

## **Empirical Analysis of Inventory Turnover Ratio in FMCG Retail Sector - Evidence from the Republic of Serbia**

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*Considering that inventories feature as a significant cost component, especially in retail companies, inventory management requires particular attention. Various tracking indicators are used, with the turnover ratio being one of the most common. This article focuses on inventory turnover ratio determinants of Serbian large and medium sized enterprises registered solely for trading in fast moving consumer goods. Based on the gathered data, the authors analysed its relation to gross margin, capital intensity and sales growth rate. The results have shown that the inventory turnover ratio correlates positively with sales growth rate and gross margin, whereas its correlation to capital intensity is not statistically significant. Retailers' approach to business operations and decision making on delivery of orders, reflecting the decline in the average inventory level, feature as the fundamental reasons for establishing a positive correlation between inventory turnover ratio and sales growth rate. On the other hand, the reasons for the positive correlation between inventory turnover and gross margin can be found in the characteristics of the retail market in the Republic of Serbia regarding the concentration levels and market share of the leading retailers. In addition to application by retail managers, the obtained results can also be used as a basis for future research related to inventory analysis of the Serbian retail sector.*

**Keywords:** *inventory turnover, gross margin, sales growth rate, capital intensity.*

### **Introduction**

Everyone manages inventories one way or another, both at home and at work (Wild, 2002). Households regularly obtain food, clothing and other necessary products, often buying more than required, keeping certain amounts of products stocked. Consumers are also faced with shortages of products in retail outlets, and, more often than not, find themselves in a situation where they have to dispose of a part of their inventories because their shelf life has expired. Considering that their response initiates various business activities in the supply chain, business entities must pay special attention to inventories as well.

Inventory control is of special importance for retailers, particularly for perishable items concerning their finite lifetimes (Chiu, 1999). Supplying consumers, they seek to provide an adequate level of product availability in their facilities, achieving the desired financial gain. If demand were fully predictable, this would significantly reduce, and, in some cases, eliminate the need to maintain inventories, not only in retail chains, but also in other links of the supply chain (Chopra & Meindl, 2004). However, due to unpredictable behaviour of final buyers and inadequately accurate demand forecasts, a certain amount of products must be kept in stock. Seamless operation of enterprises is thus secured, along with meeting consumers' demands.

Sell out, shortage or inventory depletion in retail outlets can produce negative consequences not only for retailers but also for other supply chain members. According to a report by Roland Berger Strategy Consultants, total inventory depletion costs of all supply chain members amount to over 4 billion euros. (Roland Berger Strategy Consultants, 2003). This estimate includes only the customers who give up

shopping if a particular product is out of stock in a retail facility. In addition to this, other types of consumer response to inventory depletion (delaying purchase, substituting the product or opting for another retail outlet) can also make a negative impact on the company's performance (Campo *et al.*, 2000; Corsten & Gruen, 2004). In addition to reduction in possible sales, frequent instances of inventory depletion in retail outlets also results in the loss of loyal customers, decline in reputation and deteriorated retailer's image.

However, despite the above stated arguments, stocking up has its price. In addition to costs related to buying the products, keeping stocks entails additional costs related to storage, insurance, taxation, amortisation and expiry (Krasulja & Ivanisevic, 2005). The costs of purchasing and maintaining inventory account for almost a third of the total logistic costs (Burnson, 2012). Bearing in mind the fact that inventories feature as a significant part of assets in both production and trade companies, they also take up a high proportion of financial investment. The total value of operating inventories on the Serbian market in 2011 was 12.4 billion euros, which is 11 % of total working capital employed (Serbian Business Registers Agency, 2012). This percentage is even higher in the trading sector (20 %), whereas the value of operating inventories has exceeded the value of 4.2 billion euros.

To keep the inventory levels within rational boundaries and keep them from reaching unnecessary and unjustified extent, a special attention must be paid to their analysis. One of the most common inventories utilisation efficiency indicators is the turnover ratio. In addition to featuring as a relative ratio between inventories utilisation and their average state over a particular period, it is also one of the most efficient indicators of a company's business operation.

*The scientific problem of this article* is the analysis of inventory turnover performance of Serbian medium-sized and large FMCG retailers, in relation to several business indicators. *The object of this article.* Business performance measures (inventory turnover ratio, gross margins, capital intensity and sales growth rate) for 35 medium-sized and large Serbian FMCG retailers.

*The aim of this research* is to estimate the impact of previously mentioned variables on inventory turnover ratio using an empirical model, proposed by Gaur *et al.*, 2005.

*Research methods* are based on comparative analysis of scientific literature and panel data statistical analysis. *Novelty.* Positive or negative correlations of these factors (gross margins, capital intensity and sales growth rate) with inventory turnover can be useful to retailers while analysing their inventory performance and making business decisions.

## Literature review

Due to the significant share they take in the total operating assets, especially those of trading companies, inventories must be managed efficiently. According to Hunt *et al.*, (1971), “when a business needs cash, they should check their inventories before calling a banker.” For retailers, inventory costs feature as the second largest balance sheet expenditure after the cost price of sold products (Lush, 1986).

Accordingly, the first articles on inventories dealt with their analysis from the cost aspect. They sought to define the contingency inventory levels, optimum quantities of orders, and establishing various supervision and control procedures (Dubelaar *et al.*, 2001, p. 97). As early as 1913, Harris was one of the first to lay the foundations of the EOQ model, identifying unit cost, set-up cost, interest on stock, movement, and manufacturing as the key factors of calculation. A significant contribution to the development of this model was made by Wilson, introducing the re-order point system in 1934. Later on, under the influence of technological development, the authors’ attention was focussed on developing new, more sophisticated methods, including cover-time planning (Magee & Boodman, 1958), material requirements planning (Orlicky, 1970), quick response (Larson & Lusch, 1990; Larson & DeMarais, 1999), just-in-time operational processes (Rabinovich *et al.*, 2003), inventory planning models (Shapiro & Wagner, 2009) and other automated inventory control systems. Besides micro-level analysis, there are also studies, concerning the macro aspects of inventory control and its impact on GDP growth (Maccini & Pagan, 2013).

However, in addition to the search for maximally efficient inventories management system, the ratio between inventories and other variables was the subject of much research. Urban (1998, p. 31) generalized and integrated two distinct streams of research, inventory management and shelf-space allocation decisions, by extending the inventory-level-dependent demand inventory model to the multi-item shelf space situation. Using the survey of 101 chain store units, (Dubelaar *et al.*, 2001) quantified positive relationships between retail inventory, sales and customer service. Koschat (2008) documented the market study, which presents empirical evidence that store inventory can affect demand. Positive effect of inventory levels on retail

store sales was also found by Ton and Raman (2010). However, in the case of phantom products (located in the retail outlet but unavailable to customers), they established opposite trends, i.e. that sales tend to decline with the rise in the level of inventories. In addition to sales, inventories are also related to the variety (Ryzin & Mahajan, 1999) and the forecasting process. (Kesavan *et al.*, 2010) developed the simultaneous equations model, pointing to the relevance of historical data on inventories on sales forecasts. This relation is especially important having in mind that inventory inaccuracy can affect supply chain performance and its costs (Fleisch & Tellkamp, 2005).

A lot of attention in inventory analysis is paid to the turnover ratio, one of the most significant efficiency indicators, equal to sales per square meter and sales per employee. (Vergin, 1998, p. 51) analysed trends in inventory turnover ratios of the Fortune 500 largest industrial corporations in the United States during the period of 1986-1995. Beside definitions of the inventory turnover, Hill and (Zhang, 2010, p. 36) presented its six common misuses (invariant turnover with changing demand, average of ratios, end-of-period inventory, incompatible numerator and denominator, improper comparisons, and common days on hand) and suggested several ways for their avoiding. In Serbia, (Lovreta *et al.*, 2009) examined inventory turnover ratios across several retail sectors. Similar reports, concerning values and trends in inventory turnover ratios of different retail segments and firms, have been published in Lithuania too (National Stock Exchange of Lithuania, 2002; Euromonitor, 2012).

But, some of the authors went a step further, analysing the correlation between the turnover ratio and other business variables. Using the percentage increase or decrease in inventory turnover as the measure of inventory performance, (Cannon, 2008) investigated the relationship between inventory performance and overall firm performance (return on assets and return on investments). The results of his research indicated no link between these variables. (Gaur *et al.*, 2005) constructed an empirical model to investigate the effects of gross margin, capital intensity and sales surprise (the ratio of actual sales to expected sales for the year) on inventory turnover. They used publically available financial data from 311 retailers in the USA in their study. The results showed that the annual turnover ratio correlates positively with capital intensity and sales surprise, and negatively with the gross margin. The same results were reached by (Koliass *et al.*, 2011). They analysed the financial data of Greek retailers between 2000 and 2005 for the needs of their study. (Gaur & Kesavan, 2008) extended the findings of (Gaur *et al.*, 2005) and studied the correlation of inventory turnover with company size and sales growth rate. They found that inventory turnover increases with both size and sales ratio. Similar studies relating to the analysis of the ratios of diverse business indicators and the inventory were not found either in Serbia, or in Lithuania. Therefore, according to (Gaur *et al.*, 2005; Gaur & Kesavan, 2008), this article investigates the effects of several variables on inventory turnover in Serbian FMCG retail sector, such as gross margin, capital intensity and sales growth rate.

**Research methodology and definition of variables**

Table 1

In our study, we used financial data of 35 medium-sized and large retailers, from the period of 2008-2011. According to the official classification of industries of the Republic of Serbia, they are classified in group 471, i.e. registered for retail trade in general retail stores, mostly of food, drinks and tobacco. Due to the high fragmentation level of the trading sector (Lovreta, 2009), the sample of 35 medium-sized and large enterprises is 60 % of the total number of medium-sized and large FMCG retailers operating in Serbia. This is further supported by the fact that micro and small retailers with up to 50 employees account for as high as 97.3 % of the total number of retail companies in Serbia (The Statistical Office of Serbia, 2012). However, despite the small share in the total number, medium sized and large trading companies have a significantly higher share in the total sales, value added and number of employees. When these factors are taken into account, the percentage of the sample's share in the overall sum is much higher.

The data used in the analysis were retrieved from the companies' financial reports available on the Serbian Business Registers Agency's web site. The analysis of this data produced the following variables: inventory turnover ratio, gross margin, capital intensity and sales growth rate.

The inventory turnover ratio (IT) indicates how many times the inventories are turned over, sold and reproduced over the observation period (Krasulja & Ivanisevic, 2005). In retail companies, it is the relative ratio of the purchase price, i.e. cost of goods sold (CGS) to the average amount of inventories (Inv) over the period, one year in most cases. The inventory turnover of company *i* in year *t* is calculated with the formula:

$$IT_{it} = CGS_{it} / Inv_{it} \tag{1}$$

Capital intensity (CI) measures efficiency of company's capital investment. Both gross fixed assets (GFA) and net fixed assets (NFA) can be used for measuring capital investment (Gaur *et al.*, 2005). Following (Kolias *et al.*, 2011, p. 147), our study defines capital intensity as the ratio of net fixed assets (NFA) to the sum of inventories (Inv) and net fixed assets (NFA) of company *i*, at year *t*:

$$CI_{it} = NFA_{it} / (Inv_{it} + NFA_{it}) \tag{2}$$

Gross margin (GM) represents the company's earnings, measured as the percent of total sales revenue. It can be obtained as a ratio of sales revenue reduced by the cost of goods sold and sales revenue in the company *i* in the year *t*:

$$GM_{it} = (S_{it} - CGS_{it}) / S_{it} \tag{3}$$

Sales growth rate (SG) represents the percentage change in sales in relation to the previous period. However, to avoid negative values, we used the ratio of current (*S<sub>it</sub>*) to previous sales (*S<sub>i,t-1</sub>*) in the year *t* for the company *i* for calculating this variable:

$$SG_{it} = S_{it} / S_{i,t-1} \tag{4}$$

Having calculated these coefficients for 35 small and medium sized retailers in the observation period, we analysed them. Table 1 shows their correlation coefficients.

A positive correlation appears between the inventory turnover ratio and other variables. Table 2 presents descriptive statistics for all these variables.

Correlation coefficients

Variables	IT	GM	CI	SG
IT	1.000			
GM	0.176	1.000		
CI	0.153	- 0.161	1.000	
SG	0.428	0.018	- 0.111	1.000

Table 2

Descriptive statistics for IT, GM, CI and SG

Variables	Mean	(s.d.)	Median
Inventory turnover ratio (IT)	11.5495	(5.01691)	10.81
Gross margin (GM)	0.1533	(0.36233)	0.1939
Capital intensity (CI)	0.6718	(0.21856)	0.7051
Sales growth rate (SG)	1.1182	(0.46362)	1.0942

The average share of inventories in the total corporate assets in the analysed retail companies amounted to 19 %, i.e. 33 % of the operating assets. With the average inventory turnover ratio of 11.5495 (and standard deviation of 5.01691), they earned an average of 82.5 million sales per annum.

**Conceptual model and hypotheses**

To analyse and monitor variables in various time periods in this article, we opted to use the panel data model, as a group based approach (Hausman & Taylor, 1981; Feng *et al.*, 2001). To investigate the effects of gross margin, capital intensity and sales growth rate on inventory turnover, in accordance with recent studies (Gaur *et al.*, 2005; Gaur & Kesavan, 2008; Kolias *et al.*, 2011), we used the following log-linear model:

$$\log IT_{it} = F_i + c_t + b_1 \log GM_{it} + b_2 \log CI_{it} + b_3 \log SG_{it} + \varepsilon_{it}, \tag{5}$$

where indexes “*i*” and “*t*” refer to the company and time.

Apart from gross margin, capital intensity and sales growth rate, inventory turnover ratio also depends on other factors, including managerial efficiency, location strategy, accounting policy, etc. (Gaur *et al.*, 2005, p. 12). These factors are constant in time, but vary from one company to another. Their impact on the turnover rate is represented by the control variable *F<sub>i</sub>*. Factors changing over time but constant for companies (interest rate, inflation etc) were also included though the control variable *C<sub>t</sub>*. According to (Gaur *et al.*, 2005) firm and time-specific control variables are modelled as fixed effects, because they can be used to compare average inventory turnover performance across firms and years.

Parameters *b<sub>1</sub>*, *b<sub>2</sub>* and *b<sub>3</sub>* represent coefficients to *logGM<sub>it</sub>*, *logCI<sub>it</sub>* i *logSG<sub>it</sub>*, which need to be calculated in order to assess the impact of independent variables on the inventory turnover ratio. The model also includes error term *ε<sub>it</sub>* for year *t* and company *i*. The set model was used to prove three hypotheses: *H1*, *H2* and *H3*. Following managerial practices in retail companies and results in other research papers (Gaur *et al.*, 2005; Gaur & Kesavan, 2008; Kolias *et al.*, 2011), we tested the hypotheses:

*H1: Inventory turnover ratio is negatively correlated with gross margin.*

*H2: Inventory turnover ratio is positively correlated with capital intensity.*

H3: Inventory turnover ratio is positively correlated with sales growth rate.

## Results

Before the implementation of the model (5), all data should be prepared. We transformed them into log values and restructured into cases. After employing panel data model, in Table 3 we presented the fit statistics.

Table 3

Fit statistics of model (5)

<b>-2 Restricted Log Likelihood</b>	-338.053
<b>Akaike's Information Criterion (AIC)</b>	-256.053
<b>Hurvich and Tsai's Criterion (AICC)</b>	-189.823
<b>Bozdogan's Criterion (CAIC)</b>	-110.778
<b>Schwarz's Bayesian Criterion (BIC)</b>	-151.778
<b>Test of significance of variables (F-test)</b>	
<b>logGM</b>	7.872
<b>logCI</b>	0.352
<b>logSG</b>	45.094

The fit of model (5) is statistically significant with  $p < 0.001$ , and the  $R^2$  value is 82.32 %. The coefficients' estimates for explanatory variables,  $logGM$ ,  $logCI$  and  $logSG$ , are shown in Table 4.

Table 4

Regression estimates for model (5)

Variable	Estimate	Std Error	t-statistics	p-value
<b>logGM</b>	0.075509	0.026913	2.806	0.006
<b>logCI</b>	0.089457	0.150830	0.593	0.555
<b>logSG</b>	0.147339	0.021941	6.715	0.000
Dependent Variable: LogIT				

The coefficient estimate for  $logGM$  is positive (0.075509) and statistically significant at  $p < 0.01$ . It means that the increase of gross margin by 1 % will cause the change in inventory turnover ratio for 0.075 %. Thus, the inventory turnover ratio and gross margin are positively correlated, which represents the opposite direction as hypothesized.

As presented in Table 4, the coefficient of  $logCI$  is statistically insignificant. Therefore, besides its positive value (0.089457), the hypothesis 2 cannot be supported.

Contrary to hypotheses 1 and 2, hypothesis 3 is strongly supported by the estimate of the coefficient of  $logSG$ . It has positive value of 0.147339 and is statistically significant at  $p < 0.0001$ . Thus, we conclude that the inventory turnover ratio is positively correlated with sales growth rate.

## Conclusion and directions for further research

Out of the three set hypotheses in this study, only one has been confirmed – H3, regarding the correlation between the inventory turnover ratio and sales growth rate. Using the newsboy model, (Gaur & Kesavan, 2008) stated the reasons for establishing both positive and negative correlation between these two variables. Retailers can base their decisions on inventories on the analysis of sales achieved in the previous period. The required inventory levels are established based on these data. Due to growth in sales, stimulated by growth in demand, the average inventories will be reduced, making a positive impact on the growth of the turnover ratio. (Gaur & Kesavan, 2008) called this

reasoning the *positive effect* of sales ratio on inventory turnover. If, however, the retailers want to stimulate demand by increasing inventory levels, in addition to sales rates, this will also result in average inventories. Higher growth of inventories in comparison with sales may cause reduction in the turnover ratio. Thus, due to increase in sales rate, the inventory turnover ratio will decline. The negative correlation between these variable may also occur when the retailer opts for reducing inventory levels for financial reasons (to improve cash flow). In this case, the inventory turnover ratio will increase and the sales growth rate will decline. Gaur and Kesavan (2008) called this reasoning the *negative effect* of sales growth ratio on inventory turnover. These authors (2008) also presented the situations in which one or the other of these two effects will dominate. For a retailer that has a large untapped market potential, but limited capacity and budget, sales could exceed inventory and the *positive effect* will dominate. On the other hand, for a retailer that has a small untapped market potential and tries to increase its sales growth rate by pushing more inventory to its stores (or through opening new stores or expanding product lines), the *negative effect* will dominate. According to our results, we conclude that there is a positive correlation between sales growth rate and inventory turnover, so the *positive effect* dominates.

In addition to the sales growth rate, the article also analyses the correlation between inventory turnover ratio and capital intensity. According to Gaur *et al.*, (2005), investments in warehouses and information technology, accounted as fixed assets, result in an increase in inventory turnover. They assume that a retailer can reduce safety stock and re-balance store inventories with a new warehouse. On the other hand, the implementation of modern information technology, like EDI and SCM, can decrease the average network inventory and the time needed to get the products to customers (Chopra & Meindl, 2004). In our study, the LogCI coefficient had positive value, but because of its insignificance, we could not support the hypothesis H2.

When analysing the correlation between the inventory turnover ratio and gross margin, certain discrepancies from the results obtained in similar studies (Gaur *et al.*, 2005; Gaur & Kesavan, 2008; Koliass *et al.*, 2011) were found. Unlike these, a positive correlation between the above mentioned variables was identified; the hypothesis H1 thus remained unsupported. Other authors (Gaur *et al.*, 2005; Koliass *et al.*, 2011) mostly obtained negative  $logGM$  coefficient in their studies, and thus confirmed the existence of inverse correlation between inventory turnover ratio and gross margin. In most cases, the outcome resulted from the managers' practice to base their decisions on the analysis of GMROI (gross margin in return on inventory) indicators (Sweeney, 1973). In order to maintain the trade-off between these variables, they give lower turns targets for items with higher margins and vice versa. According to (Gaur *et al.*, 2005), several factors affect the negative relation between inventory turnover and gross margin, like service level, price, product variety and length of product lifecycle. Besides these factors, (Koliass *et al.*, 2011) added a few more: target market, the organizational structure, the information and distribution systems, asset and capital structure.

However, despite the above arguments, the results of our study indicated that an increase in gross margin also results in a slightly increasing inventory turnover ratio. The reasons for positive correlation between these variables can be sought in the specific features of not only retail companies but the entire retail market in Serbia. Regardless of numerous changes in the past few years, retail trade in fast moving consumer goods in Serbia is still dominated by smaller retail outlets. They account for more than 50 % of total turnover, whereas the share of modern retail outlets (supermarkets, hypermarkets, discount stores and cash & carry facilities) is below 35 % (GFK, 2009). In the developed EU countries (Germany, France and the UK), as well as the highest developed transition countries (Slovenia, the Czech Republic and Slovakia), the share of modern retail facilities amounts to over 80 % and 60 % respectively (Lovreta, 2009; Metro Retail Compendium, 2011). According to (Langviniene & Sekliuckiene, 2011), in modern retail formats in Lithuania, the total turnover makes 61.9 percent of the food sector market share. As well as low diversity, limited space and higher prices, smaller retail outlets are also characterised by higher gross margins compared to other, larger retail outlets (Levy & Weitz, 2012). In the analysed sample, the retailers achieving the highest turnover coefficient in the observation period achieved their sales through their own or franchising conventional outlets. Smaller product range and limited range of services in small retail outlets (Levy & Weitz, 2012) facilitate the inventory management process. On the other hand, the organisation and operation of modern retail outlets (notably hypermarkets and cash & carry facilities), emerging on the territory of Serbia only in the past few years, are likely to rise to a higher level. The increasing diversity of retail formats in the future can also influence the growing competition between retailers (Morganosky, 1997).

As well as variations in retail outlets, the positive correlation between the inventory turnover ratio and gross margin is additionally influenced by the situation on the Serbian retail market. Unlike most developed countries, the concentration level of food and drink retailing is far below the EU average. From the aspect of a market leader, the

concentration level is not low, accounting for 26.4 % of total turnover of food and drink, (Lovreta, 2009). As regards the followers, however, Serbia lags behind many countries. Whereas the share of five largest fast moving consumer goods retailers' market share exceeds 60 % in some EU member countries (Germany, France Austria) and even 80 % (Sweden, Denmark and Finland), its value in Serbia amounts to under 40 % (ACNielsen, 2005; Metro Retail Compendium, 2011). This percentage is also far lower than the market share of the four largest retailers in Lithuania, accounting to more than 73 % (Langviniene & Sekliuckiene, 2011). Significantly lower share of followers is manifested through certain disproportions in market competition so that a slight rise in gross margin does not lead to a decline in the inventory turnover rate. This raises the issue of creating an appropriate market structure, which will stimulate a strengthening in the followers' share, and more intensive entry of international retail chains to the Serbian market. This is corroborated by the fact that only one of Europe's ten largest retailers, Metro Group, operates in Serbia (Deloitte, 2012). The situation is similar in Lithuania as well. The leading retailers are mostly domestic companies (Langviniene & Sekliuckiene, 2011), which can raise a whole range of issues in addition to the high share of the market leader compared to the followers (despite the high concentration levels).

The overview of the observation period cannot be complete without considering the impact of the global economic crisis. In the case of some retailers, the fall in business activities was accompanied by reduction not only in gross margins, but also in inventory turnover ratio.

The obtained results can be useful to managers in analysing and decision making regarding inventories. They can also be used as a basis for further research into and monitoring of inventory turnover ratio in Serbian retailers. The same methodology can be applied in inventory performance analysis not only in other trade segments but also various retail outlets. Another open question remains the issue of market entry of large retail chains, and their impact on retail inventory management.

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### Prekių atsargų koeficiento empirinė analizė greito vartojimo prekių mažmeninės prekybos sektoriuje – faktai iš Serbijos Respublikos

Santrauka

Norėdami efektyviai valdyti prekių atsargas, mažmenininkai pirmiausia turi atlikti prekių atsargų analizę o vėliau, atsižvelgdami į gautus rezultatus, priimti sprendimus, kad būtų išvengta rizikos, susijusios su pertekliniu prekių atsargų buvimu. Analizė pagrįsta prekių atsargų apyvartumo koeficientu. Prekių atsargų apyvartumo koeficientas (IT) parodo, kiek kartų prekių atsargos patenka į pardavimą ir per kokią laiką jos vėl atstatomos. Prekių atsargų apyvartumo koeficientas yra kompanijų verslo veiklos matmuo, o didesnė prekių atsargų apyvartos reikšmė reiškia, kad atsargų valdymas yra efektyvesnis. Kaip priklausomas kintamasis, prekių atsargų apyvartai įtaką daro keli nepriklausomi veiksniai: bendrasis pelnas, kapitalo intensyvumas ir pardavimų augimo indeksas. Kapitalo intensyvumas (CI) matuoja kompanijos kapitalo investicijų efektyvumą kaip santykinį pirkimo kainos santykį (parduotų prekių kaštus - CGS) su vidutiniu prekių atsargų kiekiu (INV) per nustatytą laikotarpį. Bendrasis pelnas (GM) parodo kompanijos pajamas, įvertintas kaip visų pardavimų įplaukas procentais. Šiame tyrime, kapitalo intensyvumas yra apibrėžtas kaip fiksuotų grynujų lėšų santykis su prekių atsargų suma ir kompanijos fiksuotos grynosios lėšos  $i$  metais  $t$ . Pardavimų augimo tempas (SG) parodo procentinį pokytį pardavimuose lyginant su ankstesniu laikotarpiu ir jį galima apskaičiuoti kaip dabartinių pardavimų santykį remiantis ankstesniais pardavimais nurodytais metais.

Bendrojo pelno, kapitalo intensyvumo ir pardavimų augimo indeksas ir įtaką prekių atsargų apyvartumui, labiausiai priklauso nuo tam tikrų rinkos sąlygų kiekvienoje šalyje. Šiame straipsnyje tirta bendrojo pelno, kapitalo intensyvumo ir pardavimų augimo indekso įtaka Serbijos respublikos teritorijoje veikiančių mažmenininkų prekių atsargų apyvartumui. Tyrimo pagrindą sudarė pavyzdžiai iš 35 didelių ir vidutinio dydžio kompanijų, įregistruotų mažmeninei prekybai bendrose mažmeninės prekybos parduotuvėse, daugiausia maisto, gėrimų ir tabako. Šis pavyzdys parodo 60 % visų šios pramonės kompanijų mūsų šalyje. Tyrimo tikslams mes naudojome viešai gaunamus duomenis iš kompanijų finansinių ataskaitų 2008-2011 metų laikotarpiu, kuriuos taip pat galima rasti *Serbijos verslo registrų agentūros* tinklapyje. Apdorodami finansinių ataskaitų duomenis, mes apskaičiavome nepriklausomo kintamojo, t. y. prekių atsargų apyvartumo vertes ir priklausomų kintamųjų, bendrojo pelno, kapitalo intensyvumo ir pardavimų augimo indekso vertes.

Norėdami iširti ryšį tarp bendrojo pelno, kapitalo intensyvumo ir pardavimų augimo indekso vienoje sferoje ir prekių atsargų apyvartumą kitoje, buvo iškeltos trys hipotezės:

- H1: prekių atsargų apyvartumo koeficientas yra neigiamai susijęs su bendrojo pelnu.
- H2: prekių atsargų apyvartumo koeficientas yra teigiamai susijęs su kapitalo intensyvumu.
- H3: prekių atsargų apyvartumo koeficientas yra teigiamai susijęs su pardavimų augimo tempu.

Šiame straipsnyje, norėdami išanalizuoti ir stebėti kintamuosius skirtingais laikotarpiais, mes nusprendėme naudoti *panelinių* duomenų modelį. Norėdami patikrinti šias hipotezes, mes naudojome *logaritminį - linijinį* modelį, pateiktą Gaur ir kt. (2005), Gaur ir Kesavan (2008) bei Kolia ir kt. (2011) tyrimuose. Rezultatai parodė:

- *logGM* koeficiento įvertinimas yra teigiamasis (0.075509) ir statistškai svarbus esant  $p < 0.01$ . Vadinasi bendrojo pelno padidėjimas 1% pakeis prekių atsargų apyvartumo koeficientą 0.075%. Taigi, prekių atsargų apyvartumo koeficientas ir bendrasis pelnas yra teigiamai tarpusavyje susiję. Tai parodo priešingą kryptį nei buvo iškeltoje hipotezėje.
- *logCI* koeficientas yra statistškai nesvarbus. Todėl, nepaisant jo teigiamos vertės (0.089457), hipotezės 2 negalima palaikyti.
- hipotezė 3 labai palaiko *logSG* koeficiento įvertinimą. Jo vertė yra teigiama ir lygi 0.147339, bei yra statistškai svarbi esant  $p < 0.0001$ . Taigi, mes darome išvadą, kad prekių atsargų apyvartumo koeficientas yra teigiamai susijęs su pardavimų augimo tempu.

Galima daryti išvadą, kad iš trijų, šiame tyrime pateiktų hipotezių patvirtinta buvo viena - H3, dėl ryšio tarp prekių atsargų apyvartumo koeficiento ir pardavimų augimo tempo. Remiantis tyrimo rezultatais, galima daryti išvadą, kad egzistuoja teigiamas tarpusavyje ryšys tarp pardavimų augimo tempo ir prekių atsargų apyvartumo, todėl dominuoja teigiama įtaka. Dėl pardavimų augimo, kurį skatina poreikio augimas, vidutinės prekių atsargos sumažės, darydamos teigiamą įtaką apyvartumo koeficiento augimui. Tai vadinama teigiama pardavimų koeficiento įtaka prekių atsargų apyvartumui Gaur ir Kesavan (2008).

Mūsų tyrime koeficientas *logCI* turi teigiamą vertę, bet kadangi jis nesvarbus, mes negalime palaikyti hipotezės H2, kadangi prekių atsargų apyvartumo koeficientas yra teigiamai susijęs su kapitalo intensyvumu. Remiantis rezultatais, hipotezė H1 nėra palaikoma ir tai reiškia, kad prekių atsargų apyvartumo koeficientas yra teigiamai susijęs su bendrojo pelnu. Priežasčių teigiamai sąsajai tarp šių kintamųjų galima būtų ieškoti ne tik tarp tam tikrų mažmeninės prekybos kompanijų, bet ir visos Serbijos rinkos savybių. Nepaisant daugybės pokyčių, per pastaruosius kelerius metus, mažmeninėje greito vartojimo prekių prekyboje, Serbijoje vis dar dominuoja mažesnės mažmeninės prekybos parduotuvės, kurios sudaro daugiau nei 50% visos apyvartos. Maža prekių įvairovė, ribota erdvė ir aukštesnės kainos, tačiau kartu ir didesnis bendrasis pelnas lyginant su kitomis, didesnėmis mažmeninės prekybos parduotuvėmis. Taip apibūdinamos mažmeninės prekybos parduotuvės. Analizuojamame pavyzdyje, mažmenininkai, kurie pasiekė didžiausią apyvartos koeficientą stebimuoju laikotarpiu, tokius pardavimus pasiekė per savo nuosavas arba frančizės pagrindu paremtas įprastas parduotuves. Kaip ir kitimai mažmeninės prekybos parduotuvių atveju, teigiamai sąsajai tarp prekių atsargų apyvartumo koeficiento ir bendrojo pelno, papildomą įtaką daro padėtis Serbijos mažmeninės prekybos rinkoje. Kitaip negu išsivysčiusiose šalyse, maisto ir gėrimų mažmeninio pardavimo koncentracijos lygis mūsų šalyje yra gerokai mažesnis už ES vidurkį. Tai pat gerokai mažesnė rinkos dalis parodoma atskleidžiant tam tikrą rinkos konkurencingumo neproporcingumą. Šiuo atveju, nedidelis bendrojo pelno padidėjimas nesukelia prekių atsargų apyvartumo koeficiento mažėjimo.

Gauti šio tyrimo rezultatai gali būti naudingi vadovams analizuojant ir priimant sprendimus dėl prekių atsargų. Taip pat jie gali būti panaudoti kaip pagrindas tolesniame Serbijos mažmenininkų prekių atsargų apyvartumo koeficiento monitoringo tyrime. Be to, tą pačią metodiką galima taikyti prekių atsargų analizei ne tik kituose prekybos segmentuose, bet taip pat ir įvairiose mažmeninės prekybos vietose.

Raktažodžiai: *prekių atsargų apyvartumas, bendrasis pelnas, pardavimų augimo tempas, kapitalo intensyvumas.*

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