Salih Yildiz (Turkey), Emel Yildiz (Turkey)

The measurement of distributor performance with a multi-criteria decision making method

Abstract

Performance measurement is gained importance by academicians and businesses. By measuring performance businesses can see what they achieve, quantify their effectiveness, identify opportunities for improvement and compare their performance against competitors. Therefore, businesses that want to be successful and survive in competitive environment, should measure performance regularly. Generally businesses have always measured performance through the financial performance. So the purpose of this study is to rank the distributors of a company operating in food sector in Trabzon according to their financial performance. The measure of performance was carried out through liquidity, capital structure, activity and return rate of three distributors using grey relational analysis (GRA). The ranking obtained from the study gave the same result with the ranking as a result of that parent company carried out evaluation. This study is limited to only distributors in food-sector and only in Trabzon. Therefore further research needs to be extended to other distributors. Also future researches can be more comprehensive by using all financial ratios. Researchers also can use another multi-criteria decision making methods. Performance is an important competitive tool for distributor. Yet limited research has accomplished in this area. Thus, this is the first research that examined distributor performance in Trabzon.

Keywords: distributor, financial performance, grey relational analysis, performance measurement.

Introduction

Performance is a product, a service or an idea which is done to accomplish the task and objective which are fulfilled according to the criteria of the pre-determined task (Pugh, 1991). As for the performance measurement, it means selecting and using the quantitative scales of capacities, processes and outcomes to fulfillment products, services or transactions (Perrin et al., 1999).

The field of distributorship is the one of fast growing ones in recent years and there intense competition has occurred. In order to be afloat at this competition, distributors need keeping pace with new developments, improvements and variations. That's why, it has been gaining importance to evaluate performance and set a course and strategy for making financial condition better from the point of distributors. For evalutaion performance distributors should follow some guidelines (Utah U.S. Export Assistance Center, 2009):

♦ Compare ratios of your sales with competitor sales.
♦ Match sales against past performance.
♦ Check against market-survey targets.
♦ Watch inventory turnover ratios.
♦ Compare notes with retailers on your distributor's sales efforts.
♦ Check local media for effectiveness of advertising.
♦ Compare short-term and long-range effectiveness of distributor's activities.

When analyzed the studies related with performance measurement, few studies measuring distributor's performance has been found. Interpretation and evaluation of distributors' performances are intended for filling the deficiency existing in the literature in this sense by using grey relational analysis (GRA) method. At the first section of the study, the literature concerning distributor performance measurement in various sectors has been touched on. In next section, Grey Relational Analysis method has been explained comprehensively and finally distributors' performances have been evaluated by being based on data in 2009 and the results have been interpreted.

2. Literature research

After the literature related with the measurement of performance has been examined, it is seen and realized that there are many studies in the sectors such as hospital (Narine, 1993; Özgülbaş, 2003, Özgülbaş, 2006; Gider, 2009; Özgülbaş ve diğerleri, 2009; Özgülbaş and Kısa, 2006; Özgülbaş and Koyuncugil, 2006); banking (Albayrak and Erkut, 2005; Demireli, 2010; Ünsal and Duman, 2005); automotive industry (Akman and Aklan, 2006; Yurdakul and İç, 2003); insurance (Sezen et al., 2005; Kaplan and Çelik, 2007; Yuengert, 1993; Fan and Cheng, 2009; Bülbül and Akhisar, 2010). The studies related to distributor performance are in a limited numbers and as follows.

Bertrand et al. (1980) investigated the indicators of distibutor performance. As a result of analysis it is found that urban distibutors had more client and performed more sales than rural distributors. Because number of active users in the past six months, number of new acceptors in the past two months and the data on contraceptive sales show the same pattern are more highly for urban distributors than rurals. In terms of performance indicators, while number of months in the program, CBD post was located elsewhere, disributor displayed a family

planning poster at CBD post, supervisor and distributors organized group meetings factors are important for urban program; distributor received assistance from spouse in the sale of contraceptives, distributor had local competition in the sale of contraceptives, distributor visited neighbors to promote family planning, distributor organized group meetings, years of school completed, frequency of supervision are important for rural distributors. Foreit et al. (1992) compare male and female distibutors and found that women distributors are more comfortable with other women than with men. While women distributors choose women clients and sell female methods, men distributors choose men clients and sell male methods. Also it is found that men recruited more new acceptors than women distributors. Wilson and Woodside (1992) investigated characteristics of distributor performance in terms of new products. As a result of analysis it is found that the share of total business the new product is an important factor showing distributor performance. Cabaniss (1995) compared native and international distributors in terms of their performances by using *t* testing. Brush and Chaganti (1998) checked and analyzed the effects of human resources, enterprise resources and strategies on distributors' performances with the help of regression analysis. Ultimately, it was reached the end of that human resources and enterprise recources had much more effects than strategies on performance. Gaur et al. (1999) examine the perfomance of retailer firms and found that retailer with long-term stock return on assets, high sales growth and high growth margin return on inventory. Kumar and Karande (2000) examined 646 retailer and stated that the retail store environment have effect on retailer performance. Mbanga-Msweli (2001) examined distributor performance in network organizations. Examining 500 network marketing distributors it is found that organizational commitment and customer profile directly affect performance. And also it is found that if performance increases, job satisfaction is decreases. Moore (2002) examine the effects of operational efficiency, marketing effectiveness and innovation on operational and financial performance and found that operational efficiency and also marketing effectiveness is combined with innovation affect performance. Mehta et al. (2003) examined the linkages among leadership styles, motivation and performance and found that channel partner motivation is positively related to channel partner performance. Sharma et al. (2004) used system dynamics as a new approach to measure distributor performance. Katsikeas et al. (2004) investigated the effect of supplier performance on distributor performance. Applying a survey to 237 distributors researchers found that there are significance difference between highly performing and poorly performing distributors in relation to their supplier's performance. Specifically, highly perfor-

ming distributors experince higher level of supplier performance in purchasing decision categories that includes competitive pricing, reliability, service and technological capability. Wu et al. (2006) investigated the retailer performence in Taiwan and found that financial factors affect performance. Megicks (2007) researched the effects of strategies on distributor performance, factor analysis and regression analysis were utilized and as a result, it was reached the end of that strategies effected performance. Song et al. (2008) examined distributor's performance in Chinese mobile industry. As a result of structural equation model it is found that while process performance and relational performance have positive effect on competitive potential, operational performance affect both financial benefit and competitive potential. Also it is stated that potential competitiveness has positive relationship with financial benefit. Demirhan (2009) evaluated retailers' performances by using multi-regression analysis. Booth and Hamer (2009) searched the relationship between enterprise culture and distributors' performance in England by means of regression analysis and therefore it was ensued that the culture had an impact on performance. Nikoomaram at al. (2010) reached the end of that various financial ratios under the title of return on sales (ROS), earning per share (EPS), operation cash flows (OCF) were suitable criteria for evaluation of productivity and performance of companies in the study which productivity and performance of 24 companies in Tehran were measured. Salcuiviene et al. (2011) investigated the antecedents of performance in multi-level marketing. In the concept of the study researchers interviewed with 105 distributors in Lithuania. Using structural equation model, it is found that trust, commitment, locus of control and shared values are important antecedents of performance. It is also found that shared values affect trust; locus of control, shared values and trust affect commitment and commitment affect channel performance. Nguyen and Nguyen (2011) examined the role of personal interactions in distributor performance. In the concept of the study 472 distributors were surveyed and found that relationship value was an important determinant of distibutor performance. Ontario Energy Board (2013) examine the performance of electricity distributors and stated that service quality, customer satisfaction, system realiability, overall cost performance, asset management, Government Policy Directive on Conservation & Demand Management, connection of renewable generation and financial ratios are the performance measures. Bezawada and Pauwels (2013) investigated the effects of organic assortment, price and promotions on retailer performance and found that when comparing with conventional products, assortment and regular price changes have elasticity for organics. Also increasing assortment and promotions ensure high profits.

Table 1. The methods used for measurement of financial performance

Writer	Sector	Methods used
Yurdakul and İç (2003)	Automotive	TOPSIS
Öztürk (2004)	Accounting	Economic added value
Kalogeras et al. (2005)	Agricultural food	PROMETHEE II
Ünsal and Duman (2005)	Bank	Main components approach
Özgülbaş and Kısa (2006)	Hospital	Trend analysis
Gücenme and Arsoy (2006)	Accounting	Format of cash flows table
Özgülbaş and Koyuncugil (2007)	Hospital	Data mining
Bülbül and Akhisar (2010)	Insurance	Data envelopment analysis
Akan and Çalmaşur (2010)	Manufacturing	Stochastic restriction analysis Data envelopment analysis

As seen in Table 1, a large number of decision-making methods with multi-criteria were used for performance measurement. Nevertheless, when the studies relevant to distributor performance were checked, it was seen that statistical techniques were mostly used and any studies using decision making methods with multi-criteria (TOPSIS, ELECTRE, PROMETHEE, grey relational analysis, etc.) were not found. Whereas, performance measurement requires attention to many criteria contradicting each other. In other words, the measurement of performance is actually a decision-making problem with multi-criteria and requires these techniques and methods. In this study, grey relational analysis method was used owing to the fact that some criteria (current ratio (rate), currency ratio, etc.) were at average, same type and model. Grey relational analysis (GRA) was used in this study so as to fill the deficiency and gap existing in the literature in this sense and consequencely distributors' financial performances were aimed to be presented comparatively.

3. Method

The purpose of the study is to sort the three distributors operating in food sector in Trabzon by their performances using grey relational analysis (GRA) method and to determine the best distributor.

The financial performance criteria used in the study are shown in Table 2 (Özgülbaş, 2006).

Table 2. Financial rates and their definitions

Ratios(Rates)	Name	Definitions
Liquidity ratios	Current ratio	Floating assets / short-term loans
	Currency ratio	Liquid assets+stocks and bonds / short-term liabilities
Capital structure ratios	Debt ratio	Total debt/ total assets
	Capital ratio	Debt / capital ratio
Operating ratios	Fixed asset turnover	Net sales / fixed assets
	Floating asset turnover	Net sales / floating assets

	Total asset turnover	Net sales / total assets
	Receivable turnover ratio	Net sales /average receivables
Profitability ratios	Net profit margin ratio	Net profit / net sales
	Profitability of assets	Net profit / total assets
	Profit capital ratio	Net profit / capital

3.1. Grey relational analysis. Grey relational analysis is the quantitative one searching similarities and differences between factors (Deng, 1989). Grey Relational Analysis comprises of the following (Yuan, 2007; Zhai et al., 2009).

1. Making of decision matrix.

Decision matrix that m alternatives show also n criteria is made as follows.

$$\begin{bmatrix} X_1(1), X_2(2)\dots \ \dots \ X_1(n) \\ X_1(1), X_2(2)\dots \ \dots \ X_2(n) \\ \dots \dots \dots \dots \dots \dots \dots \qquad \dots \\ \dots \dots \dots \dots \dots \dots \dots \qquad \dots \\ X_m(1), X_m(2)\dots \ \dots \ X_m(n) \end{bmatrix}. \qquad (1)$$

2. Making of reference series.

An imaginary company is established and referance series is made with addition of the data belonging to this company.

3. Making of comparison series.

At this stage, data is normalized and this process occurs with the help of formulas (2), (3) and (4) formulas. Formula (2) is used for benefit, (3) for cost and (4) for normalizing the values of average type criteria.

$$X_i(j) = [x_i(j) - \min x_i(j)] / [\max x_i(j) - \min x_i(j)] \quad (2)$$

$$X_i(j) = [\max x_i(j) - \min x_i(j)] / [\max x_i(j) - \min x_i(j) \ (3)$$

$$X_i(j) = 1 - |x_i(j) - u_i| / \max |x_i(j) - u_i| \qquad (4)$$

4. Making of absolute value table.

Each normalized value is subtracted from its own referance series and coefficient difference is found. So that absolute value table is made. $\Delta X_i(k)$ is calculated by the following formula:

$$\Delta X_i(k) = |X_0(k) - X_i(k)| \qquad (5)$$

5. Making of grey relational coefficient matrix.

The minimum and the maximum values in each progression are calculated.

$$(j) = (\Delta enk + \rho \Delta enb) / (\Delta i(j) + \rho \Delta enb). \qquad (6)$$

In the formula (6), $\Delta i(j)$, Δi show j value in difference data progression. ρ coefficient is used to remove probability of being the extreme value in Δmax data progression v_e generally 0,5 is taken.

6. Calculation of grey relational degree.

Two different formulas are used according to weights' being equal and different.

$$\acute{\Gamma}i = 1 / n \sum_{m=1}^{n} \ell_i(m) . \tag{7}$$

If weights are different, Grey relational degree is calculated by the following formula.

$$\acute{\Gamma}i = \sum_{m=1}^{n} \ell_i(m).w(m) , \tag{8}$$

$w(m)$ in formula describes weights.

4. Practice

In the study, 3 distributors (X_1, X_2, X_3) and 11 financial ratios as current ratio, currency ratio, debt ratio, capital ratio, fixed asset turnover, floating asset turnover, total asset turnover, receivable turnover, net profit margin ratio, profit-ability of assets and profit capital ratio $(S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8, S_9, S_{10}, S_{11},)$ were utilized. Decision matrix belonging to three distributors is shown in Table 3.

Table 3. Decision matrix belonging to distributors

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}
X_1	1,72	0,65	0,58	1,37	163,48	4,89	4,75	18,73	0,03	0,11	0,26
X_2	19,38	1,57	0,06	0,06	5,61	5,33	5,32	14,84	0,05	0,27	0,28
X_3	4,19	1,11	0,23	0,30	62,11	3,29	3,12	21,76	0,04	0,12	0,15

It is wanted liquidity ratios (S_1, S_2) to be values at average type; capital structure ratios (S_3, S_4) to be at minimum level; operating ratios (S_5, S_6, S_7, S_8) and also profitability ratios (S_9, S_{10}, S_{11}) to be at maximum level. For these ratios, the following table was acquired by being used formulas (4), (3) and (2) respectively in the process of making comparison series.

Table 4. Comparison series and referance series belonging to distributors

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}
X_0	1	1	1	1	1	1	1	1	1	1	1
X_1	0,84	0	0	0	1	0,78	0,74	0,56	0	0	0,85
X_2	0	0	1	1	0	1	1	0	1	1	1
X_3	1	1	0,67	0,82	0,36	0	0	1	0,50	0,06	0

Absolute value table was made as follows in order to calculate the minimum and maximum values by using formula (5).

Table 5. Absolute value table belonging to distributors

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}
X_0	1	1	1	1	1	1	1	1	1	1	1
X_1	0,16	1	1	1	0	0,22	0,26	0,44	1	1	0,15
X_2	1	1	0	0	1	0	0	1	0	0	0
X_3	0	0	0,33	0,18	0,64	1	1	0	0,50	0,94	1

On the purpose of conversion of financial ratios into grey relational coefficient, the table below was made by by using formula (7) on the assumption that criteria were equal in calculation of formula (6) and Grey relational degree.

Table 6. Grey relational coefficient matrix and Grey relational degree (arity)

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	Relation degree (arity)	Sorting
X_1	0,76	0,33	0,33	0,33	1	0,69	0,66	0,53	0,33	0,33	0,77	0,55	3
X_2	0,33	0,33	1	1	0,33	1	1	0,33	1	1	1	0,76	1
X_3	1	1	0,59	0,74	0,44	0,33	0,33	1	0,50	0,35	0,33	0,60	2

As sorting of distributors according to Grey relational degrees in Table 6 is $\Gamma_2 > \Gamma_3 > \Gamma_1$, their sorting in accordance with financial condition becomes $X_2 > X_3 > X_1$.

Conclusion and suggestions

Balance sheet and income statement are financial statements showing performances of companies and financiers one by one analyze the values set by them and make interpretation. On the other hand, measure-ment of performance requires to be analyzed and interpreted many criteria at the same time. While analyzing like this, it supposes to use multi-criteria decision-making methods. Grey Relational Analysis method, one of these methods, is a decision-making method being of use for interpreting financial performances of companies by paying attention to criteria at average type.

When looked at general performance sorting, X_2, X_3, X_1 are seen like in figure. The sorting as a result of analysis is the same as the one which parent company gets as a result of its evalutions. This situation shows that the results of the study are in line with the current situation.

According to findings of the study, while X_2 distributor is the best one that is good at turning its assets into profit and sale, it is bad at paying its current maturity, collecting commercial receivables due to sales and also its fixed asset productivity it is the minimum. Also, while X_1 distributor is placed on the last sorting with 0,55 value in terms of general performance, it is the best distributor to convert its fixed assets into profit and having the minimum debt.

Being taken no notice of all financial ratios is one of constraints of this study. In next articles, study can be more comprehensive, i.e, all financial ratios can be used. Furthermore, the results get by GRA can be compared with the ones get by other multi-criteria decision-making methods. On the other hand, this method suggested can be applied for performance evaluation of companies in other sectors.

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