

The Effect of Supply Chain Management and Financial Performance of Listed Companies in Tehran Stock Exchange

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Abstract: The aim of this study was to evaluate the effect of financial supply chain management key components of the performance and profitability of the companies listed in Tehran Stock Exchange with a focus on industries such as cement and petrochemical vehicle. The required data for this study from the annual financial report Tehran Stock Exchange member firms is extracted. The period of study is between 2010 to 2014 to measure corporate performance indexes of financial performance of companies (indicator of profitability, return on assets and return on equity) is used. To analyze the data collected from panel regression methods were used. The results indicate a significant relationship between supply chain management and financial indicators of financial performance measures are aimed at companies and industries. The findings show that the automotive industry as well as do not follow the rules.

Keywords: Cash Cycle, Financial Performance, Supply Chain Management, Tehran Stock Exchange.

Introduction

Many experts believe that supply chain has become more important than ever particularly in the turbulent economies which even the largest companies are looking for new ways for escaping from crisis. According to a research, investment in supply chain exceeded \$ 5.39 billion in 2000 and has increased to \$ 20 billion in 2004(Weissenrieder,1998). Considering issues of globalization, companies have taken step for production of international products to increase market of their products and sale rate. When activities increase and the companies become larger, it was not enough to use traditional and simple methods for provision of resources and a suitable supply chain should have been created. Companies gradually took step for management of supply chain. The term “supply chain management “was first introduced by consultants of USA industries in 1980(Oliver& Webber, 1982).

Supply chain management is based on a customer focus approach. On this basis, timely and perfect communication between all elements of supply chain for knowing customers’ needs and fulfillment of needs is one of the necessities of supply chain. On this basis, supply chain management is regarded as one of the

factors affecting performance of company from financial or nonfinancial perspectives which even can be effective on decision of investors. Supply chain management has two main sides of supplier and purchaser. Under today’s economic conditions, purchasers are more considered particularly considering recent economic crisis which has affected liquidity of the companies.

These conditions led us to study relationship between supply chain management and performance of companies and see if performance of the company can be improved with suitable financing methods for supply chain. To study this case, we used indices of supply chain and profitability indices and measured relationship between these indices. It is predicted that the better the supply chain financing of a company, the higher the financial performance and profitability of the company will be.

History and definitions

Since emergence of issues relating to supply chain management since 80s up to now, different definitions have been presented for supply chain. Different researchers and writers have presented different attitudes and definitions of supply chain. Some have limited supply chain to relations between purchaser and seller and this attitude only focuses on the first level purchase operation in an organization. Another group has given broader view to supply chain and believes that it includes all origins of supply (supply bases) for organization. With this definition, supply chain includes all first, second and third level suppliers. Such attitude to supply chain will analyze supply network. The third attitude is Porter's value chain attitude in which supply chain includes all required activities for provision of a product or service to end user. With the mentioned attitude, production and distribution functions are added to the chain as a part of goods and services flow. In fact, supply chain includes three scopes of procurement, production and distribution according to this view.

In the existing competitive market, economic and manufacturing enterprises believe that they need management and supervision on resources and elements out of organization while dealing with organization and local resources. The reason is access to competitive advantage or advantages to gain more market share. The key issue in a supply chain is coordinated control and management of all of these activities. Supply chain management is a phenomenon which performs this work such that customers can receive reliable and rapid services with high quality products at the minimum expense. Generally, supply chain comprises of two or more organizations which are formally separated from each other and are related to each other with material flow, information and financial flows. These organizations can be the enterprises which provide raw material, parts, end products or services such as distribution, storage, wholesale and retailing. Even the end user can be regarded as one of these organizations.

Effect of financing relates to supply chain and performance of organizations and efficiency of supply chain is improved by saving the payable costs and improving (increasing) payment period. Performance indicators relating to supply chain management are effective on profitability in supply chain program, reduction of the cost price of the sold goods certainly can have positive effect on payback period and equity right in short term and shortterm. Cause and effect relations between indices of supply chain management and profitability are confirmed through economic value added model and its test through linear regression analysis. Expansion of supply chain financing plan has increased after financial crisis of 2008 due to its useful consequences (Tomaso et al., 2010).

Small enterprises can achieve credit rating of the large enterprises through supply chain financing plan. On the other hand, small suppliers are able to reduce financing costs by discounting initial payments and increase cash fund and cash flow speed. Large enterprises can achieve positive cash flows through diversity of payment terms and increase economic value added. In addition, large suppliers affect the small enterprises through negotiations about suitable price offer and tendency to decrease cost price of the sold goods. Supply chain financing is a financial solution which leads to desirable results for all sides of the supply value chain. Generally, positive effect of supply chain on performance of the companies in economic crises can increase economic power of the companies in market and protect competitiveness of the companies.

Supply chain financing plan has been considered since the financial crises. Movement from supply chain financing toward supply chain management helps the companies strengthen competitiveness in market through real profits created by cash fund (Michael, 2009). Farris and Hutchison (2004) emphasized on Cash conversion cycle time as important index in supply chain management. Gommand Pfohl(2010) applied key performance indicators for supply chains and financial flows for evaluating performance of an organization based on economic value added model. Economic value added model studies how companies create value through capital costs relating to supply chain and achieve profitability.

In fact, effect of financial crisis as a new challenge is a new opportunity for expansion of supply chain. Relation between supply chain and financial flows has been dealt with as an unavoidable strategic solution for improvement of the organization's performance. Introduction of supply chain based on supply chain management can help the companies protect their competitive advantage and increase economic value added. There are many researchers have studied on various processes of supply chains.

Lambert and Cooper (2000) point out that a successful SCM requires a cross-functional integration in the firm by coordinating activities of the key business processes. The links of business processes have

direct effects on the levels of decision making, such as operations and financial planning, supplier risk and customer services management. Beamon and Sharma(1997) implies that a traditional supply chain is characterized by a forward flow a materials and a backward flow of information and finance. Farris and Hutchison(2004) have emphasized the cash-to-cash cycle concept to the supply chain management perspectives. It contains three important leverages which are account payables, account receivables and inventory. In the meanwhile, the idea of cash management has also been sentient in supply chain business processes. Badellet al (2005) addresses that the financial flow optimization in operation processes will satisfy shareholders as well as improves supply chain efficiencies. Cash flows are involved in each supply chain business process and the optimization of the financial flows is required at each stage. It shows the necessity of managing financial flows in the supply chain business processes, and it is significant to implement the financial.

Materials and Methods

Present study is done in a library method. In fact this study is practical in terms of its goal and it is descriptive library one in terms of its data collection. In this study correlation analysis is used in order to test hypotheses. Correlation analysis includes all the methods in which we can investigate or determine the relationship between different variables or make use of regression and correlation relationship.

Population, sampling method and sample volume

In the present study all of the present industries in Tehran stock market are chosen and they have been considered as the population of the study. Then among these industries 37 one of them were chosen as sample. The chosen sample has the following criteria:

- Before 2011 be accepted in stock market.
 - Don't have stop or change in the financial period.
 - In order to have comparable data, during the studied period the company did not change their financial period and their financial year end in Esfand 29.
 - In order to have homogenous data, be not included in investing companies or financial brokerage like bank and insurance.
 - Companies which their financial list is not mixed and their information is complete and available.
- The process of collecting data and choosing sample companies is as the following.

Table 1. Process of choosing sample companies.

The number of companies that used to be the member of Tehran Stock Exchange until the fiscal year of 2015 (1393)	475
The limitations:	
The number of companies that had been removed or off-exchange before 2013	(90)
The number of companies that had entered the stock exchange after 2013	(10)
The number of companies that had been the members of fiscal and service sections, insurance, banks, holdings, etc.	(66)
The number of companies that had exited from the list of Tehran Stock Exchange between 2011-2015 (1389-1393)	(29)
The number of companies that their fiscal year didn't end in March 20 (Esfand 29) between 2011-2015	(67)
The numbers of companies that had changed their fiscal year between 2011-2015	(11)
The number of companies their needed information for research had not been available during the period.	(9)
The number of companies that not included by research intended industries (cement industries, automobile, and petro chemistry.	(156)
Available population	37

In conclusion, among 475 available companies in these industries, the final sample of 37 companies, after performing existing filters, had been chosen and studied during 2010-2014.

Research variables

A variable is called the features that can be observed and measured, or can be replaced by two or more values or numbers. A variable is divided into three types based on the role that has in the research.

Independent variables

According to the model used, components of FSCM are used as independent Variables and are: cash conversion cycle (CCC), inventory turnover (IT), Cost of Revenue (CR), selling,general and administration expenses of Revenue (SR),Gross margin (GM).

The method of measuring independent variables are as follow:

Cash conversion cycle (CCC):

The CCC shows the value drivers from both supply chain and financial flows. This variable is calculated according to the following formula:

$$CCC = DSO + DIO - DPO$$

In fact, this variable has three categories:

(DSO): Days Sales Outstanding

$$DSO = \frac{AR}{TR} * 365$$

AR: Account receivable

TR: total Revenue

This ratio indicates a company's receivables collection period and measures by dividing the accounts receivable to annual sales.

(DIO):Days Inventory Outstanding

$$DIO = \frac{IV}{COGS} * 365$$

IV: Inventory value

CoGS: Cost of goods sold

This ratio indicates the duration of consuming the inventories.

(DPO): Days Payable Outstanding

This variable is calculated by the following method:

$$DPO = \frac{AP}{COGS} * 365$$

AP: Account Payable

IT: inventorturnover

$$IT = \frac{COGS}{IV}$$

CoGS: Cost of goods sold

IV: inventory value

IT indicates the frequency of replacing or clearing inventories in a company during a period. The higher this ratio is, the better the company uses of inventory and the shorter the time between sales and cash collections.

(CR): Cost of Revenue

$$CR = \frac{COGS}{TR}$$

CoGS: Cost of goods sold

TR: total revenue

This ratio is calculated by dividing the COGS to Total revenue.

(SR): selling,general and administration expenses of Revenue

$$SR = \frac{AE}{TR}$$

AE: administration expenses

This ratio is calculated by dividing the AE to Total revenue.

(GM): Gross margin

$$GM = \frac{GP}{TR}$$

GP: Gross Profit

TR: Total Revenue

This ratio is calculated by dividing the gross profit to Total revenue.

Dependent variable

In this article, dependent variable are financial performance and profitability containing return on assets(ROA),return on Equity(ROE) and basic earning power(BEP).

ROA: Return on Assets

$$ROA = \frac{NI}{TA(A)}$$

NI: Net Income

TA(A): Average of Total Assets

ROA gives an idea as to how efficient management is at using its assets to generate earning.

ROE: Return on Common Equity

$$ROE = \frac{NI}{E}$$

NI: Net Income

E(A): Average of common equity

ROE is viewed as one of the most important financial ratio. It measures a firm's efficiency at generating profit from every dollar of equity.

BEP: Basic Earning Power

$$BEP = \frac{OI}{TA(A)}$$

OI: Operating Income

TA (A): Average of Total Assets

BEP indicates the ability of the firm's assets to generate Operating Income.

Research hypotheses

Hypothesis 1: there is a significant relationship between supply chain and return on asset rate.

Hypothesis 2: there is a significant relationship between supply chain and operating profit index.

Hypothesis 3: there is a significant relationship between supply chain and return on equity.

Introducing the model needed for proving hypotheses

In order to study the hypotheses of the research, the following models are used:

Hypothesis 1

$$ROA_{i,t} = \alpha_0 + \alpha_1 CCC_{i,t} + \alpha_2 IT_{i,t} + \alpha_3 CR_{i,t} + \alpha_4 SR_{i,t} + \alpha_5 GM_{i,t} + \epsilon$$

Hypothesis 2

$$BEP_{i,t} = \alpha_0 + \alpha_1 CCC_{i,t} + \alpha_2 IT_{i,t} + \alpha_3 CR_{i,t} + \alpha_4 SR_{i,t} + \alpha_5 GM_{i,t} + \epsilon$$

Hypothesis 3

$$ROE_{i,t} = \alpha_0 + \alpha_1 CCC_{i,t} + \alpha_2 IT_{i,t} + \alpha_3 CR_{i,t} + \alpha_4 SR_{i,t} + \alpha_5 GM_{i,t} + \epsilon$$

Results

Table 2. Regression results Number 1.

Hypothesis 1: there is a significant relationship between supply chain and return on asset rate.				
$ROA_{i,t} = \beta_0 + \beta_1 CCC_{i,t} + \beta_2 IT_{i,t} + \beta_3 CR_{i,t} + \beta_4 SR_{i,t} + \beta_5 GM_{i,t} + \epsilon_{i,t}$				
Dependent variable	Coefficient	T Statistics	Sig.	Relationship between variable
Width from the origin	0.052008	1.366086	0.1736	
CCC	-3.61E-05	-2.301965	0.0225	Accepted
IT	0.004497	1.627814	0.1053	
CR	-0.048221	-1.109508	0.2687	
SR	0.092344	0.572083	0.5680	
GM	0.302126	13.28064	0.0000	
Results of the performing model			Amount	
Determent coefficient R2			0.597375	
Adjusted determent coefficient R2			0.586129	
F statistical			53.11649	
F Statistical significance level			0.000000	

As it is observed considering the fact that level of significance of F test is less than 5 percent, accuracy of the test is confirmed. Considering the changing level of significance of supply chain (CCC) since it is less than 5 percent the second hypothesis is also confirmed. On the other hand considering the 38 percent determination coefficient of the model comparing the result of first hypothesis it can be said that the effect of return on assets on supply chain is more than operating profit margin index.

In addition, considering the significance level less than 5 percent, we can infer the normality of number 2 statistical model remaining.

Table 3. Regression results Number 2.

Hypothesis 2: there is a significant relationship between supply chain and operating profit margin rate.				
$ROA_{i,t} = \beta_0 + \beta_1 CCC_{i,t} + \beta_2 IT_{i,t} + \beta_3 CR_{i,t} + \beta_4 SR_{i,t} + \beta_4 GM_{i,t} + \varepsilon_{i,t}$				
Dependent variable	Coefficient	T Statistics	Sig.	Relationship between variable
Width from the origin	0.052008	10.11357	0.0000	
CCC	-4.79E-05	-3.219763	0.0015	Accepted
IT	0.006081	2.316361	0.0217	
CR	-0.330439	-8.000142	0.0000	
SR	-0.544932	-3.552243	0.0005	
GM	0.006350	0.293721	0.7693	
Results of the performing model			Amount	
Determent coefficient R2			0.388051	
Adjusted determent coefficient R2			0.370957	
F statistical			22.70158	
F Statistical significance level			0.000000	

As it is observed considering the fact that F test significance level is less than 5 percent, the accuracy of model is confirmed. Considering the changing level of significance of supply chain (CCC) since it is more than 5 percent the third hypothesis is rejected.

Given the rejection of third hypothesis we have tested the remaining of third model similar to the first two model making use of Jack Bera test.

Table 4. Regression results Number 3.

Hypothesis 3: there is a significant relationship between supply chain and return on equity rate.				
$ROA_{i,t} = \beta_0 + \beta_1 CCC_{i,t} + \beta_2 IT_{i,t} + \beta_3 CR_{i,t} + \beta_4 SR_{i,t} + \beta_4 GM_{i,t} + \varepsilon_{i,t}$				
Dependent variable	Coefficient	T Statistics	Sig.	Relationship between variable
Width from the origin	0.733660	3.646385	0.0003	
CCC	-2.69E-05	-0.325271	0.7454	Accepted
IT	0.010113	0.692657	0.4894	
CR	-0.858803	-3.738915	0.0002	
SR	0.313147	0.367075	0.7140	
GM	-0.007531	-0.062639	0.9501	
Results of the performing model			Amount	
Determent coefficient R2			0.110685	
Adjusted determent coefficient R2			0.085844	
F statistical			4.455704	
F Statistical significance level			0.000752	

As it is observed, since the significance level is less than 5 percent normality assumption it is accepted, but considering the following table as it notices a small part of remaining are at the domain less than -2.5, since the majority of remaining is normal we can consider the remaining as normal.

Discussion and Conclusion

The aim of this study was to evaluate the effect of financial supply chain management key components of the performance and profitability of the companies listed in Tehran Stock Exchange with a focus on industries such as cement and petrochemical vehicle. The required data for this study from the annual financial report Tehran Stock Exchange member firms is extracted. The period of study is between 2010 to 2014 to measure corporate performance indexes of financial performance of companies (indicator of profitability, return on assets and return on equity) is used. There is a significant relationship between supply chain and return on assets.

Results and statistical tests which have been done in the fourth chapter show that generally there is a significant relationship between supply chain and return on asset. On the other hand considering the mark of this variable coefficient (negative) there is a reverse relationship between supply chain and return on assets, in other words if the cycle become smaller (cycle improvement) return on assets would be improved and become more. Findings of this part of research are in line with the finding of Brayan (2014)

It seems that Iranian companies like foreign companies through benefiting from a strong and coherent supply chain which has proper loops and components in different parts of receivable turnover ratio, inventory turnover and solvency, making relationship among these three loops which have been mentioned will result in optimized cash flow and as it has been predicted it finally would result in higher cost of assets in the company. Reducing the receivable turnover ratio and inventory turnover ratio period companies will be able to avoid extraordinary inventory turnover and receivable inventories in the balance sheet of companies can be avoided and spend it for the resources of company in the cycles without added value can also be avoided and finally the created improvement in three parts of supply chain will result in improvement of company profitability.

This finding can be good news for Iranian companies which try to make decisions based on traditional financial data. it seems that achieving results of such studies and comparing Iran economy with global macroeconomics such companies can be familiarized and equipped with such tools and methods and make use of them in their future decisions. Finally it dares to attract Iranian managers' attention to this part of findings and invite them to repair and recover cash flow having the aim of achieving optimized return on assets.

There is a significant relationship between supply chain and operating profit margin index.

Similar to first part of results (first hypothesis) this part also confirms the second hypothesis. Results show the relationship between supply chain and operating profit margin. Reasons show the reverse relationship between them. In other words the smaller supply chain be, the operating profit margin will increase and improve. Findings of this part are in line with Badell et al (2005) and study.

In this hypothesis we considered operating profit margin as one of the main variables of the study and one of the main features improvements of company status. As we know maximizing sells and minimizing the final price of sold products, companies try to maximize and improve their operating profit margin. This issue has always been one of the main concerns of management. It seems that the sample companies in our study try to optimize their cash flow being aware of this fact and having the aim of maximizing their operating profit margin and finally achieve an optimized result in their profitability part.

Maybe one of the main tools of management in increasing profitability is focus on deleting expenses lacking added value and cash flow cycle; inventory turnover is one of the proper and applicable tools in order to achieve higher operating profit.

On the other hand maybe the main indicator and component of managers' performance especially in industry part is achieving higher operating profit which shows capacity of managers in this regard. It seems that such managers can make use of findings of this part of study and tooling operating and managing part of themselves achieve the proper and optimized cycle of supply in order to achieve better operating profit. Productive industries managers in Iran like managers in other industries in foreign countries cab act more successful through tooling their operating part results to tools of optimized supply chain in competition and comparison between Iranian and foreign industries.

There is a significant relationship between supply chain and return on equity rate.

Results of the third test show lack of relationship between supply chain and return on equity rate. Result of this part is different with results and findings of Oliver and Webber(1982), Farris and Hutchison(2004), and Hendricks andSinghal(2005).

On the other hand as it has been mentioned maybe lack of confirmation in this part of hypotheses shows dependence of return on equity to company's social capital not the effective factors in economic supply chain of the organization.

In this part of the study making the third hypothesis we tried to investigate the relationship between cash cycle and return on equity rate, to potential and actual shareholders in order to achieve choosing talented companies in investment or choosing optimized portfolio, but results and findings of the study is not in line with our predictions. It seems that in choosing optimized portfolio, investors consider much greater issues in comparison with the cash flow cycle. Considering the fact that achieving return on equity is one the short term goals of shareholders, it seems that Tehran stock exchange shareholders emphasize on increasing their share price in comparison with each share.

Maybe the lack of similarity between current study and similar foreign study is in the difference in point of view and effective factors on the country stock exchange. Previous studies show that the breadth and depth of stock market in Iran is smaller in comparison to the international markets and it is managed by short term views. A part of the laws being used for financial markets is also different with global markets and maybe this fact leads to achieving different results in current study.

Conflict of interest

The authors declare no conflict of interest.

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