

# Analysis of the Influencing Factors of Inventory Management of listed Companies in Shandong Province

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## ABSTRACT

This paper studies the inventory management of 25 listed companies in Shandong Province, and uses the current ratio, return on equity, inventory turnover and other indicators to analyze the inventory management of different industrial companies and the main influencing factors. Through descriptive analysis, correlation analysis, factor analysis and other methods, a linear regression model is constructed to determine the relationship between inventory management and its influencing factors, and suggestions and countermeasures are put forward to provide reference for the improvement of inventory management of listed companies in Shandong Province and the balanced long-term development of the industry.

## KEYWORDS

Factor analysis; Inventory management; Influencing factors

## 1. INTRODUCTION

In recent years, with the rapid economic development, listed companies have become the fuel to promote economic and social development. However, some enterprises have weak inventory management, which brings pressure and inconvenience to the enterprises. Laying a good foundation for inventory management is closely related to corporate sales, production and management decisions.

Inventory management is becoming more and more important in the development of industrial economy and its requirements are also increasing. Foreign scholar Amsterdam proposed a sequential transfer inventory model from warehouse to display area to determine the optimal order quantity and transfer quantity of retailers [1].

Domestic research lags behind. Xu Zhiping and Yao Anming [2] found in 2008 that there is a linear correlation between corporate inventory and corporate performance. Sun Li [3] believes that the internal control of inventories should be strengthened, the post division control should be done well, the control of acquisition, acceptance and warehousing of inventories should be strengthened, and the control of storage and safekeeping should be strengthened to ensure the safety and integrity of inventory assets.

Based on the existing theories, this paper selects 25 enterprises in Shandong Province as samples for empirical research, builds a model to measure the correlation between inventory management and its influencing factors, and puts forward suggestions, which can provide reference for the inventory management ability and industry development of listed companies in Shandong Province.

## 2. RESEARCH DESIGN

### 2.1. Research Assumptions

The combination of theory and experience to study the factors affecting inventory management, and put forward the assumptions:

Assumption 1: the profitability of an enterprise is negatively correlated with the inventory turnover rate.

Profitability is the profit that a company generates by selling its products in the ordinary course of business. The more valuable the goods, the lower the demand, the smaller the sales volume, and therefore the lower the inventory turnover rate.

Hypothesis 2: the solvency of an enterprise is positively correlated with the inventory turnover rate [4].

The company's debt repayment ability is an important indicator of the company's sustainable development, and the inventory turnover ability is an important indicator of the inventory liquidity. The greater the inventory liquidity, the enterprise's debt repayment ability and financial risk will be reduced.

Hypothesis 3: the development capacity of an enterprise is positively correlated with the inventory turnover rate.

The company's ability to develop is reflected in the expansion and contraction of the company's scale and the increase of the company's assets. If the company's operating scale continues to shrink and its assets continue to shrink, this indicates that the development capability of the enterprise is not strong.

Assumption 4: the operating capacity of the enterprise and the inventory turnover rate show a positive correlation.

Inventory accounts for a large proportion of the current assets of an enterprise, so it has a strong inventory management capability and a stronger turnover rate.

Assumption 5: Enterprise size and inventory turnover rate show a negative correlation.

Enterprise inventory management is a cyclical cycle, companies with strong solvency will keep a small amount of inventory to speed up turnover and improve management.

### 2.2. Model Design And Variable Description

#### 2.2.1. Model design

In order to test the above five hypotheses, a multivariate linear model is constructed:

$$IT = \beta_0 + \beta_1 ROA + \beta_2 CR + \beta_3 QR + \beta_4 OCCD + \beta_5 NAGR + \beta_6 TAGR + \beta_7 CAT + \beta_8 RSOA + \beta_9 LNIROBR + \varepsilon$$

In the model, inventory turnover rate IT is taken as the dependent variable, asset net interest rate ROA, current ratio CR, quick ratio CR, current-to-debt ratio OCCD, net asset growth rate NAGR, current asset turnover rate, relative asset size RSOA, and operating income growth rate LNIROBR are taken as the independent variables, and the factors affecting inventory turnover rate and their correlation with the independent variables are investigated

#### 2.2.2. Description of variables

Inventory is an important index for enterprises to manage inventory [5] and an effective means for enterprises to manage and utilize inventory. The following is a description of the dependent variables studied in this paper:

- (1) Profitability of the enterprise: the high net cash flow rate of the enterprise's assets indicates its strong profitability and high operating efficiency.
- (2) Corporate solvency: Whether a company has fallen into bankruptcy due to excessive debt is closely related to the company's solvency.
- (3) Enterprise development capability: the higher the growth rate of total assets and net assets, the more attention the enterprise will pay to the inventory management level.
- (4) Business operation ability: the turnover rate of current assets is an index to measure the business operation ability of a company. The higher the turnover rate, the better the liquidity of current assets and the efficient use of funds.
- (5) Enterprise scale. The size of an enterprise also reflects its inventory management ability. The relative size of assets and the growth rate of operating income are used as measures to measure the size of the company.

### 2.3. Sample Selection and Data Sources

#### 2.3.1. Sample Selection

In order to ensure the correctness of the empirical results and reduce the influence of unrelated factors, the following criteria are followed in data filtering: eliminating companies with ST names; Exclude companies with incomplete data.

Through screening, the financial data of 25 listed companies in Shandong Province from 2019 to 2021 are selected for research.

#### 2.3.2. Data sources

The selected data are all from "Guotai 'an Economic and Financial Bank".

## 3. EMPIRICAL ANALYSIS

### 3.1. Descriptive Statistics

#### 3.1.1. Descriptive Statistics of Variables

The first step is to describe the dependent variable inventory turnover rate. Through the analysis of SPSS, the results are as follows:

**Table 1.** Descriptive Statistics of Dependent Variable Inventory Turnover Rate

N	effective	25
average/mean value		4.2234
mid-value		3.8456
mode		2.7312
standard deviation		4.9781
minimal value		0.0065
max.		92.2743

Data source: the author made it by spss

**Table 2.** Descriptive Statistics of Independent Variables

	Net interest rate on assets	liquidity ratio	quick ratio	Cash flow to debt ratio	net assets growth rate	turnover of total assets	Current assets growth rate	Relative size of assets	Operating income growth rate
N valid	25	25	25	25	25	25	25	25	25
be short of	0	0	0	0	0	0	0	0	0
average/mean value	7.4526	2.8885	2.3352	0.2173	42.6221	31.5211	1.5214	21.1298	19.2433
mid-value	6.4024	1.5271	1.0652	0.1362	13.2636	21.4622	1.3736	13.3639	17.6352
mode	-99.8602	1.1302	1.1302	-0.0937	17.2621	-21.3662	2.3526	18.7771	18.5531
standard deviation	10.6307	4.8287	4.8233	0.2361	0.1525	51.5512	1.0103	1.3823	1.5597
minimal value	-99.8602	0.0177	0.0127	-1.6622	-78.3525	-73.5511	0.0053	15.3626	9.0021
max.	267.7203	88.7268	79.5521	70.2514	153.6261	1072.3525	18.3562	26.5842	26.5218

Data source: the author made it by spss

From the above table, we can see that the average return on assets is 7.45, the median is 6.40, and the minimum variance is -99.86, but the net interest rate of most companies is positive, which indicates that the companies in Shandong Province are profitable as a whole.

The average value of current ratio and quick ratio are 2.89 and 2.33 respectively, with median values of 1.52 and 1.09, and most of them are positive, indicating that enterprises in Shandong Province have certain differences in both current assets and current liabilities. Enterprises can afford debts and avoid the risk of bankruptcy.

The average and median cash flow to debt ratios are 0.22 and 0.16, respectively, with the minimum mode being -0.09. Some of them are negative, indicating that the ability of the listed companies' operating cash flows to protect current liabilities is relatively weak.

The average value of the enterprise's development capability index is 42.62 and 31.52, with median values of 13.26 and 21.46 respectively, which are almost positive numbers, indicating that the company is in the process of development and expansion, and the company is growing stronger.

The turnover rate of current assets, with an average value of 1.52, a median value of 1.37 and a mode of 2.35, are all positive numbers, indicating that the enterprise is operating normally and can operate well.

### 3.1.2. Correlation Analysis between Independent and Dependent Variables

In this paper, the partial correlation coefficient method is used to explore the relationship between the factors. The correlation analysis between each variable is as follows:

**Table 3. Profitability**

Control variable			Inventory turnover	Net interest rate on assets
Current ratio, quick ratio, cash flow to debt ratio, growth rate of total assets, turnover rate of current assets, relative size of assets, growth rate of operating income	Inventory turnover	correlation	one	-0.009
		Significance (bilateral)		0.037
		df	0	25
	Net interest rate on assets	correlation	-0.009	one
		significance	0.037	
		df	25	0

Data source: the author made it by spss

As can be seen from the above table, the partial correlation coefficients of asset net interest rate and inventory turnover rate are -0.009 and 0.037 respectively, which indicates that there is a significant negative correlation between the two and they pass the test of 0.05. Consistent with assumption 1.

**Table 4. Solvency**

Control variable			Inventory turnover	liquidity ratio	quick ratio	Cash flow to debt ratio
Current ratio, quick ratio, cash flow to debt ratio, growth rate of total assets, turnover rate of current assets, relative size of assets, growth rate of operating income	Inventory turnover	correlation	one	0.09	0.122	0.064
		significance		0	0	0
		df	0	25	25	25
	liquidity ratio	correlation	0.09	one	0.993	0.475
		significance	0		0	0
		df	25	0	25	25
	quick ratio	correlation	0.122	0.993	one	0.489
		significance	0	0		0
		df	25	25	0	25
	Cash flow to debt ratio	correlation	0.064	0.475	0.489	one
		significance	0	0	0	
		df	25	25	25	0

Data source: the author made it by spss

As can be seen from the above table, the partial correlation coefficients among current ratio, quick ratio, current liability ratio and inventory turnover rate are 0.09, 0.122 and 0.064, and have significant correlation with 0.01. Consistent with assumption 2.

**Table 5. Capacity Development**

Control variable			Inventory turnover	net assets growth rate	total assets growth rate
Current ratio, quick ratio, cash flow to debt ratio, growth rate of total assets, turnover rate of current assets, relative size of assets, growth rate of operating income	Inventory turnover	correlation	one	0.013	-0.002
		significance		0.037	0.905
		df	0	25	25
	net assets growth rate	correlation	0.013	one	0.78
		significance	0.037		0
		df	25	0	25
	total assets growth rate	correlation	-0.002	0.78	one
		significance	0.905	0	
		df	25	25	0

Data source: the author made it by spss

The partial correlation coefficient between the growth rate of net assets value and the inventory turnover rate is 0.013, and the significance test of 0.05 level shows that the growth rate of net assets value of the company has a significant positive relationship with the return on net assets of the company, which is in line with assumption 3.

**Table 6.** Operating Capacity

Control variable			Inventory turnover	current assets turnover
Current ratio, quick ratio, cash flow to debt ratio, growth rate of total assets, turnover rate of current assets, relative size of assets, growth rate of operating income	Inventory turnover	correlation	one	0.578
		Significance (bilateral)		0
		df	0	25
	current assets turnover	correlation	0.578	one
		significance	0	
		df	25	0

Data source: the author made it by spss

As can be seen from the above table, in this study, the relationship between the current assets of the company and the inventory turnover rate is 0.578, and the significance test is performed for 0.01. It indicates that there is a significant positive relationship between the two. Same as assumption 4.

**Table 7.** Scale

			Inventory turnover	Relative size of assets	Operating income growth rate
Current ratio, quick ratio, cash flow to debt ratio, growth rate of total assets, turnover rate of current assets, relative size of assets, growth rate of operating income	Inventory turnover	correlation	one	-0.034	-0.024
		significance		0.022	0.098
		df	0	25	25
	Relative size of assets	correlation	-0.034	one	0.911
		significance	0.022		0
		df	25	0	25
	Operating income growth rate	correlation	-0.024	0.911	one
		significance	0.098	0	
		df	25	25	0

Data source: the author made it by spss

There is a significant negative correlation between the relative size of assets, the growth rate of operating income and the inventory turnover rate, and passed the 0.05 level significance test, which is in line with hypothesis 5.

### 3.2. Factor Analysis

#### 3.2.1. Indicator treatment

Because there are many independent variables and the independent variables have linear correlation, it will cause interference to the analysis process, so it is necessary to standardize the data processing.

#### 3.2.2. Inspection by KMO and Bartlett

**Table 8.** Testing of KMO and Bartlett

Kaiser-Meyer-Olkin measure of sampling adequacy		0.574
Bartlett's sphericity test	Approximate chi-square	227.130
	df	30
	Sig	0.001

Data source: calculated by the author based on spss

As can be seen from the above table, the KMO of the data in this paper is 0.574, which is greater than 0.5, and the Sig value of Bartlett's sphericity test is less than 0.01, indicating that factor analysis can be performed.

### 3.2.3. Extracting Common Factors

The principal component analysis method is used to extract the common factors, with the specific value greater than or equal to 1 as the index, with the variance contribution rate as the index, and the influence degree of each index is compared with the variance contribution rate, which indicates that the common factors among each index have great influence on each index. The extraction results of common factors are shown in the figure:

**Table 9.** Interpretation of Total Variance

ingredient	Initial special value			Select sum of squares to load			Rotation sum of squares load		
	total	variance %	add up to %	total	variance %	add up to %	total	variance %	add up to %
one	3.256	33.224	33.224	3.803	33.224	33.224	2.239	24.88	24.88
2	1.806	20.064	56.245	2.889	19.618	56.245	1.968	21.866	46.065
three	1.292	14.354	70.599	1.688	13.721	70.599	1.912	21.248	64.987
four	1.224	13.598	84.198	1.224	14.218	84.198	1.167	12.968	64.502
five	0.728	8.086	91.192	0.734	10.411	91.192	1.019	11.322	79.432
six	0.453	5.032	97.316						
seven	0.156	1.733	99.048						
eight	0.081	0.897	99.987						
nine	0.005	0.055	100						

Data source: calculated by the author based on spss

From the table, it can be seen that 5 common factors can be extracted due to the basic condition that the special value is greater than 1. The variance contribution rate of factor 1 is 33.224%, that of factor 2 is 19.618%, that of factor 3 is 13.721%, that of factor 4 is 14.218%, that of factor 5 is 10.411%, and the cumulative variance contribution rate of five common factors is 91.192%, which shows that extracting these five common factors can explain the sample well.

### 3.2.4. Rotation Component Load Matrix

**Table 10.** Load Matrix after Rotation

	composition				
	one	2	three	four	five
Net interest rate on assets	0.007	0.211	-0.113	0.977	0.053
liquidity ratio	0.902	0.287	-0.071	-0.015	-0.103
quick ratio	0.903	0.208	-0.057	-0.015	-0.104
Current assets to liabilities ratio	0.657	-0.210	-0.042	0.480	0.053
net assets growth rate	0.145	0.921	-0.034	0.128	0.029
total assets growth rate	0.211	0.897	-0.050	0.014	-0.004
current assets turnover	-0.107	-0.075	0.103	0.052	-0.052
Relative size of assets	-0.037	-0.018	0.942	-0.112	-0.003
Operating income growth rate	-0.076	-0.016	0.951	-0.027	0.132

Data source: calculated by spss

According to the coefficient matrix of the factor scores, five factor scores can be obtained,

### 3.2.5. Multiple Linear Regression

After factor analysis, it is integrated into 5 independent variables.

**Table 11.** Summary of Models

model	R	Party r	Adjust r	Error of standard estimate
one	0.583a	0.360	0.360	4.0053053

A. Forecast variables: (constant), F1, F2, F3, F4, F5.

It can be seen from this table that the correlation coefficient is 0.583, the decision coefficient is 0.360, and after adjustment it is 0.360, and the standard error of the estimated value is 4.0053053, which can be well explained by explanatory variables.

**Table 12.** Variance Analysis Table

model		sum of squares	df	mean square	F	Sig
one	Return	37919.396	five	7583.879	472.524	0.000a
	residual	73459.519	4577	16.050		
	amount to	111378.915	4582			

A. Forecast variables: (constant), F1, F2, F3, F4, F5.

B. dependent variable: inventory turnover

It can be seen from this table that the mean square of the regression is 7583.879, the mean square of the residual is 16.050, F=472.524, Sig=0.000, which indicates that the fitting degree of the inventory turnover rate model is good and the regression model is established.

**Table 13.** Model Regression Coefficient Table

model		Nonstandard coefficient		Standard coefficient	t	Sig
	B	standard error	trial version			
one	constant	1.509	0.652		1.421	0.151
	debt paying ability	0.283	0.010	2.219	27.132	0.001
	Developing capacity	0.132	0.003	3.114	34.874	0.003
	profitability	-0.177	0.009	-1.114	-23.412	0.023
	operating capacity	2.226	0.061	5.221	42.132	0.000
	scale	-0.177	0.022	-0.035	-7.382	0.000

A. dependent variable: inventory turnover

It can be concluded from this table that the five independent variables have passed the significance test and are positively or negatively correlated with the inventory turnover rate at the level of 0.05.

According to the result of factor analysis, the expression of multivariate linear model can be obtained as follows:

$$IT=1.081+0.0281ROA+0.01287CR+0.04301QR-0.0210OCCD+0.07121NAGR+0.0187TAGR-0.0017CAT-0.00718RSOA-0.1016LNIROBR+\varepsilon$$

### 3.2.6. Data analysis results

The above information has been used for descriptive statistics, correlation analysis, factor analysis and multiple regression model to illustrate the correlation between dependent variable inventory turnover rate and independent variables, and the assumed results are correct.

## **4. SUGGESTIONS FOR IMPROVING THE INVENTORY MANAGEMENT OF LISTED COMPANIES**

### **4.1. Increase The Importance Attached To Inventory Management**

There is a positive correlation between inventory management and the development ability and operation ability of enterprises. Therefore, strengthening the attention to the inventory management, improving the inventory management ability and establishing a perfect inventory management system will promote the development of enterprises.

### **4.2. Enterprise Size Synchronizes with Inventory Management Efficiency**

There is an inverse relationship between company size and inventory turnover rate, and expansion will reduce inventory turnover rate. Therefore, a moderate shutdown can increase inventory turnover. The size of the enterprise must be consistent with the efficiency of inventory management in order to avoid the shortage of inventory affecting the development and change of the company.

### **4.3. Improve The Information-Based Inventory Management System**

Establish an information exchange platform between enterprises to play the role of market regulation. Integrating information technology into management concepts and changing inventory management system. Under the guidance of information management, the traditional manual mode is changed, manpower is saved, accurate data transmission is ensured, and the negative impact of inventory management is avoided.

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