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The Effects of SRM Capability on Supply Management Performance

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Abstract: Supplier relationship management (SRM) connects the firm's supply organization to the external supplier network. Firms aim to increase firm competitiveness by exploiting the synergy of mutual business activities with the suppliers. To increase the effectiveness of SRM the drivers of performance need to be examined and regular monitoring of the success of SRM is required. This study examines the effects of SRM capability on monitoring and measuring supply management performance. The supply management performance is divided into monitoring of non-financial measurements measuring supply management's internal service ability and into financial measurements measuring supply management's monetary impact on firm's overall results. The effects were tested using survey data collected from 100 Finnish firms. The results indicated that the SRM capability has a positive effect on monitoring of supply management performance. Moreover, it was found that the effect of capability is more powerful on non-financial measurements than on financial measurements.

Keywords: Supply management, supplier relationship management (SRM), performance measurement, hierarchical multiple regression analysis

INTRODUCTION

The multidimensionality of supply management is derived from the history of the Porter's value chain (1985) arguments, where supply management was defined to be a support activity with several interfaces with primary activities such as logistics, operations, marketing and service. However, present studies have shown that supply

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management has increasingly important and even strategic role enhancing firms' competitiveness (Carter and Narasimhan, 1996; Gonzalez-Benito, 2007; Nollet, Ponce and Cambell, 2005; Paulraj, Chen and Flynn, 2006). Furthermore, it is argued that supply management provides interface where the external commercial supply market relations meet the firm's internal functions and resources (Day and Lichtenstein, 2006). At this interface, the management of supplier relationships (SRM) connects the firm's supply organization to the firm's supply chain.

To be able to operate effectively with the suppliers specific capabilities SRM are required in a buying firm. Firms need to identify their strategically important suppliers, maintain and enhance good business relations with them, and increase firm competitiveness by exploiting the synergy of mutual business activities. To be able to measure performance and success of these management activities concerning supplier relations goals must be set. Previous studies have widely presented different ways how to define and measure the performance; however, it is not always clear what the effect of capability on performance is and what the drivers of performance are. Therefore, to integrate SRM into the firm's overall strategy and to increase SRM effectiveness, the drivers of performance need to be examined and regular monitoring of the success is required.

This study examines the effects of SRM capability on supply management performance. There is a strong consensus among the scholars and practitioners that in general, capability has effect on firm performance (e.g. Barney, 1991, Makadok, 2001; Teece, Pisano and Shuen, 1997). Based on these previous studies it is assumed that SRM capability has a positive effect on measuring and monitoring supply management performance. This argument is tested using survey data collected from 100 Finnish firms and analyzed using hierarchical multiple regression analysis.

SUPPLY MANAGEMENT PERFORMANCE

Cox and Lamming (1997: 62) have defined supply management to be "the strategic management of external and internal resources and relational competencies in the fulfilment of commitments to customers." Thus, it is a process which flows across the firm and aims to make the firm more competitive opposed to only being a detached function of the firm (Cousins, 2002; Cousins and Spekman, 2003). Moreover, Quintens, Pauwels and Matthyssens, (2006: 171) take a global view to the supply management and define it to be "an activity of searching and obtaining goods, services and other resources on a possible worldwide scale, to comply with the needs of the company and with a view to continuing and enhancing the current competitive position of the company." These authors emphasize the influence of supply management to the firm's competitiveness. Therefore, supply performance means supply managements overall contribution to the firm's business and competitiveness.

The evaluation of supply management performance is a formal and systematic approach to monitor how well the targets set by the firm's management are achieved inside the firm. However, it has been found that the development of a

supply management performance measure can be a difficult task. Assessing the right balance between short-term price winnings and long-term reliable supplier relationships is the key problem of performance management. Therefore, performance evaluation systems generally contain a variety of measures (Monczka, Trent and Handfield, 2005).

The importance of measuring supply management performance stems from several factors: 1) Measurement directly supports the management's decision-making, 2) there is better communication across the supply chain, 3) it provides opportunity to give feedback and 4) it motivates and directs behavior toward the desired results (Monczka et al., 2005). Therefore, performance measuring is critical for maintaining the competitiveness in the global market. However, for a variety of reasons performance measurement can be on low level. According to Van Weele (2002), problems that limit the assessment of supply management performance include 1) lack of definition of concepts, 2) lack of formal objectives and performance standards, 3) lack of accurate measurement and 4) the heterogeneous nature of the purchasing activity.

One of the first attempts to develop overall performance measurement system arose in the beginning of the 1990s in the form of the balanced scorecard (BCS). BCSs became a new performance management trend (Kaplan and Norton, 1996). The aim was incorporate the financial outcomes, learning, innovations, and internal customer perspectives. Several studies have shown that the implementation of BCS can have a positive influence on the firm's competitiveness. However, there are several barriers to overcome before successful implementation can be achieved. According to Wagner and Kaufman (2004), the main difficulties in BCS implications arise during the initiation and set-up of the BCS. Furthermore, during the use of BCS there have been problems with communication, sustainability, data gathering, reporting and rewarding.

Generally, the supply management performance definitions have featured financial performance as the primary outcome, which make managers strive for short-term gains. The performance indicators have found to be incomplete, which do not support the overall integration with other functions and strategic focus of the firm. In a worst case, the performance indicators can be contradictory to continuous improvement (Easton, Murphy and Pearson, 2002). Therefore, the performance measures should be both financial and non-financial (Gunasekaran, Patel and Tirtiroglu, 2001).

Supply management performance can be divided into two primary components: efficiency and effectiveness (Van Weele, 2002). Efficiency is related to resource usage and the input-output perspective: "the greater the volume of outputs for a given volume of inputs then the greater the efficiency" (Ritchie and Brindley, 2008: 254). Generally speaking, efficiency refers to optimizing the utilization of the firm's resources. Effectiveness instead "addresses performance related to the degree to which the planned outcomes are achieved" (Ritchie and Brindley, 2008: 254). In supply management, effectiveness targets can be set on, e.g., price and cost control, quality, supplier development, logistics, delivery reliability and inventory policy (Chao, Scheuing and Ruch, 1993; Van Weele, 2002). However, it is suggested (Young and Varble, 1997; Van Weele, 2002) that internal customer satisfaction

must be part of the evaluation of overall performance. Internal customer satisfaction covers personnel, procedures and policies, management and information systems. Thus, it can be concluded that the overall performance is constructed from the optimization of effectiveness, and efficiency, and internal customer satisfaction. These can be divided to the financial and non-financial measures as Gunasekaran, Patel and Tirtiroglu (2001) have suggested. The effectiveness measures are mostly financial having a clear monetary value in firm's accounting. The efficiency and internal customer satisfaction assessment utilizes more abstract evaluations which are difficult to express using monetary value. Figure 1 illustrates these elements of overall supply management performance.

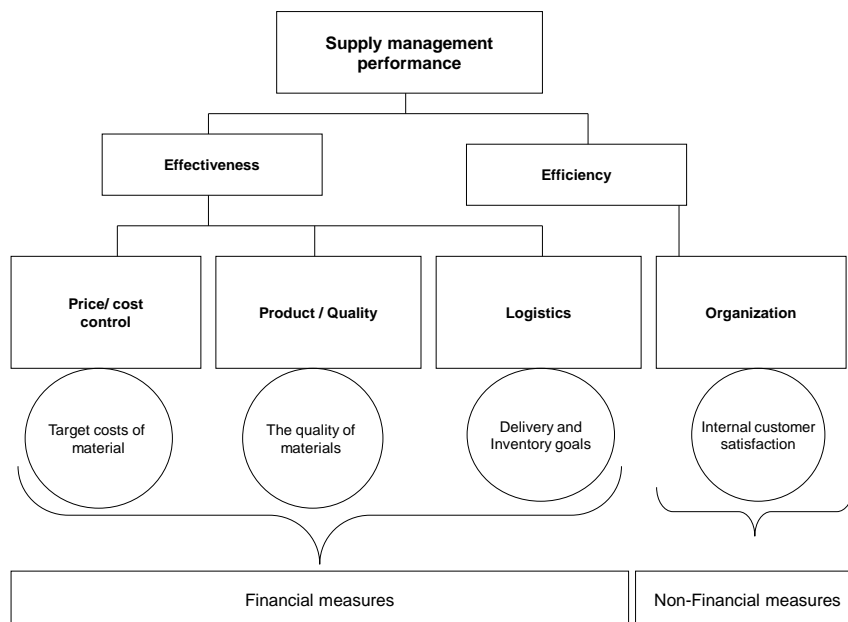


Figure 1: The elements of supply management performance (modified from Van Weele, 2002).

In previous studies the supply management performance construct has included measures of the quality of purchased material, on-time delivery, actual cost compared to target cost of materials, level of achievement of inventory goals and internal customer satisfaction (Hemsworth, Sanchez-Rodriguez and Bidgood, 2005; Sanchez-Rodriguez, Hemsworth and Martinez-Lorente, 2005). Similarly, in this study respondents were asked to evaluate the monitoring level of these performance indicators. It was assumed that careful performance monitoring represents coordinated performance management in a firm. The more the supply management professionals are aware of the performance outcomes and the forces that influence supply management performance, the more thorough performance monitoring is.

SRM CAPABILITY

The concept of capability is one of the basic elements of the resource-based view (RBV). The RBV (Penrose, 1959; Wernerfelt, 1984) explains that the firm's competitive advantage comes from unique and valuable resources, which are specific physical, human and organizational assets that can be used to implement value-creating strategies. Makadok (2001) has defined capabilities to be the firm's capacity to deploy resources by using organizational processes to achieve their goals. Moreover, Helfat and Peteraf (2003) state that capability is the firm's ability to perform coordinated tasks by utilizing organizational resources to achieve the desired results.

In the supply management literature, capabilities are defined in various ways, and the terms *knowledge*, *skills*, *competences* and *capabilities* are used interchangeably. Individual skills and knowledge referring to supply management have been widely researched. In most cases, supply management skills are viewed as personal traits (Giunipero and Percy, 2000; Faes; Knight and Matthyssens, 2001) and technical knowledge (Carr and Smeltzer, 2000). Das and Narasimhan (2000) separate supply management competence and practices. They argue that practices are internal observable activities that can be measured, and competence is a latent capability to structure, develop and manage the supply base in alignment with the firm's business priorities. Furthermore, Narasimhan, Jayaram and Carter (2001) and Knight, Harland, Walker and Sutton (2005) point out that the key content elements of capability, in addition to individual skills, include buyer-seller relationship management, network understanding, developing the network position, and strategy formulation and implementation.

In this paper, by combining the views of Makadok (2001) and Helfat and Peteraf (2003), the capability of supplier relationship management is defined to be the *organization's capacity and ability* to manage its suppliers and conduct its internal tasks and responsibilities related to supplier relations in order to achieve the desired results. Several studies and the resource-based view of the firm have suggested that the firm's capability to exploit its resources has a positive impact on firm performance. Moreover, it is shown that strategic supply management influences the firm's financial performance positively (Carr and Smeltzer, 2000).

Tracey, Lim and Vonderembse (2005) have tested empirically how supply chain capabilities affect business performance. Their study suggested that there are specific supply chain capabilities which take place before the production process, and other capabilities which are more invisible for end-customers aiming at customer satisfaction. Moreover, they found that capabilities have a positive effect on performance. Consequently, it is assumed that SRM capability has a positive relationship with the performance management, where financial and non-financial measures are used. Thus, the following hypotheses are established:

- H₁: SRM capability has a positive relationship with non-financial performance measures of supply management and,
- H₂: SRM capability has a positive relationship with financial performance measures of supply management.

Because it is possible that older and larger firms may have more standardized procedures which may have impact on the performance monitoring these factors need to be examined. Moreover, larger firms and those with longer experience may have better information distribution and established routines for utilizing knowledge effectively (Lumpkin and Dess, 1996). Thus, in order to exclude possible firm-specific and external factors that could affect the results of the study, it is hypothesized:

- H_{1b}: The firm's age and size do not influence non-financial performance measurement of supply management and,
 H_{2b}: The firm's age and size do not influence financial performance measurement of supply management.

Figure 2 presents the overall testing model, hypotheses and items included to the model.

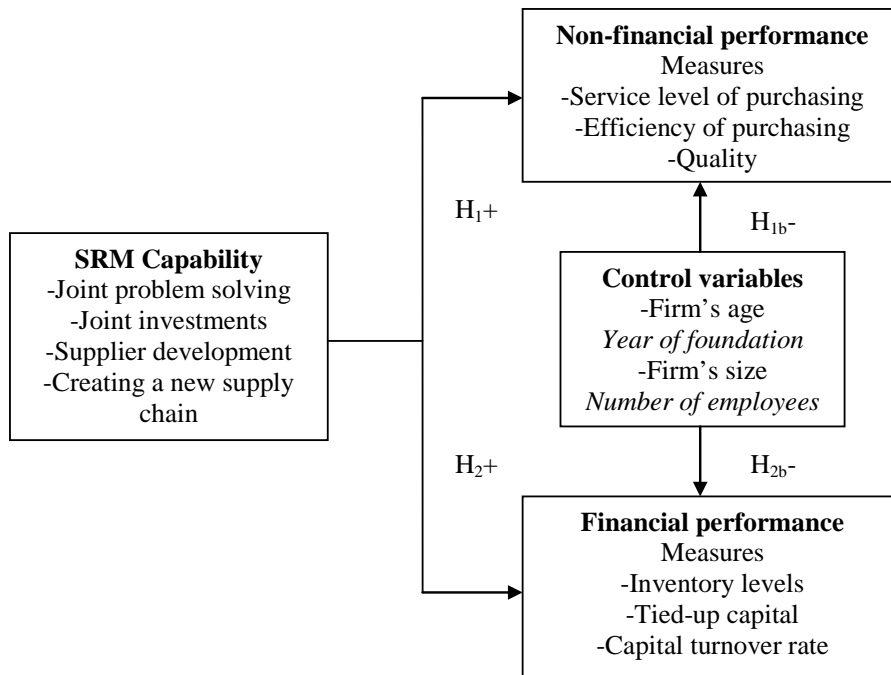


Figure 2: The testing model

METHODOLOGY

The focus in this study was to explore if the SRM capability has a positive relationship with supply management performance monitoring. To test empirically if these elements suggested in the literature exist, survey data and quantitative methods were applied. The survey data was collected in 2005 during a research

project which explored the current state of purchasing and supply management in Finland and the biggest challenges of supply management in Finnish large companies. It was a part of the large nationwide EGLO – Enhancing Global Logistics project financed by the Finnish Ministry of Transport and Communications, The Finnish Association of Logistics, and by two case companies. The initial population of the survey consisted of large Finnish companies with a minimum turnover of 50 million euros. All industry categories were included in the population. A total of 612 companies were identified from the company register of Statistics Finland. Of these, 570 were found eligible to answer the questionnaire. The questionnaire was addressed to the responsible managers with purchasing and supply management, and the general executives from the top management, in order to collect as extensive and accurate data as possible. A total of 100 responses were received, the response rate being 17.5% (100/570). The non-response bias was assessed by comparing early and late respondents, following the suggestions of Armstrong and Overton (1977). No evidence of non-response bias between the respondents and non-respondents was found.

Description of the Sample and Survey Instrument

On average, the turnover of the respondent companies was 322.8 million euros in the year 2003. Half of the respondent firms (51%) had been established before the year 1975, the oldest being nearly 200 years old. The majority of the companies, namely 47%, had less than 500 full-time employees and 23% more than 1,000. From the respondent companies 12% represented trade, 6% information technology industries, 17% the chemical industry, 9% the energy industry, 14% construction, 21% metal and machinery, 10% traffic and services, and 11% the forest and other industries. Most of the respondents had global or international operations. From the respondents 63% had global or EU region as the main market and only 4 cases pursued solely domestic buying. Table 1 shows the basic information from the respondent companies.

Table 1: Basic information from the respondent companies

Descriptives (N = 100)	Mean	Median	Std. Dev.	Minimum	Maximum
Turnover in 2003 (million €)	323	129	1194	10	11392
Year of foundation	1959	1972	44	1818	2002
Number of staff in 2003	1162	513	2198	2	13700

Most of the respondents were general executives from the top management and responsible directors in purchasing and supply management. Of them, 76% worked in the duties of supply management. Over half of them had more than five years of experience in their present assignment. This indicates that the respondents should have fairly good insights into the challenges and capabilities of supply management. The respondent profile is presented in Table 2.

Table 2: The respondent profile

Respondent profile		Frequency	Valid %
Experience in present assignment in years	0.00–4.99	47	47
	5.00–9.99	27	27
	10.00–14.99	8	8
	≥ 15.00	17	17
Full-time job description	Sourcing	73	76
	Other	23	24
The level of education	University	46	46
	Polytechnic	18	18
	College	35	35
	Other	1	1

The survey instrument comprised four interrelated parts: organizational status of supply management, supply management performance measures and indicators, use of information technology, and capabilities of supply management. Due to the broad coverage of the topics, the questionnaire was sixteen pages long. For the purposes of this study only the selected items of the questionnaire were used.

Missing values and Measurement Items

Checking the raw data revealed some missing values ($N = 93-96$), and therefore, the missing value analysis of SPSS was run. The Little's MCAR test showed non significant change ($\text{Sig.} = 0.106$), which means that the missing values were missing completely at random. In such a case, all methods to replace the missing data are applicable, because no potential bias exists in the patterns of the missing data (Hair, Anderson, Tatham and Black, 1998). Thus, the missing values were replaced with the Expectation maximization (EM) method (Little and Rubin, 1987; Olinsky, Chen and Harlow, 2003).

The SRM capability scale was partly based on to the studies of Das and Narasimhan (2000) and further developed by the authors. The performance measurement scales were based mainly on the studies of Hemsworth et al. (2005) and Sanchez-Rodriguez et al. (2005). The list of the statements summarized in Table 3. All the items were measured on a 5-point Likert scale. The firm age was measured in terms of the year of foundation, and size in terms of the number of employees. Logarithmic transformation was used in the regression analysis in order to normalize the variables and thereby satisfy regression assumptions (Cohen, Cohen, West and Aiken, 2003).

The divergent validity of the scales was ensured by performing the principal axis factoring (PAF) procedure with Varimax rotation. The Keiser-Meyer-Olkin (KMO) measure of sampling adequacy resulted in a value of 0.798. The Bartlett's Test of Sphericity ($p < 0.001$) for the overall significance of all correlations within a correlation matrix indicated a sufficient quality of the PAF. The results suggested three factors, SRM capability, supply management internal customer satisfaction

and financial performance, as expected. The reliability of the measures was ensured by checking the values of Cronbach's α , which were all on an acceptable level being 0.81, 0.71 and 0.91. Table 3 presents the means and loadings of all the items and scale reliabilities.

Table 3: Scale items, loadings and scale reliabilities

Items	Mean	Std. Dev.	Loadings	α
<i>SRM capability</i>	3.26	0.63		0.81
Joint problem solving	3.52	0.82	0.83	
Joint investments	2.27	0.96	0.65	
Supplier development	3.09	0.85	0.63	
Creating a new supply chain	2.78	0.83	0.60	
Supply market research	2.68	0.83	0.54	
<i>Non-financial performance of supply management</i>	4.10	0.64		0.71
Service level of purchasing	3.91	0.82	0.91	
Cost effectiveness of purchasing	4.16	0.90	0.81	
Quality	4.22	0.72	0.80	
<i>Financial performance of supply management</i>	3.74	1.06		0.91
Inventory levels	3.68	1.10	0.65	
Tied-up capital	3.85	1.13	0.55	
Capital turnover rate	3.70	1.21	0.55	

Testing and Analysis

Hierarchical multiple regression analysis was used in the examination of the effects. The H_1 and H_{1b} were tested in the first phase. Testing was conducted in two steps: first, only the control variables were entered and then the effects of the verified factors were tested with the control variables of firm size and age. The same procedure was repeated when testing the H_2 and H_{2b} . Correlations between the variables are presented in Table 4.

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, multicollinearity and homoscedasticity. The values of the variable inflation factor (VIF) scores and Condition indices were examined in order to test for multicollinearity. All the VIF values were within acceptable bounds, the greatest being 1.016 which was clearly less than the suggestions of acceptability put forward by Hair et al. (1998) and Cohen et al. (2003). The Condition index reached a value of 17 being less than 30 – the rule of thumb (Cohen et al., 2003). Thus, multicollinearity was not a problem. The examination of the residuals and scatter plots showed that heteroscedasticity in the regression was not a problem. The normality of the variables was estimated graphically. As no violations of the assumptions in the regression analysis were found, it could be concluded that the tests were performed successfully.

Table 4: Correlations of the variables

Item	Mean (Std.dev.)	1	2	3	4	5
1. Non-financial performance of supply management	4.10 (0.643)	1.000				
2. Financial performance of supply management	3.74 (1.058)	0.495*	1.000			
3. SRM capability	3.26 (0.625)	0.437*	0.271*	1.000		
4. Firm's age	3.11 (1.334)	0.005	0.042	-0.026	1.000	
5. Firm's size	6.21 (1.350)	-0.191	-0.172	-0.014	0.123	1.000

Notes: * $p < 0.01$

Testing the hypotheses revealed that the control variables did not have a significant influence in the model, but entering the hypothesized variables produced significantly positive effects in both cases. In H_1 it was assumed that SRM capability has a positive relationship with monitoring non-financial performance measures of supply management. The test showed a positive and statistically significant correlation ($R^2 = 0.20$, t-value 4.282, $p < 0.01$). Hypothesis H_{1b} suggested that the firm's age and size do not influence non-financial performance measurement of supply management. The correlation was slightly positive, but not significant. Thus, the hypotheses H_1 and H_{1b} were supported. According to hypothesis H_2 , it was assumed that SRM capability has a positive relationship with monitoring financial performance measures of supply management. In this case, the explanation power of SRM capability in the model was only 7% ($R^2 = 0.07$, t-value 2.477, $p < 0.05$) but still significantly positive on level $p < 0.05$. Hypothesis H_{2b} suggested that the firm's age and size do not influence financial performance measurement of supply management. The correlation was positive, but not significant. Thus, the empirical findings supported all the hypotheses.

The explanation power of SRM capability was clearly stronger (20%) when monitoring of the non-financial performance than in case of monitoring financial performance (7%). This finding demonstrates that several other factors are involved in monitoring of financial performance, e.g. the requirements of accounting, financing and legislation whereas there are no formal needs to monitor non-financial performance. The results of the regression analyses are summarized in Table 5.

Table 5: Regression results

Variable	H_1			Variable	H_{1b}		
	Coefficients	SE	t-stat		Coefficients	SE	t-stat
Constant	3.14	0.48	6.573**	Constant	4.63	0.36	12.717**
Firm age	0.02	0.05	0.38	Firm age	0.14	0.06	0.25
Firm size	-0.09	0.05	-1.85	Firm size	-0.09	0.05	-1.71
SRM capability	0.45	0.10	4.282**				

Table 5 continues.....

H ₁				H _{1b}			
Variable	Coefficients	SE	t-stat	Variable	Coefficients	SE	t-stat
R ²	0.20			R ²	0.01		
F-statistic	7.31			F-statistic	1.47		
H ₂				H _{2b}			
Variable	Coefficients	SE	t-stat	Variable	Coefficients	SE	t-stat
Constant	2.94	0.85	3.478*	Constant	4.46	0.60	7.433**
Firm age	0.06	0.09	0.65	Firm age	0.05	0.09	0.57
Firm size	-0.14	0.09	-1.61	Firm size	-0.14	0.09	-1.59
SRM capability	0.46	0.19	2.477*				
R ²	0.07			R ²	0.01		
F-statistic	2.99			F-statistic	1.33		

Notes: * p<0.05. **p<0.01

DISCUSSION AND CONCLUSIONS

In this study the effects of SRM capability on supply management performance measurement were examined. Based on the previous studies and the resource-based view of the firm it was assumed that SRM capability has a positive effect on measuring and monitoring supply management performance. The performance measures were divided into non-financial measurements assessing supply management's internal service ability and into financial measurements evaluating supply management's monetary impact on the firm's overall results. In order to exclude possible firm-specific and external factors that could affect the results of the study firm's age and size were controlled and the hypotheses were established accordingly.

The achieved results supported previous findings in the field and confirmed that the capability has positive effects on measuring performance. The stronger the SRM capability is, the more thoroughly firms are monitoring and measuring their supply performance. This result is in line with the study of Tracey et al. (2005) indicating that capabilities related to supply management have impact on business performance. Moreover, it was found that the effect of capability was more powerful on non-financial measurement than on financial measurement. This indicate that the capability may increase management's ability to develop diversified performance measures, which in turn, can ease organizational integration and clarify the role of supply management in firm's strategic focus.

However, despite the multifaceted nature of supply management investments to heavy overall performance measurement systems (such as BCS) to measure supply performance could be unnecessary. On the contrary, couple of accurate and relevant measures could give more information from supply activities and performance. As

Wagner and Kaufman (2004), have appointed there might be difficulties in implications and during the use and maintenance of BCS. Hence, capability helps managers to keep the performance monitoring on an appropriate level.

In the light of these findings it is evident that the importance of performance measurement is well understood in large Finnish firms, however, the quality and usefulness of the existing supply performance indicators can vary considerably. The problem of balance between short-term price winnings and long-term reliable supplier relationships is still present. A bias towards short-term price winnings or long-term supplier relationships may depend on firm's top management interests and the significance of supply management for firm's competitiveness as well as lack of appropriate capabilities. It can be said that low capability limits the assessment of supply management performance among the other factors defined by Van Weele (2002).

The effect of capability was found to be stronger in case of monitoring non-financial measurements. It is obvious that the development of non-financial measures requires comprehensive view about the supply management and its connections to firm's overall business. However, when assessing internal customer satisfaction and quality of the supply management the impact of subjective assessment needs to be noticed when monitoring the results and using them as a basis of decision-making and feedback.

There are some limitations to this study that should be acknowledged. Firstly, it was conducted only in Finland. The results should therefore be set against country-specific and cultural factors, which were not taken into account. Thus, generalization of the results is limited, and more empirical research is needed. Furthermore, single respondents were used which may have led to a common respondent bias.

Future research could focus on to the examination of the control mechanisms of supplier management are and how the performance measurement can be linked in management and reward objectives. Moreover, there are still some unanswered questions which can be combined with the studies concerning control mechanisms, such as how to measure capability, how to find the gaps in capability and which elements of capability are most relevant in different contexts.

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