linear regression, interpretation of the regression coefficients is obvious. By a condition that other independent variables stay constant, it refers to the amount change due to 1 unit of change in the independent variable. The coefficient values obtained via logistic regression are presented in Table 1.By applying Logistic regression, the classification success of the analyses is 76% and acceptable. The results obtained from the analyses were grouped into five cases according to different situation of operation performance (performance classification 1 (very poor) -5 (very good).

Table 1.The Coefficient Values of Regression Model

	1	2	3	4	5
β1	-0,9777	-0,8433	-0,72545	-0,93528	-0,9444
β2	-0,14505	-0,75197	-1,07526	-1,07924	-1,39858
β3	1,022853	-0,12207	-0,58369	-0,82448	-2,09779
β4	-0,5982	-0,18259	-0,82723	-0,20171	-0,71465
β5	-0,88608	-0,58753	-0,28002	1,083034	1,74136
β6	-1,30422	-4,33691	0,431749	-0,53291	1,38522
β7	0,385853	-0,37798	-1,11791	-0,7749	-1,04188
β8	-1,01094	-0,9089	-0,88846	-0,90123	-0,95539
β9	-0,98182	-1,0674	-3,43129	-1,1928	-0,56153
β10	-0,16791	0,278905	0,061871	-0,93091	-0,95668
β11	-0,97189	-0,29229	-0,11219	-0,35779	0,664325
β12	-0,98163	-0,90682	-0,93571	-0,85552	-0,51074
β13	-1,04335	0,804702	-0,90005	-0,18303	-0,75533

The equation of the (1) very poor situation is;

$$\hat{y} = -0{,}9777 - 0{,}14505x_1 + 1{,}02285x_2 - 0{,}5982x_3 - 0{,}88608x_4 - 1{,}30422x_5 + 0{,}38585x_6 - 1{,}01094x_7 - 0{,}98182x_8 - 0{,}16791x_9 - 0{,}97189x_{10} - 0{,}98163x_{11} - 1{,}04335x_{12}$$

The equation of the(2) poor situation is;

$$\hat{y} = -0{,}8433 - 0{,}7519x_1 - 0{,}1220x_2 - 0{,}1825x_3 - 0{,}5875x_4 - 4{,}3369x_5 - 0{,}3779x_6 - 0{,}9089x_7 - 1{,}0674x_8 + 0{,}2789x_9 - 0{,}2922x_{10} - 0{,}9068x_{11} + 0{,}8047x_{12}$$

The equation of the (3) moderate situation is;

$$\hat{y} = -0{,}7254 - 1{,}0752x_1 - 0{,}5836x_2 - 0{,}8272x_3 - 0{,}2800x_4 - 0{,}4317x_5 - 1{,}1179x_6 - 0{,}8884x_7 - 3{,}4312x_8 + 0{,}0618x_9 - 0{,}1121x_{10} - 0{,}9357x_{11} - 0{,}9000x_{12}$$

The equation of the (4) good situation is;

$$\hat{y} = -0{,}9352 - 1{,}0792x_1 - 0{,}8244x_2 - 0{,}2017x_3 + 1{,}0830x_4 - 0{,}5329x_5 - 0{,}7749x_6 - 0{,}9012x_7 - 1{,}1928x_8 - 0{,}9309x_9 - 0{,}3577x_{10} - 0{,}8555x_{11} + 0{,}1830x_{12}$$

The equation of the (5) very good situation is;

$$\hat{y} = -0{,}9444 - 1{,}3985x_1 - 2{,}0977x_2 - 0{,}7146x_3 - 1{,}7413x_4 - 1{,}3852x_5 - 1{,}0418x_6 - 0{,}9553x_7 - 0{,}5615x_8 - 0{,}9566x_9 - 0{,}6643x_{10} - 0{,}5107x_{11} + 0{,}7553x_{12}$$

To measure the performance results ROC (Receiver Operating Characteristic) curves are used as a method for visualizing classifier performance. A ROC space is defined by TPR (True Positive Rate – sensitivity) and FPR(False Positive Rate – Specificity) as x and y axes respectively which depicts relative trade-offs between true positive and false positive (wiki, http://en.wikipedia.org/wiki/Receiver_operating_characteristic). The best possible prediction method, also called a perfect classification, would get in the upper left corner ((0.1) point) of ROC space, representing 100% sensitivity and 100% specificity. Testing stage was implemented by using 100 samples and TPR of this method is 76%. Confusion matrix of classification, regression graphic and ROC curves of the method are depicted in figure 1, figure 2 and figure 3.

Figure 1. Confusion Matrix

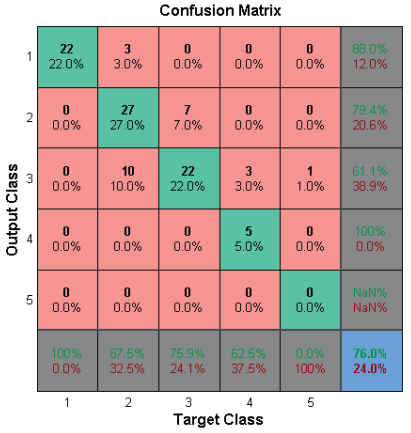


Figure 2. Regrssion Model

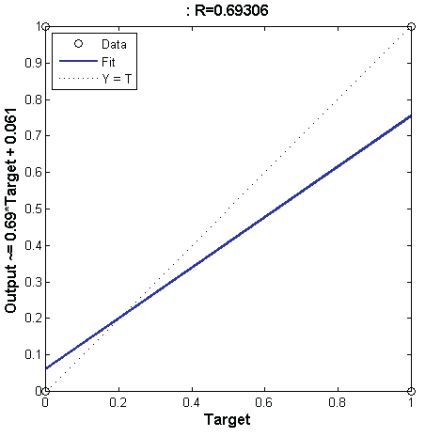
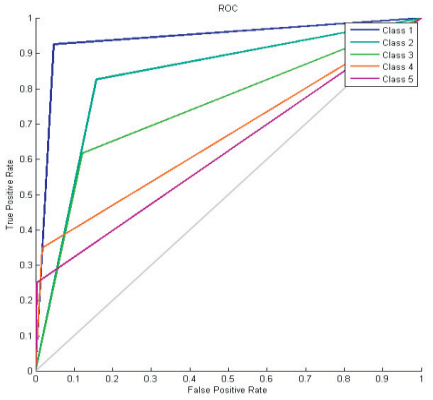


Figure 3. ROC Curves of Classification



However, the interpretation of coefficients in a logistic regression is not like multiple linear regression. By holding other variables constant, the effect of 1 unit change in the x variable on the result is interpreted by odds ratio that is the conversion of $\frac{h_{\beta_1}(x)}{1-h_{\beta_1}(x)}$.The major and minor affecting factors on each performance classification by using logistic regression and the odd values are presented below

1(Very poor) :

Major influential: glaze, raw kg

- Minor influential: the number of employees,

2 (Poor):

- Major influential: Waste, duration
- Minor influential: the number of employees, shift manager

3 (moderate):

- Major influential: the number of employees, duration
- Minor influential: shift manager, fish type

4 (Good):

- Major influential: process type, waste
- Minor influential: shift manager, fish type

5 (very good):

- Major influential: process type, the number of employees
- Minor influential: glaze, fish type

Table 2.The Odds Values of the Logistic Regression Analysis

odds	1	2	3	4	5
β1	0,376176	0,430289	0,484105	0,392478	0,388912
β2	0,864979	0,471438	0,341208	0,339855	0,246948
β3	2,781117	0,885089	0,557837	0,438462	0,122727
β4	0,549801	0,83311	0,437259	0,817329	0,489364
β5	0,412269	0,555699	0,755771	2,953627	5,705097
β6	0,271384	0,013077	1,539949	0,586893	3,995706
β7	1,470869	0,685247	0,326961	0,460752	0,352789
β8	0,363877	0,402968	0,411287	0,406072	0,384662
β9	0,374628	0,343903	0,032345	0,303371	0,570335
β10	0,845429	1,321682	1,063825	0,394195	0,384167
β11	0,378366	0,74655	0,893875	0,699219	1,943179
β12	0,3747	0,403807	0,392309	0,425061	0,60005
β13	0,352271	2,23603	0,406549	0,83274	0,469854

The calculated values according to the model are given in table 2. According to this, glaze and the raw kg are the major influential of very poor situation within the comparison by sector averages. In first performance level, with other variables being held constant, one unit change in glaze affects the performance by 2.78 ratio. Also at the same condition, one unit change in glaze affects the performance by 1.47 ratio. Also, the number of employees is the minor influential on performance.

In second performance level, with other variables being hold constant, one unit change in waste effects the performance by 2.23 ratio. Also at the same condition, one unit change in duration affects the performance by 1.32 ratio. Also, the number of employees and the shift manager are the minor influential on performance.

In third performance level, with other variables being hold constant, one unit change in the number of employees effects the performance by 1,53 ratio. Also at the same condition, one unit change in duration affects the performance by 1.32 ratio. Also, the shift manager and fish type are the minor influential on performance.

In fourth performance level, with other variables being hold constant, one unit change in process type affects the performance by 2.95 ratio. Also at the same condition, one unit change in waste effects the performance by 0.83 ratio. Also, the shift manager and fish type are the minor influential on performance.

In fifth performance level, with other variables being hold constant, one unit change in process type, the performance by 5.7 ratio. Also at the same condition, one unit change in the number of employees affects the performance by 3.99 ratio. Also, the glaze and fish type are the minor influential on performance.

As a result of the analyses, it can be seen in fourth and fifth performance level, process type is the most effective variable to improve the performance of company. So the managers should focus the process type. Also fish type is the least influential factor, this means the company can vary its products. Product diversification may create a significant competitive advantage for the company. Also in the first and second performance level, it can be seen that the number of employees is one of the minor influential factors on performance. As a result, company should understand that increasing number of employees does not increase performance level, on the contrary it can create diminishing marginal utility.

5. Conclusion

In this paper, the production processes of a seafood company are examined. Gathering data from the processes were taken into the analysis. In every situation, the aim of this study is to investigate the results in detail and state the critical factors that have an influence on the performance of this company. It was defined how the strategic decisions that were taken due to five different situations would affect the efficiency of the firm and the critical importance of strategic management was stated.

In an evolving competitive environment, there is no doubt that it will increase the performance levels of the organizations which are implementing strategic management. In this study, a conceptual framework that provides guideline for measuring and evaluating performance was presented. The aim was to emphasize the importance of measuring and evaluating performance in strategic management perspective. Based on the literature review it can be said that the performance measurement system of an organization is the mechanism which manages and controls the organization. For organizations that use PMS as the basis for their operations and development, the wellbeing of the organization depends on the effectiveness of the PMS. Maintaining the effectiveness of the organization and the measurement systems requires a systematic review process (Najmi et al., 2005: 119).

Through the research, possible positive and negative consequences of each strategic decision have been analyzed within a given case. Research revealed that companies should evaluate all the factors and their impacts efficiently to the performance of company in multiple decision making processes. Because, sometimes factors do not impact as the managers expected. So, it becomes important for the companies to manage these processes efficiently in order to be able to protect their competitive advantages in the global market.

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