Management of inventory in a company

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Abstract

Firstly, the purpose of the empirical part of the study is to analyze the inventory balances of surveyed companies and secondly, to explore the dependence between companies' level of inventory and profitability expressed in terms of return on assets. Thirdly, the aim of the theoretical research is to explore the cost and benefits from changes in the inventory level as well as to define variables that determine net savings from changes in inventory level. An optimal inventory level should be based on consideration of incremental profitability resulting from increased merchandise with the opportunity cost of carrying higher inventory balances.

The results will provide a model equation for calculating net savings from changes in inventory level as well as a new mathematical optimization model. With this model a company can consider net earnings from changes in inventory level and establish the optimal inventory level as well as improve profitability.

Keywords: inventory balances, profitability, net savings, mathematical optimization model, optimal inventory level

1. Introduction

Inventory management is an extremely important function within most businesses. The purpose of inventory management is to develop policies that will achieve an optimal inventory investment. A company can maximize its rate of return and minimize its liquidity and business risk by optimally managing inventory.

Inventory management involves comparison between the costs associated with keeping inventory versus the benefits of holding inventory. Successful inventory management minimize inventory, lowers cost and improves profitability. An optimal inventory level can be based on consideration of the incremental profitability to the opportunity cost of carrying the higher inventory balances.

The aim of this paper is to contribute to the debate by empirically investigating the relationship between inventory level and profitability, and by modelling the relationships between variables that determine net savings from changes in inventory level in order to develop a new model equation for calculating net savings. We hypothesize that there may be no statistically significant association be-

tween inventory level expressed in terms of inventory to total assets ratio and inventory to current assets ratio and profitability expressed in return on total assets.

The purpose of this study is to determine how to find optimal inventory level in order to achieve a maximum return at an acceptable level of risk. Research has been made which studied and improved many aspects of the management of inventory. However, net profitability from revising the inventory policy has not been explored entirely in previous studies. With the aim of completing the gaps relating to net savings from revising the inventory policy, the study will explore costs and benefits from changes in inventory level as well as net profitability of this important activity in managing inventory.

The study makes its own contribution to research and thereby to managers. The contribution of the paper to the literature is a new model equation for calculating net earnings from changes in inventory level as well as a new mathematical optimization model which can help to ensure that changes in inventory level will result in net savings and can help managers in managing inventory optimally. This paper has strong implications for management practice.

The remainder of the paper is organized as follows. Section 2 addresses the theoretical grounds of the research. Section 3 explains the methodology and presents a descriptive analysis of the data as well as the results. Section 4 addresses theoretical grounds for modelling and develops corresponding models. Finally, section 5 is the conclusion.

2. Literature review

Inventory management involves a trade-off between the costs associated with keeping inventory versus the benefits of holding inventory. The benefit of an inventory is to assure that goods will be available as required. The primary costs of an inventory are the opportunity cost of the capital used to finance the inventory, ordering costs, and storage costs. Inventory management seeks to maximize the net benefit – the benefits minus costs – of the inventory (Chambers, Lacey, 2011).

Different inventory items vary in profitability as well as the amount of space they take up.

Higher inventory levels result in increased costs for storage, insurance, spoilage and interest on borrowed funds needed to finance inventory acquisition (Shim, Siegel, 2007). As successful inventory management minimizes inventory, lowers cost and improves profitability, managers should appraise the adequacy of inventory levels, which depend on many factors, including sales, liquidity, available inventory financing, production, supplier reliability, delay in receiving new orders, and seasonality. An increase in inventory lowers the possibility of lost sales from stockouts and the production slowdowns caused by inadequate inventory. Inventory levels are also affected by short-term interest rates. As short-term interest rates increase, the optimum level of holding inventory is reduced (Shim, Siegel, 2008).

McComas (1995) recommends that the following actions take place within a company in the management of inventory:

- establish purchasing review criteria to review the inventory characteristics
- purchase only the amount of raw materials needed for a production run or a period of time
- collaboration with vendors to improve the purchasing practice
- improve inventory control through application of effective inventory control systems
- encourage materials exchange within the company
- consider just-in-time manufacturing.

Financial managers have a responsibility both for raising the capital needed to carry inventory and for the firm's overall profitability. The goals of inventory management are to ensure that the inventories needed to sustain operations are available, but to hold the costs of ordering and carrying inventories to the lowest possible level. There is always pressure to reduce inventory as part of firms' overall cost-containment strategies, and many firms are taking drastic steps to control inventory costs (Brigham, Daves, 2004).

Economic order quantity analysis should be applied to every product that represents a significant proportion of sales. The economic order quantity is the optimum amount of goods to order each time to minimize total inventory costs.

The Economic Order Quantity (EOQ) model of inventory management is used to mark the optimum size of delivery and to choose the cheapest deliverer which guarantees minimization of total costs of investments in inventories. EOQ model is a technique that determines the optimal amount of inventory to order each time the inventory of that item is depleted (Chambers, Lacey, 2011).

The Economic Order Quantity (EOQ) model considers the trade-off between ordering cost and storage cost in choosing the quantity to use in replenishing item inventories. A larger order-quantity reduces ordering frequency and hence ordering cost, but requires holding a larger average inventory, which increases holding costs. On the other hand, a smaller order-quantity reduces average inventory, but requires more frequent ordering and higher ordering costs.

The EOQ model makes the following assumptions:

- Demand is constant and known with certainty.
- Depletion of stock is linear and constant.
- No discount is allowed for quantity purchases.
- The time interval between placing an order and receiving delivery is constant (Shim and Siegel, 2008).

The EOQ model is written as the following:

$$EOQ = \sqrt{2 * D * S / H * C} \qquad (1)$$

Where

EOQ – target order quantity. This is a variable we want to optimize.

D – the annual demand of product in quantity per unit time.

S – the product order cost. This is the flat fee charged for making any order.

C – Unit cost

H – Holding cost per unit as a fraction of product cost.

According to Hassin and Megiddo (1991) in the classical EOQ model one seeks a policy of inventory scheduling so as to minimize the long-term average cost per time unit. In the classical EOQ model it is not a priori clear whether optimal policies exist, or whether optimally of a given policy can be decided. The classical EOQ formula describes the trade-off between the set-up cost and the holding cost (Yan and Kulkami, 2008).

Another important technique used along with EOQ is the Reorder Point (ROP) and Safety Stock. According to Fangruo Chen (1998), the ROP quantity reflects the level of inventory that triggers the placement of an order for additional units. If the demand is constant and the lead time is known, then the reorder point is written as the following:

Reorder point *= Daily usage * Lead time (in days)* (2)

When a safety stock is maintained, then the reorder point is written as the following (Gonzales, 2010):

Reorder point *= {Daily usage * Lead time (in days)} + safety stock* (3)

Cuthbertson and Gasparro (1993) developed a model of inventory holding which embodied most of the key ideas of earlier theoretical work. Previous theories include the production level smoothing and production cost smoothing models, the accelerator principle and the precautionary model. They were able to modify the above models to incorporate financial effects and technological change which might affect inventory holdings. They found that the level of manufacturing inventories had unit elasticity with respect to output, was positively related to the conditional variance of output and negatively related to the overall gearing position of the firm.

Lieberman et al. (1996) have focused on work-in-process and finished goods inventories, but they have also examined determinants of raw materials inventory, production and delivery lot sizes, and manufacturing throughput time. Their findings pointed to the importance of both technological and managerial factors in determining inventory levels. Their results on the role of technology factors were consistent with predictions derived from the EOQ formula and related models of optimal inventory holding. Inventories were higher when the underlying technologies required longer setup and processing times.

They also found evidence that management and workforce practices had substantial influence on inventory levels. Greater employee training and problem solving activity had a strong effect in reducing inventories. These general workforce characteristics facilitate a reduction in manufacturing process variability, thereby reducing the need for large inventory buffers. They found a strong connection between the frequency and extent of supplier-assembler communication and the supplier's level of inventory. These findings are consistent with models that view inventory and communication as substitutes.

Baldenius and Reichelstein (2000) examined inventory management from an incentive and control perspective. They demonstrated that the residual income performance measure based on historical cost accounting provided managers with incentives to make optimal production and inventory depletion decisions. The lower-of-cost-or-market rule is shown to be effective in situations where inventory may become obsolete due to unexpected demand shocks.

According to Rajagopalan and Malhotra (2001) numerous normative models have been developed to determine optimal inventory levels and several articles and case studies have been written about the concerted efforts and practices adopted by manufacturing firms in the United States to reduce inventories. The analysis provided an encouraging picture about the results of U.S. manufacturing inventory-reduction efforts.

Lai (2005) has provided empirical evidence that the market cannot differentiate between «good» and «bad» inventory, the market punishes firms when it can tell that inventory decisions are «bad» and the inventory levels do not statistically explain firm value. Lai (2006) has proposed that in a world with signalling incentives, short-termism and information asymmetry, inventory has a signalling role. Firms and the stock market understand this, resulting in separating or pooling equilibria and this is one channel in which inventory translates into market valuation. Finally, the model has been worked out as if the firm is a monolithic, aligned entity, without agency problems between managers and shareholders. Suppose managers are keen to not only increase share price for shareholders, but also their private benefits related to inventory and the latter benefits could come with higher levels of inventory.

Balakrishnan et al. (2005) addressed the problem of jointly optimizing price and stocking quantity for demand-stimulating inventories by considering two alternative models for incorporating the dependence of demand on price – a distribution-lifting model and a multiplicative model. For both models, they showed that the optimal policy can be derived via a sequential procedure that first optimizes price and then sets the order quantity. Their analysis of the firm's profit maximization problem has led to a better understanding of the structure of the optimal policy.

Ozer (2009) found that effective inventory management was a capability necessary to lead in the global marketplace. He provides four fundamentals of effective inventory management:

- It requires managers to know how best to use available information.
- Managers need to quantify the value of information.
- They need to coordinate decentralized inventory operations.
- Effective inventory management requires decision tools that can be embraced by their users.

The new raw material inventory management policy is targeted at solving the existing problem of having excessive inventory by optimizing current raw material inventory level based on scientific models (Wang, 2010). According to Wang et al. (2013) the traditional inventory models focus on characterizing replenishment policies in order to maximize the total expected profit or to minimize the expected total cost over a planned horizon. They provide the perspective on inventory management that treats inventory problems within a wider context of financial risk management. The inventory control problem is formulated as a continuous stochastic optimal control problem with fixed and proportional transaction costs under a continuous value-at-risk constraint. The results illustrate how the raw material price, inventory level and value-at-risk constraint are interrelated.

Several papers have attempted to link inventory levels with financial performance. Balakrishnan et al. (1996) examined the effect of JIT adoption, which decreased inventory, on firms' profitability and found that there was no statistically significant association between return on assets and JIT adoption. Lieberman and Demeester (1999) found a strong

association between higher productivity and inventory reduction.

Gaur et al. (2002) found that return on assets, sales growth, standard deviation of return on assets and financial leverage explained more than 50% of the variation in stock returns for periods of ten years or more as well as retailers in different segments achieved similar return on assets and return on equity by following very different strategies with respect to their gross margins and inventory turns. High gross margin correlated with low inventory turns and with high selling, general and administrative expenses as well as risk of bankruptcy was related to the mismatch between how fast a company attempted to grow versus what growth rate it realized. Randall et al. (2005) found that the probability of bankruptcy is lower when firms align inventory decisions with environmental and strategic factors.

Based on an analysis of more than 900 excess inventory announcements made by publicly traded firms during 1990-2002, Signhal (2005) has documented that firms that experienced excess inventory situations substantially underperformed a sample of matched firms from the same industry and of similar size. He estimated that the mean (median) abnormal return due to excess inventory was -37.22%. The evidence has suggested that the stock market partially anticipates excess inventory situations, firms do not recover quickly from the negative effect of excess inventory, and the negative effect of excess inventory is economically and statistically significant.

Chen et al. (2005) found decreasing trends for relative inventory in manufacturing and wholesaling sectors for the period 1981-2003 and somewhat mixed evidence in the retailing sectors. They showed that firms with abnormally high inventories had abnormally poor long-term stock returns and also found that the relationship between Tobin's q and abnormal inventory was absent in the cross-sectional domain.

The study of Roumiantsev and Netessine (2005) is the first to systematically analyze the relationship between companies' inventory management policies/operational environment (as captured by the relative inventory level, lead time, demand uncertainty and inventory elasticities, with respect to several environmental variables) and accounting returns as reflected by return on assets. Roumiantsev and Netessine found that superior earnings are associated with the speed of change or responsiveness in inventory management after controlling for industry and firm-specific effects. They also found that inventory elasticity with respect to sales, lead times and sales uncertainty is consistently positively associated with both current and forwarded returns on assets. This result provides statistical evidence that public companies that are more responsive in inventory management are more profitable. Their findings indicate the importance of matching supply to demand in volatile environments, whereby one must pay attention not only to the level of the inventory, but also to the speed of change in inventory, which can be used as an indication of the quality of management control.

The importance of inventory management for small and medium-sized manufacturing companies proved Rajeev (2010) who analyzed its influence on economic performance. His study was aimed especially at machine tool industries sector in India which was an extremely inventory intensive. The results showed that inventory management had really some impact on labor productivity, capital productivity and returns to scale in respondent companies.

Manufacturing companies can manipulate production to shift fixed costs between cost of goods sold and inventory accounts, thereby managing earnings either upward or downward. Considering two earnings targets, avoiding losses and consensus analyst forecasts, Cook et al. (2012) used a large sample of manufacturing companies to study how production cost structure and inventory valuation method affect this strategy. They reported the following results: Companies with high fixed-cost ratios were more likely to manipulate inventory but made smaller abnormal inventory changes than companies with low fixed-cost ratios.

Panigrahi (2013) has examined the relationship between inventory conversion period and firms' profitability and the results indicate that there is a significant negative linear relationship between inventory conversion period and profitability.

Several researches have attempted to link inventory levels with financial performance and have found little or no relation between them. We also attempt this approach and find little relation between the inventory level expressed in terms of different ratios and profitability expressed in terms of return on total assets.

3. Research

3.1. Methodology

This paper presents results from the empirical research undertaken on a representative sample of Croatian companies with the aim of exploring their inventory levels along with dependence between the companies' inventory levels and profitability.

Although the Small and Medium-sized Enterprises (SME) definition is subject to considerable differences in prior studies, there is an increasing tendency to rely on the European Commission SME definition. In line with this definition, we selected companies that met the following criteria: (1) fewer than 250 employees; (2) sales below 50,000,000 EUR; and (3) total assets below 43,000,000 EUR. We selected large companies that met the following criteria: (1) more than 250 employees; (2) sales over 50,000,000 EUR; and (3) total assets over 43,000,000 EUR.

Based on these criteria, we randomly selected an initial sample of 130 companies. We excluded companies that belong to the financial or governmental sectors because of additional requirements that apply to these sectors. In addition, we discarded observations with missing values. The empirical research was based on a sample of randomly-selected 51 large companies and 50 small and medium-sized companies.

In this section, we provide an overview of the variables that are used in our empirical analysis:

(1) Inventory level is measured as the ratio of inventory to current assets as well as the ratio of inventory to total assets.

(2) Profitability is defined as return on total assets.

We use Return On Assets (ROA) as a measure of profitability. We choose ROA over Return on Equity (ROE), since we are not interested in the capital structure effects that are implicitly captured by ROE. We choose ROA over gross profit margin and profit margin, because ROA is more often used to measure financial performance of companies. ROA is calculated as Net Income / Average Total Assets.

Using methods from statistics, we investigated whether there was a relation between inventory level and profitability. To improve the quality of analysis and descriptive statistics analysis, we used financial ratios.

In this study we also analyzed costs and benefits from changes in inventory level. The independent variables which determine net earnings have been selected and the relations between them have been defined. For precise formulation of the relationship between a set of independent variables, mathematical methods have been adapted in order to yield net savings as dependent variable. On the basis of research results, we have introduced a new mathematical optimization model and with this model a company can consider net savings from changes in inventory level and establish the optimal inventory level in order to improve profitability.

3.2. Results of analysis and discussion

We analyzed inventories used by sample companies in 2012, inventory ratios along with dependence between inventory levels and profitability as well as changes in inventory policy.

3.2.1. Analysis of inventories used by Croatian companies

Investments in inventories in sample large and SME companies in 2012 have been analyzed by using financial indicators and presented in Table 1.

Table 1 Inventory ratios of Croatian companies in 2012

Companies ratios	Large companies	Small and Medium Sized companies
Inventory/current assets ratio		
Arithmetic mean	22.88	21.95
Standard deviation	20.38	22.47
Coefficient of variation	89.08	102.35
Inventory/total assets ratio		
Arithmetic mean	10.14	8.84
Standard deviation	14.56	13.35
Coefficient of variation	143.55	150.98

Source: Author's calculations

The average share of inventory in current assets for large companies is the highest and it amounts to 22.88% of current assets and 21.95% for small and medium-sized companies.

The average share of inventory in total assets amounts to 10.14% of total assets for large companies and 8.84% for small and medium-sized companies. The lower inventory ratios may indicate that average investment in inventories is unsuitable and the company's inventory policy is too stringent which might result in a loss of business.

The average value of inventory/current assets ratio for large companies during the observed period is 22.88, while the average value of inventory/current assets ratio for small and medium-sized companies is 21.95. The standard deviation of inventory/current assets ratio for small and medium-sized companies (22.47) is higher compared to the standard deviation for large companies. The largest standard deviation has been noted with the inventory/current assets ratio for small and medium-sized companies and shows how widely members of a related group diverge from the average. Coefficient of variation for inventory/current assets ratio for small and medium-sized companies is higher than for large companies and shows that the variability of inventory/current assets ratio for small and medium-sized companies is higher than the variability of inventory/current assets ratio for large companies.

The average value of inventory/total assets ratio for large companies during the observed period is 10.14, while the average value of inventory/total assets ratio for small and medium-sized companies is 8.84. The standard deviation of inventory/total assets ratio for large companies (14.56) is higher compared to the standard deviation for small and medium-sized companies (13.35). Coefficient of variation for inventory/total assets ratio for small and medium-sized companies is 150.98 and shows that a relative dispersion is significant.

Coefficient of variation for inventory/total assets ratio for small and medium-sized companies is higher than for large companies and shows that the variability of inventory/total assets ratio for small and medium-sized companies is higher than the variability of inventory/total assets ratio for large companies.

3.2.2. Relation between inventory level and profitability

We investigated whether there was a relation between the inventory level, which compared inventory to current assets as well as inventory to total assets, and profitability, and analyzed the dependence between inventory level and profitability.

The level of inventories expressed in terms of ratios and return on assets in large and small and medium-sized sample companies in the Republic of Croatia in 2012 has been analyzed as seen in Table 2.

Table 2 Descriptive statistics of inventory ratios and return on total assets in Croatian companies in 2012

Companies	Large companies	Small and Medium-sized companies
Inventory/current assets ratio		
Arithmetic mean	22.88	21.95
Standard deviation	20.38	22.47
Coefficient of variation	89.08	102.35
Inventory/total assets ratio		
Arithmetic mean	10.14	8.84
Standard deviation	14.56	13.35
Coefficient of variation	143.55	150.98
Return on total assets		
Arithmetic mean	0.03	0.02
Standard deviation	0.08	0.06
Coefficient of variation	256.52	276.73
Correlation coefficient – inventory to current assets ratio - ROA	-0.689	-0.129
Correlation coefficient – inventory to total assets ratio - ROA	-0.070	0.035

Source: Author's calculations

The average value of return on total assets for large companies during the observed period is 0.03 while the average value of return on total assets for small and medium-sized companies is 0.02. The standard deviation of ROA for large companies (0.08) is higher compared to the standard deviation for small and medium-sized companies (0.06). Coefficient of variation for ROA for small and medium-sized companies is 276.73 and shows that a relative dispersion is significant. Coefficient of variation for ROA for small and medium-sized companies is higher than for large companies and shows that the variability of ROA for small and medium-sized companies is higher than the variability of ROA for large companies.

The correlation coefficient for large companies is -0.689 which confirms that the correlation between inventory to current assets ratio and ROA is negative and moderately strong. The negative correlation between variables inventory to current assets ratio and ROA may be an indication that a change in the inventory level is not associated with an equivalent change in the value of the return on total assets.

The correlation coefficient between inventory to total assets ratio and ROA for large companies is -0.070 which confirms that the return on total assets is correlated negatively and weakly with the inventory to total assets ratio, thus suggesting that an increase in the level of inventory triggers a decrease in return on total assets.

The negative correlation between variables inventory and ROA means that as values of inventory (expressed in terms of inventory to current assets ratio as well as inventory to total assets ratio) increase, the values on the return on total assets tend to decrease.

Repeating our analysis for small and medium-sized companies we confirm that the correlation coefficient between variables inventory to current assets and ROA is -0.129 which indicates that the correlation between inventory to current assets ratio and ROA is negative and weak. The correlation coefficient between variables inventory to total assets ratio and ROA is 0.035 which indicates that the correlation between inventory to total assets ratio and ROA is positive and weak.

We can summarize that these findings do not support the notion that profitability depends on inventory level. The study has not provided empirical evidence that inventory level is negatively related to profitability in any case, but the findings support the notion that there exists a trade-off between the inventory level and profitability. We also confirm that there may be no statistically significant association between inventory levels and profitability.

4. The model

A company should revise its inventory policy only if net profitability occurs from a revision of an inventory policy. Before revising its inventory policy, a company has to weigh the profit potential against the opportunity costs of holding inventory and the costs associated with keeping inventory. The costs associated with keeping inventory include warehousing, handling, insurance and property taxes.

In developing a new model for calculating net savings from changes in inventory policy we use the basic analytical concept of comparing the additional earnings versus the opportunity costs of carrying incremental inventory and holding costs.

Net savings from changes in inventory level can be defined as

net savings = increased profitability - opportunity cost - holding costs (1)

Increased profitability can be expressed as follows

increased profitability = (sales(1)-sales(0)) x *fixed costs* (2)

Opportunity cost of carrying incremental inventory is represented by the equation

opportunity costs = sales(1) / turnover(1)-sales(0) / turnover(0) x *rate of return* (3)

It will be convenient to define variables that determine net savings from changes in inventory level. The independent variables that determine net savings from changes in inventory level are:

- sales (S1)
- sales (S0)
- fixed costs (FC) expressed as percentage of sales

- turnover (T1)
- turnover (T0)
- rate of return (RR)
- holding costs (HC) (Kontuš, 2012).

The relations between independent variables can be established as follows in order to produce dependent variables net savings (NS) and inventory level (IL):

NS=(S(1)-S(0))XFC-(S(1)/T(1)-S(0)/T(0)XRR/100-HC (4)

whereby dependent variable inventory level (IL) is given by the expression

$IL(0)=S(0)/T(0)$

$IL(1)=S(1)/T(1)$.

Finally, the optimal inventory level is the level that results in the highest net savings.

A mathematical optimization model of inventories management is characterized by the objective function and a set of constraints. The objective function is used to keep net savings at a maximum.

The decision problem can be formulated as the following optimization problem:

Let S(0), S(1) denote sales, and T(0), T(1) turnovers, where

$IL(0)=S(0)/T(0)$

$IL(1)=S(1)/T(1)$.

The objective is to

maximize Net savings = maximize f(S).

maximize f(S)= maximize[(S(1)-S(0)x*FC*-(IL(1)-IL(0))x*RR*/100-HC] (5)

After rearrangement we obtain

maximize[(S(1)-S(0)x*FC-(S(1)/T(1)-S(0)/T(0))xRR/100-HC*

subject to $S(1)>0$,

$S(0)\geq 0$,

$T(1)>0$,

$T(0)>0$,

$S(1)/T(1)>S(0)/T(0)$.

When a company is considering changes to its inventory policy in order to improve its income, incremental profitability must be compared with the opportunity cost associated with higher investment in inventories and holding costs. To determine an optimal decision from among a number of inventory levels, financial managers should take into consideration their net earnings and an inventory level that results in the highest net earnings should be chosen. Companies can maximize net earnings and trigger an increase of profitability.

Efficient inventory management implies formulating an appropriate strategy, considering different inventory policies, choosing the appropriate inventory level from among different inventory levels, computing net savings and establishing the optimal inventory level that results in the greatest net savings.

The new optimization model that is developed is a mathematical model designed to determine an optimal decision from among different inventory levels and involves an objective function and a set of constraints. This model helps management to better understand the business and its functional relationships and improves decision-making ability in management of inventories.

5. Conclusion

The optimal management of companies' inventories is a fundamental problem and its solution would have a direct influence on the efficiency of business and the position of a company in a market. The fundamental aim of solving this problem is a continuous and complete satisfying of demand on the one hand, with minimum opportunity costs of carrying inventory and holding costs on the other.

We analyzed inventory levels expressed in terms of financial ratios along with dependence between inventory levels and profitability and we also analyzed changes in inventory policy as an important activ-

ity in management of inventory. An optimization model has been designed on the basis of the analysis results of this activity. An optimal inventory level should be based on consideration of incremental profitability resulting from increased merchandise with the opportunity cost of carrying higher inventory balances.

Major findings include a new mathematical model for calculating net savings from changes in inventory policy and demonstration of no statistically significant association between inventory levels and profitability.

The contribution of this paper is to model all the relationships between independent variables which determine net savings from changes in inventory policy as a dependent variable. The optimization model can be used as a tool to consider changes in inventory policy and to make optimum use of inventories in order to achieve a maximum return at an acceptable level of risk.

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Upravljanje zalihama u poduzeću

Sažetak

Svrha empirijskog istraživanja je analizirati razinu zaliha u odabranim poduzećima i istražiti ovisnost između razine zaliha i profitabilnosti izražene kao povrat na imovinu. Cilj teorijskog istraživanja je istražiti troškove i koristi od promjene politike zaliha i odrediti varijable koje utječu na neto uštedu koja je ostvarena nakon promjene razine zaliha. Optimalna razina zaliha treba se temeljiti na razmatranju inkrementalne profitabilnosti koja proizlazi iz povećanja zaliha robe i oportunitetnih troškova zbog držanja više razine zaliha.

Najznačajniji rezultati istraživanja jesu model jednadžba za izračun neto zarade koja je ostvarena nakon promjene razine zaliha i novi matematički optimizacijski model. Uz pomoć matematičkog optimizacijskog modela poduzeće može razmatrati neto zaradu koja je ostvarena nakon promjene razine zaliha i odrediti optimalnu razinu zaliha kao i povećati profitabilnost.

Ključne riječi: zalihe, neto ušteda, model, jednadžba