



MEASURING BUSINESS PERFORMANCE IN THE CONTEXT OF THE TURKISH MANUFACTURING INDUSTRY

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Abstract

Both the success and continuity of an organization depend on its performance. Measuring the performance of an organization means evaluating the level to which organizational goals have been attained. Generally, profitability is used to evaluate companies, but a single measure of performance can not provide a clear concentration on the critical mission of organizations. The aim of this study is to find out the relations between the variables that can measure performance of companies and variables that can affect these performance variables and then to explain the relations between the two groups in the context of the Turkish manufacturing industry.

Key Words: Performance Measurement, Turkish Manufacturing Industry, Canonical Correlation

TÜRK İMALAT SANAYİ BAĞLAMINDA İŞLETME PERFORMANSI DEĞERLENDİRMESİ

Özet

İşletmelerin başarıları ve devamlılığı gösterdikleri performansa bağlıdır. İşletme performansının değerlendirilmesi, işletmenin kuruluş amaçlarını ne ölçüde gerçekleştirdiğinin değerlendirilmesi demektir. İşletmelerin performanslarının değerlendirmesinde genellikle karlılık esas alınsa da tek bir ölçüt bunun için yetersizdir. Çalışmanın amacı işletmelerin performansını çok boyutlu değerlendirebilecek performans göstergelerini ve işletme performansını etkileyebilecek faktörleri tespit etmek ve bu iki grup arasındaki ilişkileri Türk İmalat Sanayi bağlamında tartışmaktır.

Anahtar Sözcükler: Performans ölçümü, Türk İmalat Sanayi, Kanonik korelasyon analizi

Performance

Various definitions for business performance and business performance measurement are stated in literature. Amaratunga et al. (2000: 66-75) defines an organization's performance as the manner or quality of functioning. According to Akal (1996: 1) performance is a concept that describes the qualitative or quantitative results of activities. While Neely, George and Platts (1995: 80-116) describe performance measurement as a process of quantifying the efficiency and effectiveness of action that leads to performance, Chin and Pun (2003: 443-455) define the measurement of performance as the evaluation of the efficiency and productivity of an organization. Performance can mean the level of ability at a task or the level of attainment of goals. Performance measurement is the activity that managers perform to attain the goals that are derived from a company's strategic objectives.

Why Should an Organization Want to Measure Performance?

Performance measurement is necessary in order to guide top managers in decision making, in defining the activities of planning, organising, controlling, commanding and co-ordinating. Evaluating past activities and determining variables that can affect the performance of the organization and regulating the sources by considering these evaluations will serve to achieve the goals of organization in productive ways. Without measuring something, it is not possible to evaluate and therefore improve it. For the optimum management and improvement of an organization, it is necessary to determine critical performance indicators and find out the relations between them. Neely and Anderson (1999: 205) determines seven main reasons why business performance measurement has become so topical in recent years. The reasons also reflect the importance of performance measurement. Those are; the changing nature of work, increasing competition, specific improvement initiatives, national and international quality awards, changing organizational roles, changing external demands, and the power of information technology.

How Can Business Performance Be Measured?

Depending on being in public or private sectors, organizational aims may differ in companies. The benefits of public are not considered as much by private sectors as they are by the public sectors. Increased prices, layoffs and lower wages in privatized companies are evidence for this (La Porta, De-Silanes, 1999: 1193-1242). Due to differences in aims, many companies that want to improve their performance face uncertainties about what to measure.

However different performance criteria had been used in history: effectiveness, efficiency and rate of utilization, productivity, quality of work life, profitability, quality and innovation are accepted as the basic dimensions of business performance in recent years. Because these variables are independent of each other; managers could decide which of them are to be considered in measuring business performance in respect of the goals and priorities of the firm (Akal, 1994: 1). Therefore performance measures can differ from business to business and the measures that are most relevant to a firm today can change in the future.

A company is an economic enterprise and its basic goal, with the exception of charitable corporations is to maximize its profit (Akal, 1994: 1). But profit maximization can not be the only goal of companies. This can be obtained by selling shares or by investing in bonds, but then earnings per share will decrease. If maximizing earning per share is assumed as the only goal of company, this would be insufficient, because earning per share does not consider the risk, period and timing of expected income. Growth can be seen as a goal of companies, but most of the bankrupted companies were previously grown. Another goal is stated by maximization of market value of company for shareholders (Brigham, Ehrhardt, 2002: 10). Productivity is also a goal because it is a crucial for optimizing performance. There are, however, some critiques against financial measures such as the thought that firms can not be totally evaluated by financial variables (Barker, 1995: 31-39) and the present or future performance of firms can not be evaluated by using the past values of companies. Despite this, financial measures are frequently used to evaluate the performance of companies (Yurdakul, 2003: 2501-2529, Robertson, 1997: 254-257). Robert S. Kaplan and David P. Norton (1996: 75-85) recognize that a single measure of performance can not provide a clear concentration on the critical mission of an organization. Consequently, a unique performance measure or a unique goal like profitability is insufficient for companies. Business performance should be measured with multidimensional perspectives. All the measures; profitability, productivity, growth, share value are the common goals of companies, therefore business performance should be measured by evaluating these values. Performance of companies can be affected from many factors such as, quality, innovation, debts, efficiency, effectiveness, some enviromental situations; dynamism, complexity, hostility (Luo, Park, 2001: 141-155) and some other unobservable factors; corporate culture, access to scarce resources, management skill and luck (Jacobson, 1990: 74-85).

This study will search the relation between the performance variables and the factors that are thought to be affecting the performance of companies. The relation is investigated by a multivariate statistical analysis; canonical correlation. The results of this analysis are discussed by comparing the findings of literature. In this regard a literature review is found in section 5.

Statistical Analysis

Canonical correlation analysis seeks to identify and quantify the associations between two sets of variables (Johnson, Wichern, 2002: 543). It is the most general method that can be used for both metric and non-metric values of the sets Y (dependent) and X (independent). Moreover, it is the strongest and the most appropriate technique that can be applied when the number of variables in the dependent set are more than one. It can also be applied for categorical data (Marriot, 1952: 58-64). While canonical correlation is used for explaining the relation between dependent and independent variables, it explains not only which independent variable has an effect on which dependent variable but also which independent variable has a higher effect on which dependent variables (Levine, 1977: 6). The formula can be shown as follows: (canonical variates *u* and *v* are linear composites of the variables.)

$$u = \sum \alpha_i x_i, \quad v = \sum \beta_i y_i$$

Maximizing $Kor(u, v)$ subject to the constraints given below is the main idea of the canonical correlation. α_i, β_i are called canonical coefficients of the variates u and v .

$$Kor(u, v) = \frac{Kov(u, v)}{[\text{var}(u) \text{var}(v)]^{1/2}} = \frac{\alpha' \Sigma_{12} \beta}{\sqrt{\alpha' \Sigma_{11} \alpha} \sqrt{\beta' \Sigma_{22} \beta}} = \frac{Kov(u, v)}{(1 \ 1)^{1/2}}$$

$$= Kov(u, v) = \alpha' \Sigma_{12} \beta = \rho$$

$$\text{Var}(u) = E[u - E(u)][u - E(u)]' = \alpha' Kov(x) \alpha = \alpha' \Sigma_{11} \alpha = 1$$

$$\text{Var}(v) = E[v - E(v)][v - E(v)]' = \beta' Kov(y) \beta = \beta' \Sigma_{22} \beta = 1$$

Since the constraints are equality constraints, optimums of the function can be found by means of Lagrange Multipliers λ_1 and λ_2 . Lagrange function L and its optimums are written as follows;

$$L = \alpha' \Sigma_{12} \gamma - \frac{1}{2} \lambda_1 (\alpha' \Sigma_{11} \alpha - 1) - \frac{1}{2} \lambda_2 (\gamma' \Sigma_{22} \gamma - 1)$$

$$\frac{\partial L}{\partial \alpha} = \Sigma_{12} \gamma - \lambda_1 \Sigma_{11} \alpha = 0$$

$$\frac{\partial L}{\partial \gamma} = \Sigma_{21} \alpha - \lambda_2 \Sigma_{22} \gamma = 0$$

The solution of these partial differentials results in an eigenvalue problem and the solution of that problem will give us ρ^2 . The vectors α and γ can be obtained from the equations by substituting ρ^2 . These vectors are called canonical coefficients that maximize the linear combinations of the variables.

The Survey Data

The firms included in this research are ISE (Istanbul Stock Exchange) trade manufacturing companies in 1996-1997. These firms are also Turkey's top 1000 major industrial enterprises. Data was collected from the journal of Istanbul Chamber of Industry (ICI) (Ref. 29) and Year Books of Companies of ISE (Ref. 28). 120 manufacturing firms were randomly selected from 176 firms in the industry. 17 firms were taken out as outliers at 5% level of significance by the test of Mahalanobis Distance. The sample for analysis is made up of 103 manufacturing firms. Two economical crisis took place in Turkey, one in November 2000 and the other in

February 2001. Many small and large firms were affected from these crises. To avoid reflecting the undesirable effects of the crisis, sample is selected from an economically stable year in Turkey, 1997.

Study Variables

Performance variables: As mentioned before to measure the business performance in multi dimensional perspective is crucial, for this four performance indicators are used;

Profitability: net profit / sales

Productivity: gross value added / employees

Growth: value added growth rate

Share value: market value / book value (MV/BV)

Predictor variables: As discussed in part (3) of this text, many factors can effect business performance like financial, non financial, environmental, unobservable etc. Among those, seven of the mostly discussed factors in literature constitute our predictor set;

Current ratio: total current assets / total current liabilities

Leverage: total liabilities / total assets

Cash flow ratio: profit before tax + depreciation + expenses not requiring cash outflow / short term debt + long term debt

Firm size

Machinery plant & equipment / employees (Mac&Eqp)

Inventories turnover (Inv.Turn.)

Research and development (R&D)

Assets, shareholders equity, value added or sales are generally used to measure firm size. Spearman rank correlations (Table I) of the firms show high correlations between the ranks of the firms with respect to the four variables. The correlations are significant at the level of $p=10^{-4}$. This shows that any one of these four variables can be used for firm size. In this research the average of the ranks of the firms according to the four variables was used to reflect the effects of all variables.

Table I: Spearman Rank Correlations of firms according to assets, value added, sales and shareholders equity

| Shareholders | Assets | Value | |
|--------------|--------|-------|-------|
| Equity | Added | | |
| Assets | .906* | | |
| Value Added | .906* | .887* | |
| Sales | .876* | .894* | .915* |

* significant at $p < 10^{-4}$

Table II shows the means and standard deviations of the variables. Standard deviations are high because of different firm sizes in the sample. Although the firms were drawn from the same industry, they are operating in different sub sectors. The firms from different sectors might have different financial structures. Even the firms were in the same sector, management style and financial preferences may create differences between companies. Therefore, standard deviations of the variables can become high.

Table II: Summary of performance and predictor variables

| Variables | Mean | Standard Deviation |
|------------------------------|-------|--------------------|
| Performance variables | | |
| Growth (%) | 7.28 | 33.11 |
| Profitability (%) | 9.41 | 8.10 |
| Productivity (10^{12} TL) | 6.07 | 5.49 |
| MV/BV | 5.36 | 3.50 |
| Predictor variables | | |
| Current Ratio | 1.79 | 0.69 |
| Inventory Turn | 7.28 | 8.44 |
| Cash Flow (%) | 40.83 | 43.38 |
| Size | 0.47 | 0.50 |
| Mac&Eqp (10^9 TL) | 6.60 | 6.31 |
| Leverage (%) | 53.74 | 17.61 |
| R&D | 0.39 | 0.49 |

31 December 1997; 205 000 TL ~ 1\$

Results of the Analysis

When the variables were tested by Shapiro-Wilk, Kolmogorov-Smirnov, Skewness and Kurtosis tests, all the variables except growth and leverage failed from the tests at 5% level of significance. Some transformations help the variables to pass the tests. Because there was no big difference in the results of canonical correlations between the original and transformed variables, original variables were preferred in interpretation.

Multicollinearity become a problem when the variance inflation factor is greater than 10 or the condition index is more than 100 or tolerance is less than 0.10. All the tests do not show that multicollinearity is a problem for either dependent or independent variables.

For the canonical correlation analysis The SAS System for Windows V8 statistical program was used. Table III gives the results of the Pearson Correlation Coefficients. Table shows that, there is no correlation between growth and any other variable in the analysis at 0.05 level of significance. There is a positive correlation between productivity and Mac&Eqp (R=0.49), cash flow (R=0.44), size (R=0.42) and inventory turnover (R=0.20). The correlation is negative between productivity and leverage (R=-0.27). Profitability has positive correlations with cash flow (R=0.87), current ratio (R=0.49), productivity (R=0.48), firm size (R=0.30) and Mac&Eqp (R=0.27) and it has a negative correlation with leverage (R=-0.62). MV/BV has positive correlations with cash flow (R=0.30), profitability (R=0.29) and productivity (R=0.22).

Table III: Pearson Correlations between performance and predictor variables

| | Growth | Produc | Profit | Mv/Bv | R&D | Cur.R | Inv.T. | Leverg. | Cashflow | Size |
|--------------------|--------|--------|--------|-------|-------|--------|--------|---------|----------|--------|
| Produc. | 0.14 | | | | | | | | | |
| Profit. | 0.17 | *0.48 | | | | | | | | |
| Mv/Bv | 0.13 | **0.22 | *0.29 | | | | | | | |
| R&D | -0.15 | 0.06 | 0.03 | 0.03 | | | | | | |
| Cur.R. | 0.04 | 0.04 | *0.49 | 0.06 | -0.04 | | | | | |
| Inv.T. | 0.13 | **0.20 | 0.10 | 0.15 | -0.01 | 0.11 | | | | |
| Leverg. | -0.14 | *-0.27 | *-0.62 | 0.05 | -0.01 | *-0.67 | -0.04 | | | |
| Cashflow | 0.16 | *0.44 | *0.87 | *0.30 | 0.05 | *0.55 | 0.12 | *-0.70 | | |
| Size | 0.05 | *0.42 | *0.30 | 0.00 | 0.09 | 0.00 | -0.02 | -0.16 | 0.19 | |
| Mac&Eqp | 0.04 | *0.49 | *0.27 | 0.00 | 0.08 | 0.09 | 0.08 | *-0.44 | *0.30 | **0.21 |

*significant at 1% ** significant at 5 %

Table IV displays canonical correlations between performance variables and independent variables. The first three canonical correlations are highly significant. The first canonical correlation, R=0.89 and its significance level, $p=10^{-6}$ show that the correlation between the sets is very high. The second canonical correlation, R=0.57 ($p=2 \times 10^{-6}$) is high and the third, R=0.41 ($p=0.011$) is moderate. The second and third canonical correlations are also highly significant. The last canonical correlation (R=0.23) is low and not highly significant ($p=0.26$).

Because the canonical correlations do not give the variance shared between the performance and independent variables, Stewart and Love's redundancy index is obtained (Table IV). The redundancy index is the mean variance of the dependent (or independent) set of variables that is explained by a particular canonical variate of the independent (or dependent) set. The proportion of variance in the performance variables predictable from or shared with the independent variables is 39.4% and the proportion of variance in the independent variables shared with the performance variables is 29.3%

Canonical variates of the performance variables explain 100 % of the variation in their set and canonical variates of independent variables explain 65 % of the variation in their sets.

Table IV: Canonical correlations between performance and predictor variables and Redundancy Index

| Variate Number | Canonical Correlation | Num R-Squared | Den | Prob F-Value | Wilks' DF DF | Level | Lambda |
|----------------|-----------------------|---------------|------|--------------|--------------|--------------------|--------|
| 1 | 0.89 | 0.79 | 9.90 | 28 | 333 | 1×10^{-6} | 0.11 |
| 2 | 0.57 | 0.32 | 3.61 | 18 | 264 | 2×10^{-6} | 0.54 |
| 3 | 0.41 | 0.17 | 2.36 | 10 | 188 | 0.01 | 0.79 |
| 4 | 0.23 | 0.05 | 1.34 | 4 | 95 | 0.26 | 0.95 |

Redundancy Index: variations explained by canonical variates

| Variation in | Cumulative Percent Explained by | Explained |
|-----------------------|---------------------------------|-----------|
| Performance Variables | Predictor Variates | 39.4 |
| Predictor Variables | Performance Variates | 29.3 |
| Performance Variables | Performance Variates | 100 |
| Predictor Variables | Predictor Variates | 65 |

Canonical coefficients, canonical loadings or canonical cross loadings are interpreted to understand the relation between dependent and independent variables. Because canonical coefficients can be misleading when multicollinearity appears in one of the sets, generally loadings or cross loadings are preferred (Table V). According to the loadings in Table V, the canonical variate of dependent set is a linear combination of the variables; growth, productivity, profitability and MV/BV. All the variables are positively correlated with the first canonical variate. The variable which has the highest correlation with the first canonical variate is profitability (R=0.99), the most important variable. After that productivity (R=0.58), MV/BV (R=0.33) has significant loadings to their canonical variate. Growth (R=0.19) has no significant loading to its canonical variate. Except leverage other variables in the independent set have positive loadings to their canonical variate. The most important variable in this set is cash flow (R=0.98), and then leverage (R= -0.67), current ratio (R=0.52), size (R=0.37) and mac&eqp (R=0.36). Inventory turnover (R=0.14) and R&D (R=0.04) have no significant loadings to their canonical variate. The variables that have positive (or negative) correlations with their canonical variate, have positive correlations with each other, and the variables that have correlations in opposite directions, have negative correlations with each other. Thus leverage has negative correlations with performance variables and the other variables in the independent set have positive correlations with performance variables. Consequently, cash

flow, leverage, current ratio, firm size, mac&eqp, have significant effect on business performance; while leverage affects negatively, other variables affect positively.

Table V: Canonical loadings and cross loadings of variables to canonical variates

| | Loadings | | Cross Loadings | |
|----------|----------|-------|----------------|-------|
| | V1 | V2 | U1 | U2 |
| Growth | 0.19 | 0.05 | 0.17 | 0.03 |
| Produc. | 0.58 | 0.81 | 0.52 | 0.46 |
| Profit. | 0.99 | -0.12 | 0.88 | -0.07 |
| MV/BV | 0.33 | -0.01 | 0.30 | -0.01 |
| | U1 | U2 | V1 | V2 |
| R&D | 0.04 | 0.08 | 0.04 | 0.04 |
| Cur.Rat. | 0.52 | -0.49 | 0.46 | -0.28 |
| Inv.Tur. | 0.14 | 0.27 | 0.12 | 0.15 |
| Leverage | -0.67 | 0.15 | -0.60 | 0.08 |
| Cashflow | 0.98 | -0.14 | 0.87 | -0.08 |
| Size | 0.37 | 0.50 | 0.33 | 0.28 |
| Mac&Eqp | 0.36 | 0.67 | 0.32 | 0.38 |

The first canonical variates reflect the best situation that they could explain the most variation in the sets. $R^2 = 0.79$, shows the explained variance in a canonical variate by the other canonical variate. The second, third and fourth canonical variates explain less variations in the opposite canonical variates. The variance explained in the second canonical variates is 0.32, the explained variance in third canonical variates is 0.17 and in the last is 0.05 (Table V). Researchers generally prefer to interpret the first canonical variates.

Discussion

Profitability is a measurement of the sales performance of a firm. The results of the study show that profitability reflects almost all the performance of companies. This result conforms to the research of Kald and Nilsson (2000: 113-127), who have showed that companies understand performance as profitability. Cash flow ratio is the most important variable in the set of independent variables. This result verifies the studies that show cash flow is very important for decision makers (Timo, et. al, 1997: 121-136). Cash flow shows the ability of the company's cash reserves to cover company's debts. In long term, the ability of satisfying a company's responsibilities depend on its profitability and debts. This ability serves to sustain companies in unusual times. Cash reserves are also important for providing raw materials and equipment in convenient conditions to utilize from cash discounts and suitable investment opportunities. Therefore finding a high correlation between performance and cash flow ratio is meaningful.

Leverage ratio shows the extent to which debt is used in financing the company's total assets. An increase in this ratio means the debt and the risk level of the company are increased. This causes high interest rates when credits are necessary. It is assumed that

50% leverage rates are normal. The firm with a high earning rate would maintain a relatively lower debt ratio because of the ability of financing itself from internally generated funds (Toy et. al., 1974: 875-886). In this study a negative correlation was found between leverage and profitability. The same result is also given by Opler and Titman (1994: 1015-1040).

A positive correlation was found between profitability and firm size. In competitive areas large firms have more advantages than small firms. They have large market shares and so they can earn more than small firms. Large firms can work without high competition in high equity needed areas; this provides more profitability to them. The positive relation between firm size and mac&eqp (Table III) can show large firms are more innovative, spend more on technical innovation (Chin, Pun, 2003: 443-455) and are more professional. Technology investments reduce costs and hence profitability rises. Besides, growth in sales decreases unit costs, therefore it increases profitability. Similar relations between profitability and firm sizes in Turkish companies are given by Günçavdı, Levent & Ülengin (1999: 42). There are contradictory publications in literature about profitability and firm size. While Hall M., Weiss L. (1967: 319-331), Schmalensee (1989: 337-357), Schneider (Fink, Koller, 2002), and Lirely et. al, (2000: 46-68) mention a positive relation between firm size and profitability, Osborn (1970: 15-26), Dhawan (2001: 269-293), Elliot (1972: 1309-1320), Toy at. al., (1974: 875-886) claim a negative relation. In Fred R. Kaen ve Hans Baumann's (Ref. 26) study, nearly half of their manufacturing industries, firm profitability increases at a decreasing rate and eventually declines as firms become larger. For most of the remaining manufacturing industries, no relation exists between size and profitability. They also find that profitability is negatively correlated with the number of employees for firms of a given size measured in terms of total assets and sales.

The value of current ratio shows the ability of the company's total current assets to cover its short term obligations. High value of current ratio is suitable for companies in paying short term debts, but very high values display that company has idle funds which are not used in productive ways for more profits. As a general evaluation, the value of a current ratio of 2 is assumed enough (Helfert, 1978: 99). The mean of current ratio of firms in this study is 1.78. Increasing current ratio helps increase in profit.

There is a positive correlation between productivity and firm size, mac&eqp, cash flow and inventory turnover, and a negative correlation between productivity and leverage. Technology investments provide more products with less manpower. From the relation between firm size and mac&eqp, it is understood that large firms spend more on mac&eqp. In manufacturing industry, technology and innovation investments improve productivity in services and operations. In this study there is no correlation found between business performance and R&D. This is an unexpected result, because innovation is the power of companies in competitive areas. The studies that have done in this area show that R&D expenses have positive impact on business performance. H. C. Co and K. S. Chew (1997: 3333-3348) determine that firms with above average sales growth have above average R&D intensity and vice versa. Blundell, et. al, (1995: 529-554) determined that there is a positive correlation between market share and R&D expenditures in Britain manufacturing industry by using the data between 1972 and 1982. The same correlation was confirmed by Hall and Vopel (1997) for American manufacturing firms between 1987 and 1991. In this study 63 of 103 firms have no R&D investments. This may be the cause of no correlation between business

performance and R&D. R&D investment is not profitable in short terms because it is a long term process. The rapid improvement in information and technology in modern ages imply permanent investment in information and technology. Due to the insufficient resources and lack of communication between university and industry; an R&D tradition couldn't be established in Turkey (Oktay, 1998: 1).

From the negative correlation between productivity and leverage rate and positive correlation between firm size and mac&eqp., it is possible to find out a conclusion that large firms are found to be less risky therefore they can get credits with less interest rates. Because small firms get credits with high interest rates, their production costs become high and therefore their productivity decreases. Existing literature on the positive relationship between productivity and leverage considers the situation that increased debt can lead to an increased managerial effort in operating the firm by additional investment in tangible assets, thus increasing their productivity (Anderson, Prezas, 1999: 3-19). Firms that experience disciplinary effects of debt will manage their tangible assets more efficiently and will have more productive workers (Winn, 1997: 585-600). Other factors that have effects on productivity are; education, skill and capacity of workers and openness to new investments of firms (Harris, 1999). Fortine, Helpman (Ref: 26), Brynjolfsson, Hitt (2000: 23-48) determine direct impact of technology investments on productivity and Bernstein (1998) determines the impact of quality of workers, R&D and firm size on productivity.

Market Value/Book Value is the proportion of the price of a share to the shareholders equity per share. It is possible to see high MV/BV ratio, depending on feeling of confidence for a company but a ratio over the average shows the price of share is expensive and under the average shows the share is cheap. The most important factors that effect the value of shares are profitability and components of profitability. Sector (Ray at. al., 2000: 254-262), interest rates and expectations are effective factors in determining the market value of company (stock, 1981: 64-71). Chan, Hamao and Lakanishok (1992: 1739-1764), Fama and French (1992: 427-465) state that MV/BV ratio is effective to express expected income. The ratio is a good explanatory variable to measure share performance (Gagne and Reddy, 1999: 53-64). The firms owning high value of MV/BV ratio, have high expected incomes of shares. Fama, French (1992: 427-465), Morck, Shleifer and Vishny (1998: 293-315) and McConnell, H. Servaes (1990: 595-612) determine that this ratio is affected by income. In this study a high correlation is found between MV/BV, profitability and cash flow. This result supports the studies that found correlation between MV/BV and income. There is no significant correlation between stock performance of share and firm size, a similar result was given by Loughran (Trecartin, 2000: 361-373). Because smaller firms are riskier than larger firms and inverse proportion of risk and revenue, smaller firms may be more profitable than larger firms. The amount of dividends paid to shareholders from net profit may be more in smaller firms. These can be the reasons of the unrelatedness of MV/BV and firm size.

There is no significant correlation found between growth and any independent variable in this study. 46 of the firms have negative growth rates and 57 of the firms have positive growth rates in the sample. The high number of firms that have negative growth rates may have concealed the relations. Qualitative manpower, experience, competition, institutional substructure and management (Barney, 1991: 99-120), (Wernefelt, 1984: 171-180), technology and R&D investments, providing improvement in productivity,

improvement new products and new process (Griliches, 1994: 1-25) are the factors of growth. The continuity of long term value added growth rates depends on the improvement of new technologies. When the firms in the analysis are divided into two groups such as firms with positive growth rates and firms with negative growth rates, it is seen that grown firms have higher profitability, productivity, MV/BV, cash flow, mac&eqp, and current ratio than the rest of the firms but such firms have higher leverage than the grown firms.

Conclusion

Performance measurements and improvements are important for companies to attain the goals that are derived from the company's strategic objectives. Performance measurement involves the determination of the measures of goals. A single measure of performance can not provide a clear concentration on the strategic objectives of companies. Therefore companies must measure their performance in multidimensional perspectives. When profitability, productivity, MV/BV and growth are used to measure business performance; profitability and productivity became the most important variables. MV/BV also has significant loading to performance set but growth is not an important variable among others in the set. The results indicate that cash flow, leverage, current ratio, firm size and machinery and equipment are effective for high performance. Cash flow ratio and leverage ratio are more important variables than the others. Business performance has positive correlation with cash flow ratio, current ratio, firm size and machinery and equipment, and has negative correlation with leverage. Inventory turnover and R&D investments have no significant effects on business performance.

There are some variables that can be included in later studies. For instance, sales returns or average defective ratio to measure production quality, absenteeism, number of employee-employer disagreements or number of accidents for quality of work life, experience of top managers, maturity, qualified workers for growth, salaries of employees, contribution to social associations to represent social aims of firms.

Limitation of the research:

The study takes one year's figures as its raw data. A comparison should be made with two years; especially economically stable and unstable years.

More non financial indicators should be employed in the analysis.

In this study, data were collected from Turkey's top 1000 major industrial enterprises, relatively small enterprises are excluded.

REFERENCES

- AKAL, Z. (1994). *Total Performance, Productivity, Profitability and Cost Comparison Between Manufacturing Public Business*, (Turkish), National Productivity Centre Publications, Ankara, pp.1
- AKAL, Z. (1996). *Performance Measurement and Control in Business*, (Turkish), National Productivity Centre Publications, Ankara, pp.1
- AMARATUNGA, D., DAVID B., MARJAN S. (2000). "Assesment of facilities management performance- what next ?", *Facilities*, Vol.18, N. ½, pp. 66-75
- ANDERSON, M. H., PREZAS A., (1999). "Intangible Investment, Dept Financing, and Managerial Incentives", *Journal of Economics and Business*, 51, pp. 3-19
- BARKER, R.C., (1995). "Financial Performance Measurement: Not a Total Solution", *Management Decision*, Vol. 33, No. 2, pp. 31-39
- BARNEY, J.B., (1991). "Firm resources and sustained competitive advantage", *Journal of Management*, 17, pp. 99-120.
- BERNSTEIN, J.I., (1998), "Inter-Industry and U.S. R&D Spillovers, Canadian Industrial Production and Productivity Growth." Industry Canada, Working Paper No. 19, <http://strategis.ic.gc.ca/epic/internet/ineas-aes.nsf/en/ra01581e.html> , 26.07.2004
- BLUNDELL, R., GRIFFITH, R., REENEN J. V., (1995). "Market Share, Market Value and Innovation in a Panel of British Manufacturing Firms", *Review of Economic Studies*, 66, Issue 3, pp. 529-554
- BRIGHAM, E.F., EHRHARDT, M.C., 2002, *Financial Management*, Thomson Learning, 10th Ed. pp.10
- BRYNJOLFSSON, E., HITT, L., (2000). "Beyond Computation; Information Technology, Organizational Transformation and Business Performance", *Journal of Economic Perspectives* 14, Vol. 4, Fall, pp. 23-48
- CHAN, LUIS K. C., YASUSHI H., LAKONISHOK J., (1992) "Fundamentals and Stock Returns in Japan", *The Journal of Finance*, December, pp. 1739-1764
- CHIN, K. S., PUN K. F., (2003). "Development of knowledge-based self-assessment system for measuring organizational performance", *Expert Systems with Applications* Vol. 24, Issue 4, May, pp. 443-455
- CO, H.C., CHEW K.S., (1997). "Performance and R&D expenditures in American and Japanese manufacturing firms", *Int. J. Prod. Res.*, vol.35, No.12, pp.3333-3348

DHAWAN, R., (2001). "Firm Size and Productivity Differential: Theory and Evidence from a Panel of US Firms", *Journal of Economic Behavior and Organization* 44, pp. 269-293

ELLIOTT, J.W., (1972). "control, size, growth and financial performance in the firm", *The Journal of Financial and Quantitative Analysis*, Vol. 7, Issue 1, Jan., pp. 1309-1320

FAMA, E.F., FRENCH K. R., (1992). "The Cross-Section of Exepected Stock Returns", *The Journal of Finance*, 47, pp. 427-465

FINK, G., WOLFGANG K., (2002). "Did Accession to the EU Affect Small and Large R&D Firms Differently? The Case of the Austrian Retail and Wholesale Sector", *European Integration online Papers (EIOP)* Vol. 6 No: 9, <http://eiop.or.at/eiop/texte/2002-009a.htm>

GAGNE, M.L., VENKATESHWAR K. R., (1999). "Predicting the Performance of Equity Mutual Funds", *Journal of Accounting and Finance Research*, Vol 6, No.2, Spring, pp. 53-64

GRILICHES Z., (1994). "Explanations of productivity growth: Is the glass half", *American Economic Review*, 84 (1), pp. 1-25.

GÜNÇAVDI, Ö., HALUK, L., ÜLENGİN, B., (1999). *Factors That Determine The Financial Structures of Istanbul Stock Exchange Traded Companies*, (Turkish) Banks Association of Turkey Publications, No: 209, pp.42

HAIR, ANDERSON, TATHAM, BLACK, (1998). *Multivariate Data Analysis*, Prentice Hall, pp. 443

HALL, M., WEISS L., (1967). "Firm Size and Profitability", *The Review of Economics and Statistics* 49, vol 3, pp.319-331

HALL, B.H., KATRIN V., (1997)., "Innovation, Market Share, and Market Value", june 1997, <http://elsa.berkeley.edu/users/bhhall/papers/HallVopel97.pdf> 28.07.2004

HARRİS, R.G., (1999), "Determinants of Canadian Productivity Growth; Issues and Prospects", *Industry Canada, Discussion Paper, No.8, Dec.*, <http://strategis.ic.gc.ca/epic/internet/ineas-aes.nsf/en/ra01736e.html>

HELFFERT, E.A., (1977). *Techniques of Financial Analysis: A Moden Approach*, IRWIN Professional Publishing, 9th ed., pp.99

<http://ssc.uwo.ca/economics/undergraduate/400E-001/rkim.pdf>, 02.08.2004

<http://mfs.rutgers.edu/conferences/10/mfcindex/mfc61-80.htm>, 01.08.2004

Istanbul Stock Exchange, 1998, Year Books of Companies, *ISE Publications*, www.ise.org

Istanbul Chamber of Industry, Sept. 1997, Nov. 1997, Sept. 1998, Oct. 1998, Journal of Istanbul Chambers of Industry, (Turkish) *ICI Publications*, Istanbul

JACOBSON, R., (1990). "Unobservable Effects and Business Performance", *Marketing Science*, V.9, Issue 1, pp. 74-85

JOHNSON, R.A., DEAN W.W., (2002). *Applied Multivariate Statistical Analysis*, Prentice Hall, 2002, pp.543

KALD, M., FREDRIK N., (2000). "Performance Measurement at Nordic Companies", *European Management Journal*, V.18, No.1, pp. 113-127

KAPLAN, R.S., NORTON D. P., (1996). "Using the Balanced Scorecard as a Strategic Management System." *Harvard Business Review*. (January-February) pp. 75-85

LA PORTA, R., FLORANCIO L.D.S., (1999), "The Benefits of Privatization: Evidence From Mexico", *The Quarterly Journal of Economics*, v.114, n.4, pp. 1193-1242

LEVINE, M. S, (1977). *Canonical Analysis and Factor Comparison*, Sage Publications, p.6

LIRELY, R. L, ROBERT B. W., PHILIP L. L., (2000). "An Evaluation of the effect of the 1986 tax Reform ACT on Risk Adjusted Measures of Corporate Tax Equity", *Academy of Accounting and Financial Studies Journal*, Vol. 4, No: 1, pp.46-68

LUO, Y., SEUNG H. P., (2001). "Strategic Alignment and Performance of market-Seeking Mncs in China", *Strategic Management Journal* 22, pp. 141-155

MARRIOT, F. H. C, (1952). " Test of Significance in Canonical Analysis", *Biometrika*, V.39, pp.58-64

MCCONNELL, J., SERVAES H., (1990), "Additional Evidence on Equity Ownership and Corporate Value", *Journal of Financial Economics* 27, pp. 595-612

MORCK, R., SHLEIFER A., VISHNY R. W., (1988), "Management Ownership and Market Valuation", *Journal of Financial Economics*, 20, pp. 293-315

NEELY, A., GREGORY M., PLATTS K. (1995). Measuring Performance System Design: A literature Review and Research Agenda. *International Journal of Operations and Production Management*, 15 (4), pp.80-116

NEELY, A., (1999). "The Performance Measurement Revolution: Why Now and What Next?", *International Journal of Operations & Production Management*, v.19, Issue.2, pp.205

OKTAY, M., (1998). *Some Determinations about R&D Situations in Turkey From the view of R&D expended Small and Medium Enterprises*, (Turkish), ICI Publications, No: 1998-8

OPLER, T., TITMAN S., (1994). "Financial Distress and Corporate Performance", *Journal of Finance*, XLIX (3), July, pp. 1015-1040

- OSBORN, R.C., (1970). "Concentration and Profitability of Small Manufacturing Corporations", *Quarterly Review of Economics and Business* 10, pp. 15-26
- RAY, B. K., RUEY S. T., (2000). "Long Range Dependence in Daily Stock Volatilities", *Journal of Business & Economic Statistics*, Vol 18, No. 2, April, pp. 254-262
- ROBERTSON H.W., (1997). "A Construction Company's Approach to Business Performance", *Total Quality Management*, Vol. 8, Issue 2/3, June, pp.254-257
- SCHMALENSSEE, R., (1989). "Intra- Industry Profitability Differences in US Manufacturing: 1953-1983", *Journal of Industrial Economics* 37, pp. 337-357
- STOCK, D., (1981). "A Canonical Correlation Analysis of the Moments of Bond Portfolio Return Distributions", *Review of Business and Economic Research*, Vol 17, No. 1, Fall, pp. 64-71
- TIMO S., ILKKA V., PAAVO O., (1997). "The Generalized Association Between Financial Statements and Security Characteristics", *Scand. J. Mgmt*, Vol. 13, No.2, pp.121-136
- TOY, N., STONEHILL A., REMMERS L., WRIGHT R., BEEKHUISEN T. (1974). "A Comparative International Study of Growth, Profitability, and Risk as Determinants of Corporate Debt Ratios in the Manufacturing Sector", *The Journal of Financial and Quantitative Analysis*, volume 9, Issue 5, 1974 Proceedings, Nov., pp. 875-886
- TRE CARTIN, RALPH R. JR., (2000). "The reliability of the book-to-market ratio as a risk proxy", *Financial Services Review* 9, pp. 361-373
- WERNEFELT, B., (1984). "A resource based view of the firm", *Strategic Management Journal*, 5, pp. 171-180
- WINN, J., (1997). "Asset Productivity Turnaround: The Growth / Efficiency Challenge", *The Journal of Management Studies*, 34 (4), pp. 585-600
- YIN, X., (2004). "Canonical Correlation Analysis Based on Information Theory", *Journal of Multivariate Analysis*, Vol. 91, Issue 2, Nov., pp. 161-176
- YURDAKUL, M. (2003). "Measuring Long Term Performance of a Manufacturing Firm Using the Analytic Network Process (ANP) Approach", *International Journal of Production Research*, v.41, n.11, pp.2501-2529