MEASURING THE INVENTORY TURNOVER IN DISTRIBUTIVE TRADE

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Abstract

The ability of rapid inventory turnover indicates the success of a company in the use of their investments in inventory as a major business asset of the trading company. The inventory turnover expresses the speed at which the trading company sells its inventories or how much turnover the average inventory generates in one year. Also, the inventory turnover indicates how many times during a year the trading company is able to sell the amount of merchandise that matches its average inventory. The inventory turnover reflects how frequently a company flushes inventory from its system within a year. The inventory turnover greater than one indicates that the average inventory is sold in less than one year or it generates more than one turnover in a year.

The inventory turnover can be calculated in two ways: as the ratio of the cost of goods sold for the reporting period and the average amount of inventory for that time period or by dividing sales revenue for the reporting period by the average amount of inventory for that time period. Furthermore, these ratios of inventory turnover have different meanings for different trading firms. Therefore, the authors of this paper will explore how these ratios affect the success of the trading companies. It will be investigated whether replacing one ratio with another ratio affects the interpretation of the success of the trading companies. Moreover, the relationship between these two ratios and the rate of return called the return on assets (ROA) will be investigated. Trading companies are divided according to the

criterion of their size (large, medium-sized and small) and according to the criterion of the type of merchandise they sell (specialized and general consumer goods).

The study included 28 large trading companies, 30 medium-sized trading companies and 22 small trading companies, which altogether make a total of 80 companies from the Republic of Croatia. The data used in the study are based on the financial and accounting indicators for the year 2008 and the year 2009.

Keywords: inventory turnover, profitable inventory management, trading companies.

1. INTRODUCTION

The return on assets is typically measured as the ratio between the net profit and the total assets of the company. However, it can be measured as the ratio between the gross profit (margin) and the total assets of the company. In this case, the company's success from selling inventory and the value of the return on assets depend on a combination of two factors (Edmonds, 2000, p. 379): the gross profit rate (gross margin percentage) and the inventory turnover.

These factors have a different meaning for certain companies. We can compare two extreme cases, discount stores and specialized shops. Discount stores offer a narrower range of merchandise at lower prices trying to boost sales faster (higher inventory turnover). In contrast, specialized trading companies typically require more in gross profit margin to compensate for the unfavorable condition of slower sales of goods (lower inventory turnover). Specifically, specialized shops usually offer a better service and a wider choice of goods to convince consumers that the higher prices of their goods are justified.

Consumers buy goods in specialized stores and department stores or in the discount stores, depending on whether the price of the goods or the range of services, which the trading company offers to them, is more important to them. If consumers want to get a good piece of advice on which model of the required product to choose, they will be willing to pay a higher price of the goods in order to obtain a higher level of professional help. Decisions about pricing, advertising and services that the company provides to consumers, generally are considered to be marketing decisions, but it is clear that such decisions cannot be made properly without understanding and appreciation of accounting information on the interaction between the gross profit rate and turnover of inventories (Edmonds, 2000, p. 379).

For the company it is the most favorable situation when it has a high inventory turnover and when the gross profit rate is high. However, in the conditions of market competition it is normal to expect that the company is more focused on one, and less on the other of these two factors.

If managers of trading companies want to increase the return on assets, besides proper managing company's profit (gross margin), they must take into account another relevant factor usually called asset management (business resources management) of a company. Required accounting information to evaluate the quality of asset management can be found primarily in the company's balance sheet. Assets include economic resources of the company, and can be divided into fixed (long-term) and current (short-term) property. Current assets include assets that can be converted into cash over a period of one year. In the trading company, current assets include cash, accounts receivable and inventories of goods. Accounts receivable are a form of consumer crediting and for the trading companies in the marketing sense they present an important service to consumer, aimed at encouraging sales. Merchandise inventories are the lifeblood of the trading companies. The principle benefit trading companies "offer customers is having the right merchandise inventory available at the right time and place" (Levy, 2009, p. 177).

By calculating the inventory turnover it is easy to measure success of managers in inventory management. The ratio of inventory turnover is a rough expression of inventory performance which serves to define the objectives and to measure the performance of the manager. However, the value of the inventory turnover can be significantly different depending on the type of goods and the method of calculation (cost of goods sold or revenue from the sale are placed in relation to the average value of the inventory). Average inventory turnover ratios are usually calculated by chamber of commerce or associations of entrepreneurs for certain industries.

2. GENERAL FEATURES AND IMPORTANCE OF THE INVENTORY TURNOVER

The speed of inventory turnover indicates the success of the companies in the use of their investments in inventories that are the primary current assets of the trading companies. It is the rate at which the trading company sells its inventories (stocks). The inventory turnover measures the speed of the inventory turnover and shows how many of the average inventory turnovers the company makes in one year, that is, how many times during the year the company is able to sell a quantity of goods corresponding to its average inventory.

Monitoring the size of the inventory turnover serves as the inventory analysis techniques and as a means to maintain optimal levels of inventories in the company. The inventory turnover can be calculated in two ways. One it is as the ratio between the cost of goods sold during the year and the average capital invested in inventories during the year $(average inventory at cost)^4$, while the second represents the ratio between the revenue from the sale of goods (net sales) and the average capital invested in inventories during the year (average inventory at cost), also called sales-to-stock ratio⁵. Thus, the following applies:

$$KO1 = \frac{\text{cost of goods sold}}{\text{average inventory at cost}}$$
$$KO2 = \frac{\text{net sales}}{\text{average inventory at cost}}$$

Accordingly, the required information to calculate the speed of turnover of the inventory are the cost of goods sold and the revenue from the sale of goods (from the profit and loss account), and the average inventory of the goods at cost (from the balance sheet of the company). The value of the inventory is contained in the balance sheet on a particular day (usually at the end of the fiscal year), and the average inventory should be calculated as the average of the beginning and finishing annual inventory, or even as the average of

⁴ See, eg: Chasteen, 1992, pp. 286–287. ⁵ Levy, 2009, p. 334.

monthly or daily inventories during the year for a more accurate calculation of the inventory turnover speed.

In calculating the inventory turnover ratio, it is necessary to bear in mind the following facts (Schreibfeder, 1997):

First, only the purchase value of goods sold from a warehouse of the companies is taken into account (whereas the goods that are not held in stock or direct shipment are not taken into account, since they do not take up storage space or involve equity firms).

Second, the size of cost of goods sold (COGS) in the numerator formulas contain and transfer the stored goods to other departments as well as the quantity of the goods, which is used for internal purposes, such as repairs and installation.

Third, the inventory turnover ratio based on the purchase value (which it is paid by company) or to the selling price (which company charges from buyers).

In the denominator of the formula for calculating the inventory turnover, the average value of inventories during the year is used. In determining the average value of capital invested in inventories (Schreibfeder, 1997):

- 1. Calculate the total value of all commodity items in inventory (quantity on hand times cost) every month, on the same day of the month. It is necessary to take into account the principle of consistency and ensure the use of the same cost basis (average cost, last cost, replacement cost, etc.), in order to calculate both the cost of goods sold and average inventory investment.
- 2. If inventory levels in the company fluctuate throughout the month, calculate the total inventory value on the first and fifteenth day of every month.
- 3. Determine the average inventory value by averaging all inventory valuations recorded during the past 12 months.

Success in inventory management is measured by the inventory turnover. Managers of the trading companies, responsible for the investment in inventories and for the success of inventory management, strive to achieve a high inventory turnover. Increasing the inventory turnover can increase sales volume (the inventory consists of newer goods that sells better and faster), improve salesperson morale (they offer constantly new goods), reduce the risk of goods obsolescence (especially fashion and perishable goods), reduce the need for lower prices and provide more resources to take advantage of new favorable opportunity for buying and profitability raising, for example, in situations where the vendors wants to get rid of large inventory offering goods at low prices (Levy, 2009, p. 336).

When managers try to speed up the inventory turnover of their companies they must take into account the impact of measures to increase the inventory turnover on gross profit. Specifically, the inventory turnover can be increased in two ways (Levy, 2009, p. 337):

First, by reducing the number of merchandise categories, the number of stock keeping units (SKU) within a category or the number of items within a stock keeping unit, which means narrowing the range that can cause a decrease in sales of goods.

Second, by means of buying merchandise more often and in smaller quantities, which reduces the average inventory without reducing the sales, but by buying smaller quantities the gross profit margin decreases (buyers cannot take advantage of quantity discounts and transportation economies of scale) while operating expenses of trading business increase (higher costs of placing orders and monitoring deliveries).

Trading companies with rich sales programs have different categories of goods with different gross profit margin. While certain types of merchandise are quickly turning (up to 12 turns a year), some types of goods are slowly turning (one or even less than one turn per

year). It is necessary to calculate the inventory turnover separately for each commodity item in every warehouse of the trading companies. This is the only correct way for the manager to identify cases in which slower turnover than the average or the normal inventory turnover is realized. It is not sufficient merely to separate slower inventory turnover, the accounting staff also needs to properly assess their value. As a general rule, inventories with a slow turnover have to be assessed at values below the actual cost (Grady, 1965, p. 242).

3. EMPIRICAL RESEARCH SETTINGS

The empirical research is based on a sample of 80 companies which are divided according to two criteria. The first criterion depends on the type of the merchandise range of the trading company that it sells, so we can distinguish between trading companies that sell general merchandise and specialized trading companies whose sales range is considerably narrower and focused only on a particular category of goods or services. According to this criterion 47 trading companies that sell specialized merchandise can be distinguished as well as 33 companies that sell general merchandise. The second criterion represents the size of the company. Using this criterion, the authors classified the trading companies according to the Croatian Accounting Act (Official Gazette, 109/07)⁶, which distinguishes small, medium and large enterprises, depending on the parameters set on the last day of the fiscal year preceding the fiscal year for which the financial statements are prepared. Accordingly, the category of small companies consists of all the entities that meet two of the three conditions: total assets being less than HRK 32,500,000.00 with the income being less than HRK 65,000,000.00, whereas the average number of employees is less than 50. To the category of medium enterprises belong all the companies that meet two of the following three conditions: total assets is less than HRK 130,000,000.00, but it is higher than HRK 32,500,000.00; the total income is less than HRK 260,000,000.00, but it is greater than HRK 65,000,000.00, and the average number of workers is less than 250, but it is greater than 50. The category of large companies includes all the companies that exceed at least two of the three conditions listed for medium-sized businesses.

4. MEAS UREMENT OF THE INVENTORY TURNOVER

In wholesale the inventory turnover shows the number of times the company sells its inventory balance in a given period (usually one year), while in retail it shows how many times the average inventory passes through the store during a specified period (usually one year). The trade of general consumer goods (for example, food and household items), that sells relatively fast and has shallower depth of the merchandise range (a small number of different sizes, colors, models, brands and sizes of one type of goods in stock), has high inventory turnover, in contrast to trade of goods (for example, jewelry and clothing) which has a greater depth range, relatively higher investment in inventories and slower inventory turnover.

The data from the financial statements of the trading companies in Croatia, used in this study, indicate that the average trading company that sells general merchandise had

⁶ Zakon o računovodstvu, Narodne novine, 109/07.

inventory turnover (KO1) 8.79 in the year 2008, while in the year 2009 it was slightly lower and amounted to 7.69 (Table 1). However, trading companies that sell specialized goods (for example, cars) have a much lower inventory turnover (KO1). Hence, the average trading company that sells specialized merchandise had inventory turnover (KO1) 5.73 in 2008, while in 2009 it increased and amounted to 6.12 (Table 1).

	Year 2008			Year 2009			
	Total of general	Total of specialized	Total all	Total of general	Total of specialized	Total all	
Number of companies	33	47	80	33	47	80	
Value of goods sold (net sales)	33.494.054	8.407.549	41.901.603	31.919.153	6.037.266	37.956.420	
Value of average goods sold	1.014.971	178.884	523.770	967.247	128.452	474.455	
Cost of goods sold	27.334.063	7.060.200	34.394.263	25.720.785	5.039.245	30.760.030	
Average cost of goods sold	828.305	150.217	429.928	779.418	107.218	384.500	
Value of the total inventory	3.108.500	1.230.794	4.339.294	3.343.553	822.439	4.165.993	
Value of the average inventory	94.197	26.187	54.241	101.320	17.499	52.075	
KO1	8,7933	5,7363	7,9262	7,6926	6,1272	7,3836	
КО2	10,7750	6,8310	9,6563	9,5465	7,3407	9,1110	

Table 1: The average value of the inventory turnover (KO1 and KO2) by the type of sales range (monetary amounts in thousands)

Source: authors' calculations

The calculation of the inventory turnover KO2 reaches the same conclusion as the application of the inventory turnover KO1. The trading companies with a general sales range have higher inventory turnover than the companies with a specialized sales range. In addition, in the observed period both of the inventory turnover ratios (KO1 and KO2), measured as total for all the companies, decreased their value. It is presumed that the reduction of economic activity at the macroeconomic level directly reflects on the trading companies.

In this research, trading companies were arranged by size into three groups. The two mentioned inventory turnover ratios (KO1 and KO2) were calculated for each group based on average values, with the results being presented in Table 2 and Table 3. The average large trading company in the year 2008 had an inventory turnover (KO1) 8.35, followed by the average small trading company whose ratio was 5.87. According to this scale the least successful were medium-sized trading companies with an inventory turnover KO1 reaching the value of 4.85. If we compare these three average companies using an inventory turnover ratio KO2, we will come to a changed order. According to the inventory turnover KO2, the most successful companies are the large trading companies, followed by medium-sized trading companies.

Year 2008	Total large enterprises	Total medium- sized enterprises	Total small enterprises	Total all
Number of companies	28	30	22	80
Value of goods sold (net sales)	38.389.631	2.964.444	547.527	41.901.603
Value of average goods sold	1.371.058	98.815	24.888	523.770
Cost of goods sold	31.608.128	2.268.548	517.587	34.394.263
Average cost of goods sold	1.128.862	75.618	23.527	429.928
Value of the total inventory	3.784.150	467.024	88.121	4.339.294
Value of the average inventory	135.148	15.567	4.005	54.241
KO 1	8,3528	4,8575	5,8736	7,9262
KO 2	10,1449	6,3475	6,2134	9,6563

Table 2: The average inventory turnover (KO) by the size of the trading companies for the year 2008 (monetary amounts in thousands)

Source: authors' calculations

In the year 2009 the inventory turnover KO1 of the average large trade company was 7.84, while a medium-sized trading company had an inventory turnover 4.05, and a small trading company had an inventory turnover 4.62 (Table 3). According to this criterion, it can be seen that the average large trading company was the most successful, followed by the average small trading company, and average medium-sized trading company. The inventory turnover KO2 provides a slightly different order. According to this ratio, the most successful company was again the average large trading company, followed by the average medium-sized company, and then the average small trading company (Table 3).

Table 3: The average inventory turnover (KO)	by the size of the trading companies for the
year 2009 (monetary amounts in thou	sands)

Year 2009	Total large enterprises	Total medium- sized enterprises	Total small enterprises	Total all
Number of companies	28	30	22	80
Value of goods sold (net sales)	35.243.279	2.333.340	379.800	37.956.420
Value of average goods sold	1.258.689	77.778	17.264	474.455
Cost of goods sold	28.621.647	1.772.827	365.555	30.760.030
Average cost of goods sold	1.022.202	59.094	16.616	384.500
Value of the total inventory	3.650.079	436.928	78.985	4.165.993
Value of the average inventory	130.360	14.564	3.590	52.075
KO 1	7,8414	4,0575	4,6281	7,3836
KO 2	9,6555	5,3403	4,8085	9,1110

Source: authors' calculations

Analyzing the turnover of inventories (ratios KO1 and KO2) for the average trading companies of different sizes, we have come to the conclusion that the majority of small and medium-sized trading companies belongs to specialized trading companies. The inventory turnover (KO1 and KO2) in the year 2008 and 2009 has the approximately equal values of both ratios (KO1 and KO2) for specialized trading companies. The level of inventory turnover does not depend so much on the size of the trading company, as on the type of its merchandise range.

5. EMPIRICAL EVIDENCE FOR THE RELATIONSHIPS BETWEEN THE INVENTORY TURNOVER AND THE RETURN ON ASSETS

Trading companies that have low gross profit rates, as a rule, need to achieve high inventory turnover rates in order to operate profitably. In other words, if the company had a low gross profit margin, it required a large volume of transactions in order to achieve a sufficient total amount of profits. "Companies that sell high markup items, such as jewelry stores and art galleries, can operate successfully with much lower inventory turnover rates" (Meigs, 2001, p. 595). On the other hand, poor inventory turnover increases the risk of the lack of goods for which there is a demand from potential buyers. In this way, the risk that a trading company does not possess goods in stock that the customer is ready to buy at a certain point, increases. Therefore, the trading company is forced to urgently buy required goods from suppliers, with such orders often resulting in unnecessarily high costs (increased risk of delay of the goods ordered), which eventually reduces the profits of the trading companies.

Hence, from the previously mentioned data it is not possible to clearly indicate the relationship between the inventory turnover and profitability. To clarify the relationship between these two phenomena, an empirical study has been conducted, with the return on assets (ROA) being used as an indicator of the profitability of the trading companies. Return on assets is the ratio of profit and total assets of trading companies. The empirical study is based on two regression models:

$ROA_i = \alpha + \beta(ko1_i) + \varepsilon_i$

where: ROA_i – represents profitability of the total assets of the i-th trading company;

 $\alpha - constant$

 β – regression coefficient

kol_i – inventory turnover ratio (KO1) of the *i-th* trading company

 ϵ – residual

$ROA_i = \alpha + \beta(ko2_i) + \varepsilon_i$

where: ROA_i – represents profitability of the total assets of the i-th trading company;

 $\alpha-constant$

 β – regression coefficient

ko2_i – inventory turnover ratio (KO2) of the *i-th* trading company

 $\epsilon-\text{residual}$

The set of linear regression equations was calculated using the least squares method with the help of the econometric software package STATA. The study included 80 trading companies in Croatia and used financial and accounting data for the year 2008 and the year 2009.

Table 4 shows the results of the regression equation 3. Coefficient β is -0.197, so we have come to the conclusion that the relationship between the inventory turnover KO1 and the return on assets (ROA) is negative, that is to say that the increase in the inventory turnover tends to decrease ROA. P-value is less than 0.05, while the t-value is -2.10, which indicates the statistical significance of the results at the level of 5 percent.

Source	SS	df	MS		Number of obs	= 160 = 4 39
Model Residual	194.88691 7008.11176	1 158	194.88691 44.3551377		Prob > F R-squared	= 0.0377 = 0.0271 = 0.0209
Total	7202.99867	159	45.3018784		Root MSE	= 6.66
roa	Coef.	Std. E	irr. t	P> t	[95% Conf.	Interval]
ko1 _cons	1971291 5.090156	.09404 .90798	41 -2.10 31 5.61	0.038	3828749 3.296805	0113834 6.883506

Table 4: Results of regression analysis of the inventory turnover (KO1) and the return on assets (ROA)

Source: authors' calculations

The results of the regression model between the inventory turnover KO2 and the return on asset (ROA), shown by equation 4, indicates a negative relationship between these two phenomena (Table 5) because the coefficient β is equal to -0.096. The regression equations are statistically significant at the 10 percent level because the p-value is equal to 0.057, while the t-value is -1.92.

Table 5: Results of regression analysis of the inventory turnover (KO2) and the return on assets (ROA)

Source	SS	df	MS		Number of obs	= 160 = 3.67
Model Residual	163.465335 7039.53333	1 163 158 44.	.465335 5540084		Prob > F R-squared	= 0.0572 = 0.0227 = 0.0165
Total	7202.99867	159 45.	3018784		Root MSE	= 6.6749
roa	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
ko2 _cons	0969958 4.592816	.0506388 .7621184	-1.92 6.03	0.057 0.000	1970122 3.087562	.0030205 6.09807

Source: author's calculations.

Both ratios of the inventory turnover are in the negative relation to the return on assets (ROA). The negative relationship is stronger and firmer between the inventory turnover KO1 and the return on assets when compared to the relationship between the inventory

turnover KO2 and the return on assets. It is significant that both relationships are negative: no matter what method of calculation was applied, the connection remained negative. The results confirm the hypothesis that if the gross profit rate is low, a high volume of trading transactions is necessary to produce a satisfactory amount of total profits. The empirical results of this study are consistent with the research conducted by Bout et al. In their study they included 16 different industries in Belgium and found evidence of a negative relationship between the inventory turnover and the return on assets. The relationship in almost all industries is negative, and the highest value of the ratio is 0,088, while its lowest value is -0.358 (Bout, 2007, p. 9).

6. CONCLUSION

In the empirical research we have come to conclusion which supports the hypothesis that trading companies which sell specialized merchandise have on average smaller inventory turnover in comparison to companies that sell general merchandise. The reasons for this situation can be found in the value of individual items of merchandise. Specialized goods have mainly a higher price than general consumer goods. Thus, it is more difficult to sell them, which results in lower inventory turnover. We have noticed that trading companies that sell specialized goods belong to the category of small or medium-sized enterprises with approximately equal inventory turnover.

Required (planned) value of the inventory turnover depends on the average gross profit margin that the company seeks to achieve by selling goods. Trading companies that generate higher rate of gross profit (for example, 20 to 30 percent) seek to achieve the overall inventory turnover of 5 to 6 times a year. Companies with smaller gross margin have to strive for higher inventory turnover. Such companies cannot afford slower inventory turnover, as the companies with higher gross profit margin. The company can increase the inventory turnover when it procures smaller quantities of goods. However, in that case the company usually does not achieve adequate return on capital invested in goods, with a negative relationship between the inventory turnover and profitability being recorded, all of which was confirmed in the study.

In such cases, the company must carefully consider the effectiveness of reducing the quantities of goods that are normally purchased from suppliers. The aim is to economically dispose of limited available capital when investing in inventories. The period of tying up the capital in inventory of any goods must be limited, so in order to obtain the funds necessary for the payment of overdue accounts and for the distribution of realized profit, the company must sell all the goods purchased. Furthermore, the inventory turnover measures the speed at which inventories are moving through the warehouse of the company and measures the flow (liquidity) of a main part of its current assets. Along with other criteria, such as customer service level and the return on asset, the inventory turnover is a good barometer of the success of an enterprise.

However, managers must both carefully analyze the performance of their companies by using inventory turnover, and be careful when drawing any conclusions. The research presented in this paper provides evidence that the method of calculating inventory turnover can affect the ranking of a company's performance.

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