

## Supply Management Performance and Cash Conversion Cycle

Nikolaos E Pavlis<sup>a</sup>, Socrates J. Moschuris<sup>a</sup> and Lambros G. Laios<sup>a,\*</sup>

<sup>a</sup> *University of Piraeus, Piraeus, Greece*

### Abstract

The purpose of this study is to explore the relationship between dimensions of supply management performance and the components of cash conversion cycle. Although previous studies investigated the link between supply management performance and financial performance, the relationship between supply management performance and liquidity, which can be assessed by the cash conversion cycle, has been largely overlooked. In this study, therefore, the proposed model and hypotheses were tested using data from small and medium size enterprises (SMEs) operating in Greece. Support was found for the relationship between supply management performance and cash conversion cycle. We hope that the results of our investigation will help supply management professionals not only to have a clear understanding of the importance of balance sheet and profit and loss statements in relation to supply management performance, but also to pay more attention to the contribution of supply management practices to ratios derived from balance sheets and profit and loss statements.

**Keywords:** Performance Management; Management Accounting; Purchasing; Cash Conversion Cycle; Supply Management.

### 1. Introduction

Supply management can be viewed as “organizing the optimal flow of high-quality, value-for-money materials or components from a suitable set of innovative suppliers” (Goffin et al., 1997; Wagner, 2003). Supply management is mainly responsible for supplier selection, supplier base rationalization, supplier development, and supplier integration (Antonette et al., 2002; Wagner, 2003). The ever-increasing importance placed on supply management decisions will influence, to a large degree, the future of supply management function (Gundlach et al., 2006).

“Supply management performance is identified as a critical driver of overall firm performance. Its operational antecedents, such as status and integration, and pertinent strategic skill sets, bear great importance to superior operations and competitive advantage. The value of strategic supply management practices and characteristics primarily stems from the role each has in managing relationships with trading partners in order to attain effectiveness and efficiency for the supply chain” (Eltantawy et al., 2009).

Supply management is a source of competitive advantage and, therefore, advances in supply management should be visible in corporate financial performance (Tan et al., 1998). Shao et al.(2012) argue that “purchasing and supply management’s contribution to sales increase and the reduction of supply risks impact directly the financial performance of the firm”. Saranga and Moser (2010) found, using Data Envelopment Analysis (DEA), that enterprises are transforming purchasing and supply management performance outcomes into corporate financial performance.

The main contribution of this paper is the evaluation of supply management performance constructs and the investigation of the impact of supply management practices on the cash conversion cycle. “The cash conversion cycle represents the time period required to convert cash investments in suppliers into cash receipts from customers for goods or services rendered” (Kroes and Manikas, 2014). A number of studies focus on cash flow modeling in order to explore its role in

the supply management context (Badellet al., 2005; Chen, 2011; Chenet al., 2005; Tsai, 2008). “Financial practitioners perceive that traditional measures of corporate liquidity such as current ratio, quick ratio, and even net working capital are static in terms of what cash resources are ready for use at a given moment in time to satisfy current obligations” (Wang, 2002). Cash conversion cycle is a useful and more dynamic way of assessing the liquidity of firms, because it measures liquidity from the perspective of a firm as an ongoing concern.

We also contribute to the sparse literature on supply management in SMEs by investigating the dimensions of supply management performance. SMEs play an important role in many economies (de Wit and de Kok, 2014). Moreover, in financially constrained firms such as SMEs, the reduction of cash conversion cycle leads to a substantial improvement in firms’ profitability (Garcia-Teruel and Martinez-Solano, 2007). Thus, it is worthwhile to understand the relationship between the supply management performance and cash conversion cycle in the cash-starved firms.

The final contribution of this study is the employment of two different data sets. Qualitative data were used for supply management performance, whereas balance sheets and profit and loss statements were the source of the quantitative data used for the calculation of a firm’s cash conversion cycle. Using these data sets provides insights into the relationship between supply management performance and cash conversion cycle.

The remainder of the paper is organized as follows. In the next section, the relevant literature is reviewed and the hypotheses are developed. The methodology followed in this research is then presented. Next, data analysis is performed and the results are reported and discussed in the context of existing knowledge in the field. Then, conclusions and implications of the findings are examined. In the final section, limitations of the study and suggestions for further research are reported.

## 2. Review of the literature and hypotheses development

### 2.1 Cash conversion cycle

Cash conversion cycle (CCC) is a concept developed by Richards and Laughlin (1980). Cash-to-cash (C2C) is a term used instead of cash conversion cycle (Pirttila, 2014). “CCC comprises days-in-payable, days-in-inventory, and days-in-receivable, where days-in-payable is the number of days’ credit before a firm pays its suppliers and subcontractors, days-in-inventory is the length of the manufacturing process and the number of days that the finished goods remain in the firm before they are sold, and days-in-receivable is the average collection period from the firm’s customers” (Chen, 2011). In other words, “CCC is a proxy for the net time interval between a firm’s cash expenditures for purchases and its final recovery of cash receipts in terms of days” (Yazdanfar and Ohman 2014). “It is one of the critical factors for a company to be successful in running business by representing how well the company manages its liquidity. A low CCC indicates that the company has low financial cost to fund its business operation” (Tangsucheeva and Prabhu, 2013). Table I describes the CCC employed in this study.

**Table 1.** The cash conversion cycle

	Components	Calculation
1	Days of Receivables	Receivables / (Sales / 360)
2	Days of Inventory	Inventory / (Cost of Goods Sold / 360)
3	Days of Payables	Payables / (Cost of Goods Sold / 360)
4	Cash Conversion Cycle	Days of Receivables + Days of Inventory – Days of Payables

Previous research shows contradictory results regarding the relationship between CCC and firm profitability. On the one hand, a number of studies have found a positive relationship between CCC and profitability (Abuzayed, 2012; Gill et al., 2010; Shah et al., 2018; Sharma and Kumar, 2011). This means that “managers might increase profitability and thereby firm value by focusing on CCC and keeping accounts receivable at an optimal level” (Yazdanfar and Ohman, 2014).

On the other hand, other studies indicated a negative relationship between the length of the firm’s CCC and profitability, which means that firms with shorter CCCs tend to be more profitable (Babu and Chalam, 2014; Iqbal and Zhuquan, 2015; Muscettola, 2014; Zeidan and Shapir, 2017). “A possible explanation for the inverse relationship between CCC and profitability is that increased levels of inventory and accounts receivable increase working capital and thereby the costs of working capital maintenance. Maintaining working capital at a higher than optimal level will result in financial resources being detained in unprofitable cases” (Yazdanfar and Ohman 2014).

It has been assumed that cash conversion cycle has a significant impact on supply chain practice, because it shows clearly the financial benefits accrued from an effective supply chain management (Christopher and Gattorna, 2005; Fawcett et al., 2007). More specifically, “the CCC metric is a key performance indicator of supply chain cash flows, because the metric not only bridges across inbound material and service activities with suppliers and subcontractors, through manufacturing operations, and to the outbound sales activities with customers, but also indicates the value of net cash

flows” (Chen, 2011). “Using the cash-to-cash metric to manage the supply chain offers increases visibility of more decision variables in the supply chain, increases optimization of decisions for the supply chain, reduces sub-optimization of financial decisions within firms, and aids supplier decision making by eliminating the uncertainty of customer actions” (Farris II et al., 2005).

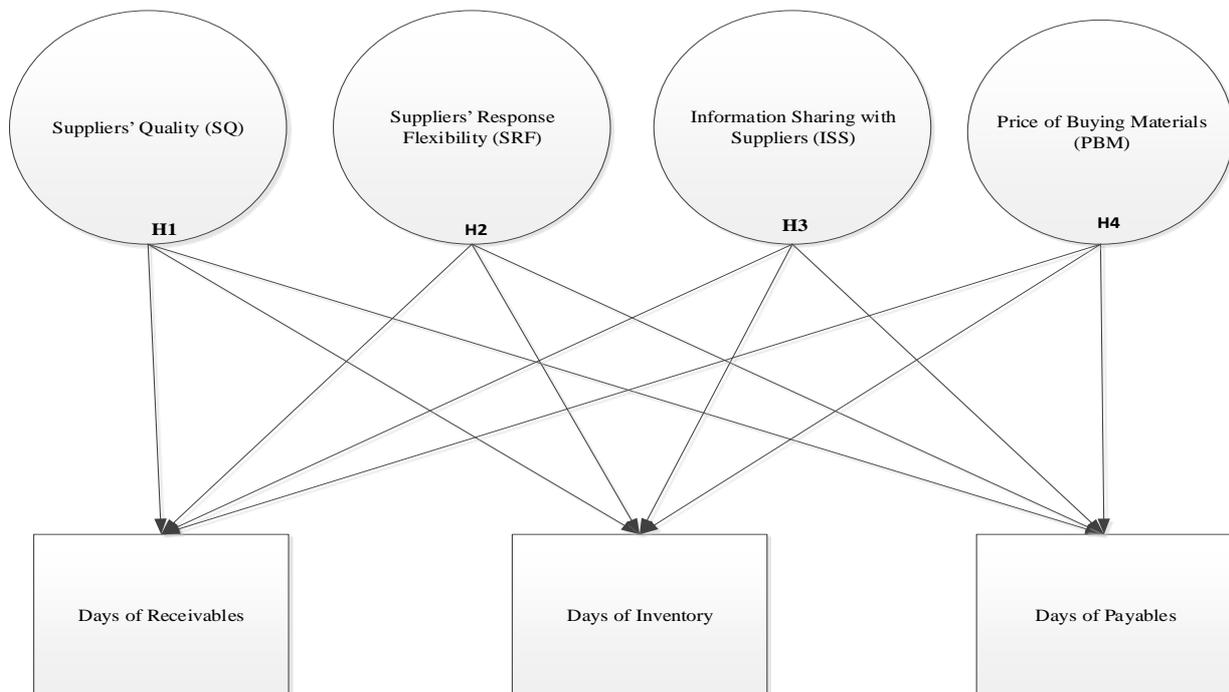
**2.2 Supply management performance**

“Strategic supply management function can help a firm to sustain its competitive advantage in a number of ways. First, it provides value in the area of cost management. Second, it provides the firm with the valuable information concerning supply trends that will enable the firm to make better decisions and achieve its goals. Third, it establishes close relationships, where appropriate, with customers to improve the sales volume of materials” (Hossain et al., 2018).

According to the resource-based theory, purchasing and supply management practices can help buying firms enhance their performance (Barney, 2012). Although a number of studies report a positive relationship between purchasing-supply management practices and firm performance (Day et al., 2015; van Weele and van Raaij, 2014; Zimmermann and Foerstl, 2014), it remains unclear whether and to what extent these practices relate to performance.

The relevant literature indicates that two paths are evolved in addressing supply performance. The traditional path is focused on tactical objectives of supply management, such as the improvement in productivity and the reduction in inventory and cycle time (Hult et al., 2000; Sharland et al., 2003). The second path, resulted from the evolution of the supply management from a tactical to a strategic function, takes account of the strategic goals of supply management (Giunipero et al., 2006). Nowadays, scholars pay more and more attention to the ability of supply management function’s performance to contribute to the attainment of the goals of supply chain members, i.e. effectiveness and efficiency (Harwick, 1997; Tan, 2002).

In our study, supply management performance was assessed using four dimensions (suppliers’ quality, suppliers’ response flexibility, information sharing with suppliers, price of buying materials). These dimensions are quite similar to the dimensions used by other researchers (e.g. Handfield et al., 2015; Kilpi et al., 2017; Sanchez-Rodriguez, 2009). The relationship between the supply management performance and cash conversion cycle was investigated separately on each of the components of cash conversion cycle (days of receivables, days of inventory, days of payables), as shown in Figure 1.



**Figure 1.** Research model

### 2.2.1 Suppliers' quality (SQ)

Saraph et al (1989) as well as Sroufe and Curkovic (2008) argued that quality management is deeply rooted in supply chain processes. According to Forker et al. (1997), "supplier quality management is a little-researched subject, despite manufacturing's interest in quality performance and the recognition that a company's output is only as good as the company's inputs". Kaynak and Hartley (2008) as well as Kaynak (2003) investigated the impact of quality management on the supply chain in terms of financial performance. Ratios used to measure financial performance were return on investment, sales growth, profit growth, market share, and market share growth. Results from both studies indicate that quality management in the supply chain has a mediating influence on financial performance. Kaynak and Hartley (2008) also found that "suppliers play an important role in assuring that incoming materials are defect free, which means that the buyer does not have to hold as much safety stock as a contingency in case of defects in incoming materials. Supplier quality management has a direct positive relationship with inventory management".

Burt et al (2003) argued that a large percent of manufacturers' quality problems is due to defects in purchased materials. Therefore, a reduction in defects in incoming resources can improve the quality of final products, which leads to more sales generated from satisfied customers and to higher profit margins.

Here, the relationship between suppliers' quality and the cash conversion cycle is hypothesized as follows:

H1. Suppliers' quality is related to the components of cash conversion cycle.

### 2.2.2 Suppliers' response flexibility (SRF)

Another dimension used to assess supply management performance is suppliers' response flexibility. Suppliers' response flexibility is an essential element used in suppliers' evaluation whether it is regarded to order lead time, volume changes or the introduction of new products. The interest in suppliers' response flexibility has increased as mass customization calls for flexible market responsive supply chains in order to satisfy particular customer needs (Gunasekaran et al., 2001). Vickery et al (1999) used five dimensions (product flexibility, volume flexibility, launch flexibility, access flexibility, and responsiveness to target markets) to describe supply chain flexibility. They found that all these dimensions have a strong association with financial performance. Lummus et al (2003) underlined the importance of supply chain flexibility in high tech industries, innovative product industries, and in environments which require rapid product introduction. Sanchez and Perez (2005) validated Vickery et al (1999)'s findings. More specifically, they explored the impact of thirteen components of supply chain flexibility on financial performance. Both studies used similar financial performance measures (return on investment, return on investment growth, market share, market share growth, return on sales, and return on sales growth). Avittathur and Swamidass (2007) maintained that supply chain flexibility should fit plant flexibility if profitability is the goal.

The fact that suppliers' response flexibility has never been tested for its impact on the cash conversion cycle leads us to the following hypothesis:

H2. Suppliers' response flexibility is related to the components of cash conversion cycle.

### 2.2.3 Information sharing with suppliers (ISS)

"Information sharing refers to the extent to which critical and proprietary information is communicated to one's supply chain partner" (Li et al., 2005). "Information sharing is crucial to efficient operations everywhere along the supply chain and to every functional area" (Tan, 2002). Good quality information flow leads to the establishment of mutual trust between enterprises and to the improvement of long-term collaborative relationships among the partners (Chang et al., 2013; Large, 2005; Liker and Choi, 2004).

Information sharing is recognized as the backbone of effective supply chain management (Bechtel and Jayaram, 1997). Lin et al. (2002) argued that the outcome of information exchange between partners is the reduction of uncertainty, the improvement of order fulfillment rate, and better supply chain performance. Yu et al. (2001) found that the consequences of information sharing among business partners are cost savings, better inventory control, and more partnership. The improvement of the relationships between a buyer and the suppliers, due to information sharing, has a positive impact on the quality of a buyer's products (Sriram and Stump, 2004). Good relationships with suppliers, because of information sharing, enable them to "become actively involved in the product development process, which is important to reduce the time-to-market on new product introduction" (Shin et al., 2000). Effective information sharing increases mutual understanding and results in a stronger buyer-supplier relationship (Humphreys et al., 2004; Prahinski and Benton, 2004). Carr and Kaynak (2007) argued, "Information sharing between firms emerges as an important factor for improving firm performance in that it is directly related to product quality improvement and indirectly related to financial performance through product quality improvement".

Here, the relationship between information sharing with suppliers and cash conversion cycle is hypothesized as follows:

H3. Information sharing with suppliers is related to the components of cash conversion cycle.

**2.2.4 Price of buying materials (PBM)**

Price of buying materials is considered an established historical criterion for suppliers' evaluation and selection. The impact of purchasing price on financial figures is significant since the price of purchased materials can represent more than 50 per cent of the cost of goods sold (Handfield et al., 1999; Simpson et al, 2002). Whether it is widely supported that every dollar saved in purchasing materials has a direct effect on profit margins, supplier selection is focused mainly on system-wide goals rather than piece price (Degraeve and Roodhooft, 1999; Krause et al., 2000).

Price fluctuation is one of the four causes of the bullwhip effect (Lee et al., 1997). In this regard, the short-term benefits of trade discounts maybe realized in terms of increased sales, but in the long run (when the price returns to normal) the variations in the buying material would be greater than the variations in consumption rate.

Price of buying materials is expected to have a direct impact on cost of goods sold, inventory value and payables. However, Moffett and Youngdahl (1999) stressed out the example of General Motors, which, in the early 1990s, decided to reduce its supplier base. General Motors forced its suppliers to proceed to cost and price reductions. Suppliers responded by cutting costs, compromising quality, and delaying production schedules. The outcome was low customer satisfaction and loss in market share of the company.

Despite the controversial effects of purchasing price on profitability, a reasonable question would be whether the price of buying materials has an impact on cash conversion cycle. Therefore, the following hypothesis will be tested:

H4. Price of buying materials is related to the components of cash conversion cycle.

**3. Research methodology**

In order to validate the four dimensions of supply management performance, a questionnaire with 13 supply management performance measures was designed with the questions measured on a 5-point Likert scale, ranging from "very low" to "very high". Review of the literature provided the basis for the operationalization of these variables. However, some of the dimensions of supply management performance are relatively novel and have not been investigated thoroughly in the previous empirical work. Therefore, an extensive pretest was required to enhance the content validity of all constructs. The pretest used 4 academics in the field of supply management, who provided great assistance to identify ambiguities, typographical errors, problematic formatting, etc. in the survey instrument. Moreover, 8 business professionals, from companies represented in the Hellenic Purchasing Institute sampling frame, were included in the pretest; however, they were not part of the random sample used in the study.

During 2007, the revised survey instrument was posted to 840 small and medium enterprises drawn from the Hellenic Purchasing Institute membership list. In collecting the data, some steps were taken based on Dillman (1978)'s guidelines. A survey packet containing the questionnaire, a prepaid, self-addressed return envelope, and a cover letter outlining the research objectives, was dispatched to the supply management executive of each enterprise. In the very small companies, where supply management position did not exist, the survey packet was dispatched to the owner of the enterprise. To those who did not respond, a second wave of survey packets was mailed approximately one month after the initial mailing.

The results included 122 usable responses, giving a response rate of 14.5 percent of the initial contact sample of 840 enterprises. The demographic characteristics of the responding firms are shown in Table II.

**Table 2.** The respondents' profile

<b>Sample Stratification</b>	<b>%</b>	<b>Respondents' Business Function</b>	<b>%</b>
Manufacturing	55.0	Raw Material Manufacturer	7.0
Trading	33.0	Component Manufacturer	5.0
Services	12.0	Final Product Manufacturer	43.0
	<b>100.0</b>	Wholesaler or Retailer	33.0
		Services	12.0
			<b>100.0</b>
<b>Number of Employees</b>	<b>#</b>	<b>Annual Gross Sales</b>	<b>€</b>
Median	240	Median	86 m
Minimum	17	Minimum	330,000
Maximum	540	Maximum	800 m

The relatively low response rate in our survey could be attributed to three issues. First, it may related to the fact that senior managers, which were selected as respondents, have intense time pressure and receive a large number of requests to participate in surveys (Rodrigues et al., 2004). Second, this result confirms the notion that “response rates for mailed surveys in executive populations are declining over time” (Cycyota and Harrison, 2006). Finally, the low response rate could be explained by the fact that companies had no incentive to fill out the questionnaire (Rose et al., 2007).

In order to assess non-response bias, we proceeded to the comparison of firm size (measured in terms of the number of employees and annual sales turnover) for both early and late respondents, with the last wave of surveys received being considered representative of non-respondents (Armstrong and Overton, 1977; Hair et al., 2007; Lambert and Harrington, 1990). An independent t-test was run to determine whether significant differences exist between the means of the two groups. The results show that the early respondents do not display statistically significant differences from the late respondents, suggesting that the non-response bias may not affect this study.

In order to calculate the components of cash conversion cycle, we used data from the financial statements (balance sheets, profit and loss accounts) of 2003-2006 issued by the responding enterprises.

#### 4. Data analysis and results

In our survey, we used SPSS 17 Amos 7 software to perform the confirmatory factor analysis and structural equation modeling. External validity was assessed by examining the normality of the sample distribution. For this purpose, we computed the measures of skewness and kurtosis. Skewness lower than 2.0 and kurtosis lower than 5.0 indicate that bias does not exist in the data gathered (Ghiselli et al., 1981). In our study, the values of skewness and kurtosis for each variable were within the acceptable limits.

##### 4.1 Confirmatory factor analysis

Seven qualitative characteristics are included in the suppliers’ quality. These characteristics are the supplier’s ability to conform to the buying firm’s quality standards, the satisfaction of the buying firm, the certification of the suppliers, and the suppliers’ contribution to problem solving. Suppliers’ response flexibility is related to the flexibility of suppliers in lead-time and response to order. Information sharing with suppliers has two dimensions including the use of information technology and information clarity for suppliers. However, information sharing with suppliers is a big research issue that includes more than two variables. In our study, the limited number of variables forming the construct of information sharing with suppliers was based on the intention to analyze data that best represents daily practices of SMEs operating in Greece. Finally, price of buying materials includes two variables relating to the comparison of supplier’s price with competition and to the savings made from buying materials at low price.

**Table 3.** The confirmatory factor analysis

Construct	Scale items	Std loading	t-value	Composite reliability
label				
indicators				
SQ 1	Suppliers’ achievement of the required quality standards.	0.826	-	0.850
SQ 2	Enterprise’s satisfaction with suppliers’ cooperation with quality improvements.	0.681	7.87	
SQ 3	The suppliers’ level in the implementation of certified quality process control.	0.614	6.93	
SQ 4	The technical level of the suppliers.	0.917	7.30	
SQ 5	The level of purchasing order correctness.	0.560	6.21	
SQ 6	Suppliers’ contribution to problem solving.	0.659	7.57	
SQ 7	Enterprise’s satisfaction with suppliers’ cooperation with cost reduction schemes.	0.602	6.77	
ISS 1	Order tracking in the various stages of implementation by the suppliers.	0.628	-	0.795
ISS 2	Information clarity to the suppliers concerning the specifications of products and services.	0.652	4.37	
PBM 1	Suppliers price in relation to the competition.	0.755	-	0.653

Table 3. Continued

PBM 2	The rate of cost savings from the supply of materials as a percentage of total supply expenses.	0.567	3.30	
SRF 1	The proportion of unscheduled orders that was delivered by suppliers to the total number of delivered orders.	0.465	-	0.630
SRF 2	Purchasing order lead time.	0.987	2.70	
$\chi^2 = 89.077, p = 0.005, df = 58, RMSEA = 0.067, CFI = 0.933, NFI = 0.835$				

“Confirmatory factor analysis was conducted using the measurement portion of the model, which allowed all of the factors in the model to covary” (Carr and Kaynak, 2007). The model fit indexes calculated were at an acceptable level ( $\chi^2 = 89.077, d.f = 58, RMSEA = 0.067, CFI = 0.933, \text{ and } NFI = 0.835$ ). Therefore, we can argue that a reasonable fit of the measurement model was achieved (Bagozzi and Yi, 1988; Hu and Bentler, 1999).

“Convergent validity establishes that there is a high correlation among the variables loading on to a single factor. It ensures that a set of variables are measuring the same concept” (Hair et al., 2007). In our study, “convergent validity was assessed by examining both the magnitude of the factor loadings of the manifest variables on their respective latent variables as well as whether or not those factor loadings were statistically different than zero” (Petersen et al., 2005). The fact that all factor loadings were of sufficient magnitude and significantly different from zero at the  $p < 0.05$  level suggests high convergent validity.

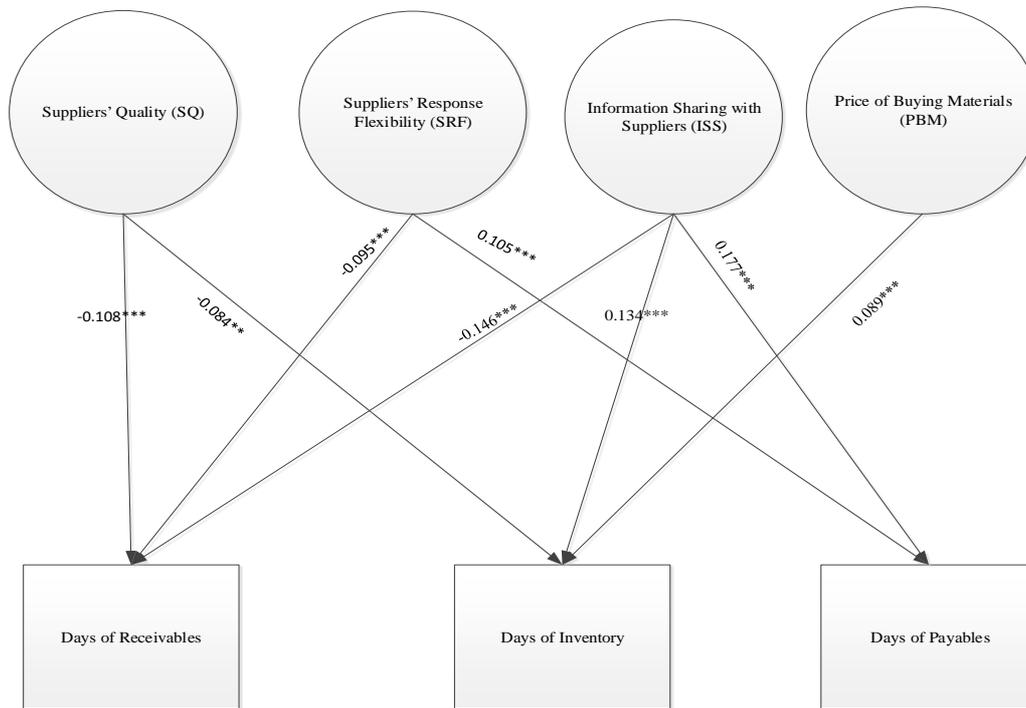
“Discriminant validity assesses the extent to which two similar concepts are distinct. It indicates the degree to which factors are unique and uncorrelated” (Hair et al., 2007). “One way to determine discriminant validity is to examine the pattern matrix where variables are required to load significantly only on one factor to provide evidence for factor distinctiveness” (Ofori-Amanfo, 2014). In our study, discriminant validity was assessed using the matrix of factor loadings (Bentler, 1990) and modification indexes in Amos 7. Table III shows that there is “a clean factor structure with discriminant validity being evident by the high loadings within factors” (Ofori-Amanfo, 2014). “Reliability of the measurement scale has to be ensured when scales are employed in a study” (Pallant, 2005). “Reliability simply means that the measurement scale should consistently reflect the construct it is measuring. Cronbach’s alpha ( $\alpha$ ) is the most common measure of scale reliability” (Field, 2005). Hair et al. (2007) argued that the value of Cronbach’s alpha should be 0.70 or more. In our study, as reported in Table III, suppliers’ quality and information sharing with suppliers have a value of  $\alpha > 0.70$ . However, Cronbach’s alpha ( $\alpha$ ) for the price of buying materials and that of the suppliers’ response flexibility have a value between 0.60 and 0.70, which is considered acceptable, since there are only two items in the scale for each of these factors.

#### 4.2 Structural model estimating and hypotheses testing

Structural model estimation was used to test the research hypotheses. Tables IV and Figure 2 indicate the results of the statistical analysis.

Table 4. Results of the structural model

Hypothesis statement		Std estimate	S.E.	t-value
SQ	→ Days of receivables	-0.108	3.434	-3.744***
SQ	→ Days of inventory	-0.084	2.598	-2.266**
SQ	→ Days of payables	-0.136	3.331	-1.885
SRF	→ Days of receivables	-0.095	2.598	-3.766***
SRF	→ Days of inventory	-0.024	3.434	-0.866
SRF	→ Days of payables	0.105	3.331	3.211***
ISS	→ Days of receivables	-0.146	2.598	-4.541***
ISS	→ Days of inventory	0.134	3.434	5.427***
ISS	→ Days of payables	0.177	3.331	6.112***
PBM	→ Days of receivables	-0.012	2.598	-0.247
PBM	→ Days of inventory	0.089	3.434	5.193***
PBM	→ Days of payables	0.083	3.331	1.364
Notes: ** $p < 0.05$ ; *** $p < 0.001$ ; $\chi^2 = 12.036 (df=7; p < 0.01)$ ; $RMSEA = 0.160$ ; $CFI = 0.983$ ; $NFI = 0.978$				



**Figure 2.** Structural model statistically significant result

The global fit indexes ( $\chi^2 = 12.036$ ;  $df = 7$ ;  $p\text{-value} < 0.01$ ;  $\chi^2/df = 1.72$ ;  $RMSEA = 0.160$ ;  $CFI = 0.983$ ;  $NFI = 0.978$ ) were at an acceptable level. This is an indication of a satisfactory overall fit of our structural model (Bagozzi and Yi, 1988; Hu and Bentler, 1999).

The supplier’s quality has a positive impact on the cash conversion cycle, because it reduces days of receivables ( $t\text{-value} = -3.744$ ;  $p < 0.001$ ) and days of inventory ( $t\text{-value} = -2.266$ ;  $p < 0.05$ ). However, the suppliers’ quality has a non-statistically significant effect on days of payables. Hence, H1 is partly supported.

The suppliers’ response flexibility has a positive impact on the cash conversion cycle. More specifically, the negative relationship between the suppliers’ response flexibility and the days of receivables ( $t\text{-value} = -3.766$ ;  $p < 0.001$ ) indicates short number of days of turning sales into cash, whereas the positive relationship between the suppliers’ response flexibility and the days of payables ( $t\text{-value} = 3.211$ ;  $p < 0.001$ ) shows a longer time period that payables are not paid. The suppliers’ response flexibility has a non-statistically significant effect on days of inventory. Therefore, H2 is partly supported.

Information sharing with suppliers has a mixed impact on the cash conversion cycle. In fact, it has a negative effect on days of receivables ( $t\text{-value} = -4.541$ ;  $p < 0.001$ ). On the contrary, it is positively associated with days of inventory ( $t\text{-value} = 5.427$ ;  $p < 0.001$ ), and days of payables ( $t\text{-value} = 6.112$ ;  $p < 0.001$ ). Therefore, H3 is fully supported.

Price of buying materials has a negative impact on the cash conversion cycle because it increases days of inventory ( $t\text{-value} = 5.193$ ;  $p < 0.001$ ). This relationship indicates that buying at low prices increases inventory levels. On the other hand, price of buying materials has a non-statistically significant effect on days of receivables and days of payables. Therefore, H4 is partly supported.

**5. Discussion**

Statistically significant support was found for the majority of the relationships between the dimensions of supply management performance (suppliers’ quality, suppliers’ response flexibility, information sharing with suppliers, price

of buying materials) and the components of cash conversion cycle (days of receivables, days of inventory, days of payables).

The impact of suppliers' quality on the cash conversion cycle can be characterized by its negative effect on the days of receivables and days of inventory. In other words, supply management practices from SMEs indicate that improved suppliers' quality reduces the days of collecting receivables due to the fact that customers have more incentives for early payment. Moreover, suppliers' quality reduces the days that inventory is held, either because of an inventory turnover due to sales increase or because "the need for safety stock to hedge against this type of variation is obviated" (Foster, 2008). However, suppliers' quality does not have a statistically significant effect on the days of payables. This is an interesting finding, because lower levels of payables could work as an incentive to gain better levels of suppliers' quality in SMEs. This conclusion provides some insights into whether, for example, suppliers' quality is related to short-term debt or accounts payable.

The suppliers' response flexibility has a positive impact on the cash conversion cycle by reducing the days of receivables and increasing the days of payables. We believe that, by having suppliers providing unscheduled orders on short lead time, SMEs are reducing days of receivables possibly due to the faster fulfillment of customer orders. On the other hand, they prolong days of payables. It is suggested that either suppliers, for reasons of dependency, are tolerant of extended credit or the premium prices imposed by the suppliers for satisfying unscheduled orders increase the value of the ratio of "days of payables". However, no significant relationship was found between the suppliers' response flexibility and days of inventory, which is opposed to the findings of Jack and Raturi (2002), Krajewski et al. (2005), and White et al. (2005). Those findings were referred on inventory buffers maintained for finished products and for work-in-process. Our study does not verify the assumption that suppliers' response flexibility in SMEs has an impact on days of inventory. A possible explanation of this finding is that in our study the days of inventory were calculated by the aggregated value of total inventory, which includes all types of inventory (raw materials, semi-finished and finished products).

Information sharing with suppliers leads to the reduction of the days of receivables (due to improvement in production schedules and customer response) and to an increase in the days of payables (due to better communication between the parties). An interesting finding, however, is the positive relationship between information sharing with the suppliers and the days of inventory. One should expect that information sharing contributes to better collaboration and scheduling plans and, thus, reduces inventory levels. However, information sharing with suppliers is a very difficult issue for members of the supply chain. Yu et al. (2001) said that "while every single member has perfect information about itself, uncertainties arise due to a lack of perfect information about other members. To reduce uncertainties, the supply chain member should obtain more information about other members. If the members are willing to share information, each of them will have more information about others. Therefore, the whole system's performance will be improved because each member can gain improvement from information sharing". Li (2002) stated that information sharing should not be restricted to the gains and losses of the parties directly involved in the supply chain, but the shared information should be leaked in order to help partners act properly. Therefore, information sharing is a result of mutual trust between supply chain members (Doney and Cannon, 1997; Hsu et al, 2008; Krause et al, 2007; Li and Lin, 2006; Ren et al, 2010). The present study adopted tactical level variables in the form of information sharing with suppliers construct, which represent practices that are widely adopted by the majority of SMEs operating in Greece. Such practices do not seem to reduce days of inventory.

The findings of our study verify that buying at low prices produces no benefits in the cash flow. Though there is a rational accounting explanation that savings from buying material increase profit margins and reduce the value of inventory bought, this study brings a new insight into the effects of price of buying materials on the cash conversion cycle. Price of buying materials has no impact on days of receivables and days of payables, which were found to be significant for the financial performance and the cash flows of SMEs. The finding of our study is that buying at low prices increases the days of inventory held, due to the fact that firms buy large quantities of items to take advantage of the discount offered. The limited impact of price of buying materials on the cash conversion cycle gives us the opportunity to assume that, despite the tendency of manufacturing companies to move their facilities to low cost countries, the issues of quality, flexibility, and information sharing in the supply chain remain critical to the daily operations. Hence, enterprises increase profit margins and financial performance because they sustain high levels of supply management performance at lower operational and material costs.

## **6. Conclusions and implications**

In this study, we examined a method for analyzing the impact of supply management performance on financial figures. We believe that further research on the impact of supply management performance can reveal interesting insights. Financial figures are persistently used in the financial market for evaluating enterprise performance. Supply managers and academicians should focus more on the kind of impact supply management practices have on balance sheet figures. "Since the flow of material is still at the heart of supply chain management, companies must analyze their supply chain management and processes and link the operational drivers to top level financial indicators" (Gomm, 2010).

Findings of this study reveal that SMEs should focus on building partnerships in the supply chain in order to increase cash availability. These partnerships, through which materials' flow is associated with increased quality, flexibility and information sharing, are important in assuring cash flow in the supply chain.

Another conclusion concerns the industries' adoption of slashing pricing in order to become competitive. However, if this decision is not followed by an adjustment and improvement of both cash and physical processes, the outcome will be the reduction of firm's cash reserves. The related literature shows that "to reduce the cash conversion cycle, a company can reduce days in inventory, shorten days-in-receivables and prolong days-in-payables. These three time-related factors are affected by the lead time of production, credit periods of receivables and payables, and early collection/payment patterns due to trade discounts" (Tsai, 2008). Findings of this study support that the persistence in selecting suppliers based on lower price can lead to negative results in terms of liquidity if the quality of incoming materials, information sharing with suppliers, and flexibility are not concerned. An implication for supply managers is to look beyond the short-term benefits in profit margins realized in the balance sheet that relates to buying at lower prices and expand their view of the long-term consequences for the cash conversion cycle.

The results of this study show that suppliers' response flexibility and information sharing with suppliers have the strongest impact on the components of cash conversion cycle. SMEs would benefit from the reinforcement of information links and levels of trust between supply chain members. An important conclusion is referred to the positive relationship between information flow and cash flow among the members of a supply chain.

## 7. Limitations of the study and suggestions for further research

Some limitations need to be acknowledged when attempting to generalize from the present findings. First, our hypotheses are not based on the previous literature, which makes this research explorative rather than confirmative. Second, our study is based on data collected ten years ago (i.e. 2007). Nevertheless, the absence of related studies leads us to believe that our findings provide some insight into the relationship between the supply management performance and cash conversion cycle. A replication of this research, using recent data and taking into account the current economic situation in Greece, would be extremely useful. The final limitation of this research relates to the sample population which was drawn from the Hellenic Purchasing Institute membership list. We can argue that the results are valid for the enterprises in that population. Future research may include a larger number of SMEs operating in Greece in order to expand the scope and generalizability of the results.

## References

- Abuzayed B. (2012), Working capital management and firms' performance in emerging markets: the case of Jordan, *International Journal of Managerial Finance*, Vol. 8, pp. 155-79.
- Antonette G., Giunipero L.C. and Sawchuk C. (2002), E-Purchasing plus: Transforming Supply Management through Technology, JGC Enterprises, Goshen, NY, pp. 167-82.
- Armstrong J.S. and Overton T. (1977), Estimating non-response bias in mail surveys, *Journal of Marketing Research*, Vol. 14, pp. 396-402.
- Avittathur B. and Swamidass P. (2007), Matching plant flexibility and supplier flexibility: lessons from small suppliers of US manufacturing plants in India, *Journal of Operations Management*, Vol. 25, pp. 717-35.
- Babu M.S. and Chalam P.G. (2014), Study on the working capital management efficiency in Indian leather industry – an empirical analysis, *International Journal of Research in Management & Technology*, Vol. 5, pp. 196-201.
- Badell M., Pomerom J. and Puigjaner L. (2005), Optimal budgets and cash flow during retrofitting period in batch chemical industry, *International Journal of Production Economics*, Vol. 95, pp. 359-72.
- Bagozzi R. and Yi Y. (1988), On the evaluation of structural equation models, *Journal of the Academy of Marketing Science*, Vol. 16, pp. 74-94.
- Barney J.B. (2012), Purchasing, supply chain management and sustained competitive advantage: the relevance of resource-based theory, *Journal of Supply Chain Management*, Vol. 48, pp. 3-6.
- Bechtel C. and Jayaram J. (1997), "Supply chain management: a strategic perspective", *International Journal of Logistics Management*, Vol. 8, pp. 15-34.
- Bentler P.M. (1990), Comparative fit indexes in structural models, *Psychological Bulletin*, Vol. 107, pp. 238-46.

- Burt D.N, Dobler D.W. and Starling L.S. (2003), *World Class Supply Management: The Key to Supply Chain Management*, McGraw-Hill, Irwin.
- Carr A.S. and Kaynak H. (2007), Communication methods, information sharing, supplier development and performance: an empirical study of their relationships, *International Journal of Operations & Production Management*, Vol. 27, pp. 346-70.
- Chang H.H., Tsai Y.C. and Hsu C.H. (2013), E-procurement and supply chain performance, *Supply Chain Management: An International Journal*, Vol. 18, pp. 34-51.
- Chen H.L. (2011), An empirical examination of project contractors' supply-chain cash flow performance and owners' payment patterns, *International Journal of Project Management*, Vol. 29, pp. 604-14.
- Chen H.L., O'Brien W.J. and Herbsman Z.J. (2005), Assessing the accuracy of cash flow models: the significance of payment conditions, *Journal of Construction Engineering & Management*, Vol. 131, pp. 669-76.
- Christopher M. and Gattorna J. (2005), Supply chain cost management and value-based pricing, *Industrial Marketing Management*, Vol. 34, pp.115-21.
- Cycyota C.S. and Harrison D.A. (2006), What (not) to expect when surveying executives: a meta-analysis of top manager response rates and techniques over time, *Organizational Research Methods*, Vol. 9, pp.133-60.
- Day M., Lichtenstein S. and Samouel P. (2015), Supply management capabilities, routine bundles and their impact on firm performance, *International Journal of Production Economics*, Vol. 164, pp.1-13.
- De Wit G. and de Kok J. (2014), Do small businesses create more jobs? New evidence from Europe, *Small Business Economics*, Vol. 42, pp.283-95.
- Degraeve Z. and Roodhooft F. (1999), Effectively selecting suppliers using total cost of ownership, *The Journal of Supply Chain Management*, Vol. 35, pp. 5-10.
- Dillman D.A. (1978), *Mail and Telephone Surveys: The Total Design Method*, Wiley-Interscience, New York.
- Doney P. M. and Cannon J.P (1997), An examination of the nature of trust in buyer-seller relationships, *Journal of Marketing*, Vol. 61, pp. 35-51.
- Eltantawy R.A., Giunipero L. and Fox G.L.(2009), A strategic skill based model of supplier integration and its effect on supply management performance, *Industrial Marketing Management*, Vol. 38, pp. 925-36.
- Farris II M.T., Hutchison P.D. and Hasty R.W. (2005), Using cash-to-cash to benchmark service industry performance, *The Journal of Applied Business Research*, Vol. 21, pp. 113-24.
- Fawcett S.E., Ellram L.M. and Odgen J.A. (2007), *Supply Chain Management: From Vision to Implementation*, Pearson Education Inc., Upper Saddle River, New Jersey.
- Field A. (2005), *Discovering Statistics Using SPSS, 2nd Edition*, Sage, London.
- Forker L.B., Mendez D. and Hershauer J.C. (1997), Total quality management in the supply chain: what is its impact on performance?, *International Journal of Production Research*, Vol. 35, pp. 1681-701.
- Foster Jr S.T. (2008), Towards an understanding of supply chain quality management, *Journal of Operations Management*, Vol. 26, pp. 461-67.
- Garcia-Teruel J.P. and Martinez-Solano P. (2007), Effects of working capital management on SME profitability, *International Journal of Managerial Finance*, Vol. 3, pp. 164-177.
- Ghiselli E., Campbell J. and Zedeck J. (1981), *Measurement Theory for the Behavioral Sciences*, Freeman, San Francisco, CA.
- Gill A., Biger N. and Mathur N. (2010), The relationship between working capital management and profitability: evidence from the United States, *Business and Economics Journal*, Vol. 10, pp. 1-9.

- Giunipero L., Handfield R.B. and Eltantawy R.A. (2006), Supply management's evolution: key skill sets for the supply manager of the future, *International Journal of Operations and Production Management*, Vol. 26, pp. 822-44.
- Goffin K., Szejcowski M. and New C. (1997), Managing suppliers: when fewer can mean more, *International Journal of Physical Distribution & Logistics Management*, Vol. 27, pp.422-36.
- Gomm M.L. (2010), Supply chain finance: applying finance theory to supply chain management to enhance finance in supply chains, *International Journal of Logistics: Research & Applications*, Vol.13, pp.133-42
- Gunasekaran A., Patel C. and Tirtiroglu E. (2001), Performance measures and metrics in a supply chain environment, *International Journal of Operations & Production Management*, Vol. 21, pp.71-87.
- Gundlach G.T., Bolumole Y.A., Eltantawy R.A. and Frankel R. (2006), On the nature and interrelationship of supply chain management, marketing channels of distribution, logistics, and purchasing: implications for scholarship, *Journal of Business & Industrial Marketing*, Vol. 21, pp.428-38.
- Hair J., Black W., Babin B., Anderson R. and Tatham R. (2007), *Multivariate Data Analysis*, 6th ed., Pearson Education, Inc., New Jersey.
- Handfield R.B., Cousins P.D., Lawson B. and Petersen K.J. (2015), How can supply management really improve performance? A knowledge-based model of alignment capabilities, *Journal of Supply Chain Management*, Vol. 51, pp. 3-17.
- Handfield R.B., Ragatz G.L., Petersen K.J. and Monczka R.M. (1999), Involving suppliers in new product development, *California Management Review*, Vol. 42, pp.59-82.
- Harwick T. (1997), Optimal decision-making for the supply chain, *APICS-The Performance Advantage*, Vol. 7, pp.42-44.
- Hossain M.Z., Khadem M.M.R., Al-Mawali N.R. and Al Hajri A.S. (2018), Customer integration and supply management performance of small and medium enterprises: an empirical investigation, *International Journal of Economics & Research*, Vol. 9, pp. 45-54.
- Hsu C.C.K., Tan V.R. and Keong K.C.L. (2008), Information sharing, buyer-supplier relationships, and firm performance: a multiregional analysis, *International Journal of Physical Distribution & Logistics Management*, Vol. 38, pp.296-310.
- Hu L.T. and Bentler P.M. (1999), Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives, *Structural Equation Modeling: A Multidisciplinary Journal*, Vol. 6, pp. 1-55.
- Hult G.T.M., Ketchen D.J. and Nicholas E.L. (2000), Measuring cycle time in organization processes, *Cycle Time Research*, Vol. 6, pp.13-27.
- Humphreys P.K., Li W.L. and Chan L.Y. (2004), The impact of supplier development on buyer-supplier performance, *Omega: The International Journal of Management Science*, Vol. 32, pp. 131-43.
- Iqbal A. and Zhuquan W. (2015), Working capital management and profitability evidence from firms, *International Journal of Business & Management*, Vol. 10, pp. 213-35.
- Jack E.P. and Raturi A. (2002), Sources of volume flexibility and their impact on performance, *Journal of Operations Management*, Vol. 20, pp.519-48.
- Kaynak H. and Hartley J.L. (2008), A replication and extension of quality management into the supply chain, *Journal of Operations Management*, Vol. 26, pp. 468-89.
- Kaynak H. (2003), The relationship between total quality management practices and their effects on firm performance, *Journal of Operations Management*, Vol. 21, pp.405-35.
- Kilpi V., Lorentz H., Solakivi T. and Malmsten J. (2017), The effect of external supply knowledge acquisition, development activities and organizational status on the supply performance of SMEs, *Journal of Purchasing and Supply Management*, In Press.

- Krajewski L., Wei J.C. and Tang L.L. (2005), Responding to schedule changes in build-to-order supply chains, *Journal of Operations Management*, Vol. 23, pp. 452-69.
- Krause D.R., Handfield R.B. and Tyler B.B. (2007), The relationships between supplier development, commitment, social capital accumulation and performance improvement, *Journal of Operations Management*, Vol. 25, pp.528-45.
- Krause D.R., Scannell T.V. and Calantone R.J. (2000), A structural analysis of the effectiveness of buying firms' strategies to improve supplier performance, *Decision Sciences*, Vol. 31, pp.33-55.
- Kroes J.B. and Manikas A.S. (2014), Cash flow management and manufacturing firm financial performance: A longitudinal perspective, *International Journal of Production Economics*, Vol. 148, pp.37-50.
- Lambert D.M. and Harrington T.C. (1990), Measuring nonresponse bias in customer service mail surveys, *Journal of Business Logistics*, Vol. 11, pp.5-25.
- Large R.O. (2005), External communication behaviour of purchasers: effects on supplier management performance, *Journal of Purchasing and Supply Management*, Vol. 11, pp.28-41.
- Lee H.L., Padmanabhan V. and Whang S. (1997), Information distortion in a supply chain: the bullwhip effect, *Management Science*, Vol. 43, pp.546-58.
- Li L. (2002), Information sharing in a supply chain with horizontal competition, *Management Science*, Vol. 48, pp.1196-212.
- Li S. and Lin B. (2006), Accessing information sharing and information quality in supply chain management, *Decision Support Systems*, Vol. 42, pp.1641-56.
- Li S., Rao S.S., Raguathan T.S. and Raguathan B. (2005), Development and validation of a measurement instrument for studying SCM practices, *Journal of Operations Management*, Vol. 23, pp.618-41.
- Liker J.K. and Choi T.Y. (2004), Building deep supplier relationships, *Harvard Business Review*, Vol. 82, pp. 104-13.
- Lin F.R., Huang S.H. and Lin S.C. (2002), Effects of information sharing on supply chain performance in electronic commerce, *IEEE Transactions on Engineering Management*, Vol. 49, pp.258-67.
- Lummus R.R., Duclos L.K. and Vokurka R.J. (2003), Supply chain flexibility: building a new model, *Global Journal of Flexible Systems Management*, Vol. 4, pp.1-13.
- Moffett M.H. and Youngdahl W.E. (1999), Jose Ignacio Lopez de Arriortua, *Thunderbird International Business Review*, Vol. 41, pp.179-94.
- Muscettola M. (2014), Cash conversion cycle and firm's profitability: an empirical analysis on a sample of 4,226 manufacturing SMEs of Italy, *International Journal of Business & Management*, Vol. 9, pp. 25-35.
- Ofori-Amanfo J. (2014), Supply Management Capabilities and Operations Performance of UK Manufacturing Small and Medium Sized Enterprises (SMEs), Doctor of Philosophy Thesis, The University of Leeds, United Kingdom.
- Pallant J. (2005), *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS Version 12*, Open University Press, London.
- Petersen K.J., Ragatz G.L. and Monczka R.M. (2005), An examination of collaborative planning effectiveness and supply chain performance, *Journal of Supply Chain Management*, Vol. 41, pp.14-25.
- Pirttila M. (2014), The Cycle Times of Working Capital: Financial Value Chain Analysis Method, Doctor of Science Thesis, Lappeenranta University of Technology, Finland.
- Prahinski C. and Benton W.C. (2004), Supplier evaluations: communication strategies to improve supplier performance, *Journal of Operations Management*, Vol. 22, pp. 39-62.
- Ren J.Z., Cohen M.A., Ho T.H. and Terwiesch C. (2010), Information sharing in a long-term supply chain relationship: the role of customer review strategy, *Operations Research*, Vol. 58, pp. 81-93.

- Richards V.D. and Laughlin E.J. (1980), A cash conversion cycle approach to liquidity analysis, *Financial Management*, Vol. 9, pp.32-8.
- Rodrigues A.M., Stank T.P. and Lynch D. (2004), Linking strategy, structure, process and performance in integrated logistics, *Journal of Business Logistics*, Vol. 25, pp. 65-94.
- Rose D.S., Sidle S.D. and Griffith K.H. (2007), A penny for your thoughts: monetary incentives improve response rates for company-sponsored employee surveys, *Organizational Research Methods*, Vol. 10, pp. 225-40.
- Sanchez A.M. and Perez M.P. (2005), Supply chain flexibility and firm performance: a conceptual model and empirical study in the automotive industry, *International Journal of Operations & Production Management*, Vol. 25, pp. 681-700.
- Sanchez-Rodriguez C. (2009), Effect of strategic purchasing on supplier development and performance: a structural model, *Journal of Business & Industrial Marketing*, Vol. 24, pp.161-72.
- Saranga H. and Moser R. (2010), Performance evaluation of purchasing and supply management using value chain DEA approach, *European Journal of Operational Research*, Vol. 207, pp.197-205.
- Saraph J.V., Benson P.G. and Schroeder R.G. (1989), "An instrument for measuring the critical factors of quality management", *Decision Sciences*, Vol. 20, pp. 810-29.
- Shah B., Gujar M.A. and Sohu N.U. (2018), The impact of working capital management on profitability: case study of pharmaceutical and chemical firms listed on Karachi stock exchange, *International Journal of Economics, Commerce & Management*, Vol. 6, pp.200-20.
- Shao J., Moser R. and Henke M. (2012), Multidimensional supply performance framework: a conceptual development and empirical analysis, *International Journal of Production Economics*, Vol. 138, pp.26-34.
- Sharland A., Eltantawy R.A. and Giunipero L.C. (2003), The impact of cycle time on supplier selection and subsequent performance outcomes, *Journal of Supply Chain Management*, Vol. 39, pp. 4-12.
- Sharma A.K. and Kumar S. (2011), Effect of working capital management on firm profitability: empirical evidence from India, *Global Business Review*, Vol. 12, pp. 159-73.
- Shin H., Collier D.A. and Wilson D.D. (2000), Supply management orientation and supplier/buyer performance, *Journal of Operations Management*, Vol. 18, pp. 317-33.
- Simpson P.M., Siguaw J.A. and White S.C. (2002), Measuring the performance of suppliers: an analysis of evaluation processes, *Journal of Supply Chain Management*, Vol. 38, pp.29-41.
- Sriram V. and Stump R. (2004), Information technology investments in purchasing: an empirical investigation of communications, relationship and performance outcomes, *Omega: The International Journal of Management Science*, Vol. 32, pp 41-55.
- Sroufe R. and Curkovic S. (2008), An examination of ISO 9000: 2000 and supply chain quality assurance, *Journal of Operations Management*, Vol. 26, pp 503-20.
- Tan K.C. (2002), Supply chain management: practices, concerns, and performance issues, *Journal of Supply Chain Management*, Vol. 38, pp. 42-53.
- Tan K.C., Kannan V.R. and Handfield R.B. (1998), Supply chain management: supplier performance and firm performance, *International Journal of Purchasing & Materials Management*, Vol. 34, pp.2-9.
- Tangsuecheeva R. and Prabhu V. (2013), Modeling and analysis of cash-flow bullwhip in supply chain, *International Journal of Production Economics*, Vol. 145, pp.431-47.
- Tsai Y.C. (2008), On supply chain flow risks, *Decision Support Systems*, Vol. 44, pp.1031-42.
- Van Weele A.J. and van Raaij E.M. (2014), The future of purchasing and supply management research: about relevance and rigor, *The Journal of Supply Chain Management*, Vol. 50, pp. 56-72.

- Vickery S., Calantone R. and Droge C. (1999), Supply chain flexibility: an empirical study, *The Journal of Supply Chain Management*, Vol. 35, pp.16-24.
- Wagner S.M. (2003), Intensity and managerial scope of supplier integration, *Journal of Supply Chain Management*, Vol. 39, pp.4-13.
- Wang Y-J. (2002), Liquidity management, operating performance, and corporate value: evidence from Japan and Taiwan, *Journal of Multinational Financial Management*, Vol. 12, pp.159-69.
- White A., Daniel E.M. and Mohdzain M. (2005), The role of emergent information technologies and systems in enabling supply chain agility, *International Journal of Information Management*, Vol. 25, pp.396-410.
- Yazdanfar D. and Ohman P. (2014), The impact of cash conversion cycle on firm profitability: an empirical study based on Swedish data, *International Journal of Managerial Finance*, Vol. 10, pp. 442-52.
- Yu Z., Yan H. and Cheng T.C.E. (2001), Benefits of information sharing with supply chain partnerships, *Industrial Management & Data Systems*, Vol. 101, pp.114-21.
- Zeidan R. and Shapir O.M. (2017), Cash conversion cycle and value-enhancing operations: theory and evidence for a free lunch, *Journal of Corporate Finance*, Vol. 45, pp. 203-19.
- Zimmermann F. and Foerstl K. (2014), A meta-analysis of the 'purchasing and supply management practice-performance link, *The Journal of Supply Chain Management*, Vol. 50, pp.37-54.