ANALYSIS OF THE IMPACT OF THE SUPPLY CHAIN PERFORMANCE ON THE OVERALL ORGANIZATIONAL PERFORMANCE

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Abstract: *One of the first questions which need to be addressed in empirical research on organizational performance is how to measure it. Different stakeholders might understand performance in their own terms so adequate measures of organizational performance have to balance different perspectives. Although financial measures of performance, in particular shareholders return, are recognized as most appropriate measures of firms' performance, the most employed measures of organizational performance are accounting indicators due to the availability of data. Drawing on existing empirical studies on organizational performance we have chosen to measure the organizational performance using one of the most prevalent accounting ratios – the return on sales (ROS). After presenting the multidimensionality of organizational performance and its specific in the context of a supply chain, this paper uses a Romanian dataset of firms to estimate the impact of different areas of performance in the context of a supply chain on the overall organizational performance. Analysis follows a balanced scorecards approach, identifying four areas of performances in the context of supply chains. Logistics costs and revenues measure the performance in a supply chain from a financial perspective. We have chosen customers' satisfaction, delivery dependability, speed and flexibility as the major coordinates of the marketing performance in the context of a supply chain. Standardization, simplification and structural adaptation define in our perspective the operational performance in the context of a supply chain and information management and internal communication accounts for the innovational performance, the last performance area defined by a balanced scorcard. Results show that financial, marketing and innovation do have a positive and statistically significant impact on the overall organizational performance. While all the estimated coefficients have the expected sign, not all the performance areas and metrics employed in the analysis are statistically significant. We appreciate that this research affords a better understanding of the performance areas that contribute to the increasing of organizational performance.*

Keywords: *supply chain management, supply chain performance*

JEL classification: M10, C54

1. Multidimensionality of organizational performance

Richard, Devinney, Yip and Johnson (2009) wrote a comprehensive reviews of the empirical studies on organizational performance published between 2005 and 2007 in top 5 US management journals (Academy of Management Journal - AMJ, Administrative Science Quarterly – ASQ, Journal of International Business Studies – JIBS, Journal of Management – JOM and Strategic Management Journal - SMJ). The review shows that the most employed measures of organizational performance are accounting and financial indicators and ratios. The accounting measures have

been the traditional mainstay of proxies for organizational performance in empirical research (Roberts and Dowling, 2002). Their prevalence is attributable to a documented statistical relationship between accounting performance and organizational performance. Yet there is agreement in the management literature on performance that economic and not accounting performance reflects the true organizational performance. Financial measures of performance, in particular shareholders return, are recognized as most appropriate measures of firms' performance. That is because such measures better incorporate intangible assets that in the case of accounting measures. In addition accounting measures of firms' performance are limited by the fact that they reflect past performance and consequently using them for forecasting future performance is limited. Yet using financial indicators as proxies for performance has in its turn strong limitations. Relying on the assumption that shareholders are the sole beneficiary of firms' rents reduces the dimensionality of firms' performance. Then, as financial literature points out, market valuation reflects not present performance but expectations about future performance. In other words changes in market prices are determined by information and not by fundamentals. Under market efficiency hypothesis we have a random walk phenomenon. We cannot use past information to predict future performance. Momentum (Glenn, Pettengilla, Edwards and Schmitt, 2006) also contributes to the week relationship between economic fundamentals and future organizational performance. Finally, financial indicators of firms' performance evaluate performance at organizational level as a whole, making impossible to disaggregate performance at product or strategic business unit's level due to synergies / cannibalization phenomena associated with interactions among units (Richard, Devinney, Yip and Johnson, 2009).

Mixed indicators (financial and accounting) are a third class of indicators used in measuring organizational performance. There is extensive literature on Economic Value Added (EVA). The key advantage of EVA is that this method accounts for the cost of capital, providing a better balance between risks and returns. Although considered a mixed indicator, EVA does targets solely the interests of shareholders. A better accounting for the multidimensionality of organizational performance is offered by the balanced scorecards. Most important BS is mapping not only financial performance and shareholders' outcomes but also marketing performance and innovation and consequently Balanced scorecards better account for the multidimensionality of firm's performance. Yet obviously employing Balanced Scorecards methodology to assess organizational performance is not appropriate in empirical estimation with one left hand side proxi variable for organizational performance. It follows that quantitative estimations of organizational performance cannot use balanced scorecards methodology – which is another reason for the prevalence of using accounting indicators as proxies for organizational performance.

2. Supply chain performance metrics

Defining a performance metrics in a supply chain requires: (i) choosing the areas where we measure performance and (ii) choosing the most appropriate measures of performance (Constangioara, 2013).

Turning to the issue of defining a relevant conceptual framework of approaching the performance metrics in supply chain, to account for the multidimensionality of performance in supply chains, the literature on supply chains proposes three

approaches to defining performance metrics and sub-metrics: (a) balanced scorecards, (b) differentiating between strategic, operational and tactical levels of SCM and (c) considering more closely the four major supply chain activities / processes: plan, source, make/assemble and deliver. Gunasekaran, Patel and McGaughey (2003) in their proposed framework for supply chain performance's measurement even consider a combination of approaches (b) and (c).
Regarding the most appropriate supply chain performance measures, the existing supply chain literature agrees that in empirical studies, accounting and financial indicators such as ROI or price/earnings are most often employed in estimations of performance. Yet using solely accounting / financial indicators limits the dimensionality of performance in the context of a supply chain. These considerations are discussed in detail in the literature on organizational performance and briefly mentioned in what fallows.
The literature on SCM extends the perspective of the literature on organizational performance towards supply chain context. All the considerations presented in the organizational performance literature are important in defining the areas where we measure performance and the most appropriate indicators that we choose to use.

3. Analysis of performance metrics in Romanian supply chains

3.1. Data
For the analysis of performance metrics in SCM, I am using a Romanian sample of 100 firms which were subject to a supply chain survey in 2011. Respondents were asked to evaluate different areas of performances in the context of Romanian supply chains. The 100 mailed questionnaires returned 26 usable responses. The 26% response rate is similar to response rate reported in supply chain empirical studies. The working dataset comprises enterprises representative of the overall structure of Romanian economy. Most enterprises form the working dataset are from the manufacturing sector (11) followed by commerce (5) and other services (10). Final sample size is sufficient for adequate quantitative estimation.

3.2. Methodology
There are many empirical studies focusing on performance metrics in the context of a supply chain. The methodology proposed by them first checks for the dimensionality of the scales employed in the analysis, by means of a principal component analysis. The principal component is a mathematical procedure that uses an orthogonal transformation to convert a set of correlated variables into a set of values of uncorrelated variables called principal components. Thereby this analysis results in set independent principal components. However the assumption needed here is that the dataset is jointly normally distributed and results are very sensitive to relative scaling of original variables (Wagner and Neshat, 2012). For business analysis and management policies development, the principal component analysis is important because identifies how much each factor contributes to the total variability of data. After the preliminary analysis of the scales employed for collecting data, Gunasekaran, Patel and McGaughey (2003) propose an approach similar to Pareto analysis for analysing the performance metrics in the context of supply chains. They establish the importance of the performance measures used in the supply chain context by calculating the means of all responses and ranking them.

Ranks are then converted to relative percentages. Nevertheless, most of the empirical works use regression to estimate the partial effect of different performance measures on the overall performance.
Comparing the two, it is obvious that Gunasekaran, Patel and McGaughey (2003) approach is easier to interpret but lacks the statistical significance interpretation. The regression approach is grounded in quantitative methods employed in business but, although provides an ordering of factors, results are less intuitive than the relative percentages offered by the approach of Gunasekaran, Patel and McGaughey (2003).
For the purpose of my empirical research I propose using econometric estimation of impact of performance in the context of supply chain on the overall organizational performance. Furthermore, my analysis employs a balanced scorecards methodology for defining the performance areas in a supply chain context. Thus I had only four areas of performance. The variables used in the analysis and the corresponding area of supply chain performance are presented in table 1.

Table 1: Performance metrics used in the analysis

Variable	Label	Performance area
costs		Financial
Revenues		
Customers satisfaction		Marketing
Delivery dependability		
Delivery speed		
Delivery flexibility		
Standardization		Operations
Simplification		
Structural adaptation		
Information management		Innovation
Internal communication		

Table 1 show that we have employed two variables for measuring financial performance in the context of a supply chain (logistics costs and revenues), four variables to account for marketing performance (customers satisfaction, delivery dependability, speed and flexibility), three for operational performance (standardization, simplification and structural adaptation) and two for measuring the innovational performance (information management and internal communication).
The independent variables are all dichotomous, taking value one for improved performance and zero otherwise. The dependent variable is dichotomous, with value one corresponding to an increase in ROS over a two years period (2009 to 2010) and zero otherwise.

3.3. Results

SPSS statistical package was used for estimation purposes. Results are presented in table 2.

Table 2: Estimation results

Variable	Coefficient (β)	p-values
costs	0.21	<0.001
Revenues	0.06	0.08
Customers satisfaction	0.17	<0.001
Delivery dependability	0.15	<0.001
Delivery speed	0.19	<0.001
Delivery flexibility	0.17	<0.001
Standardization	0.04	0.065
Simplification	0.07	0.011
Structural adaptation	0.11	0.09
Information management	0.23	<0.001
Internal communication	0.15	0.24

Table 2 shows that all estimates have the expected sign. However not all of them are statistically significant. In particular indicators measuring marketing performance are all statistically significant, with p – values less than 0.001. This documents the important contribution that marketing performance in the context of a supply chains plays in achieving the overall organizational performance. We see that the odds of increased organizational performance are 21% higher for firms that have increased their delivery speed over the investigated period. In comparison the odds are lower for delivery flexibility (19%) and dependability (16%).

Financial performance also influences the overall organizational performance. We see that reducing costs over the investigated period has increased the odds of increasing organizational performance by 21%. Yet the contribution of sales to organizational performance is not statistically significant at p – values less the 5% (p=8%).

Operational performance contributes to organizational performance to a lesser degree. We see that none of the estimates corresponding to indicators measuring operational performance is statistically significant.

Finally we see that innovation is important for organizational performance. Information management has the greatest overall impact on organizational performance. Improving information management is fount to increase the odds of greater organizational performance by 25%.

Concluding remarks

Although it is generally accepted that there has been a shift from treating accounting and financial measures of performance as the 'foundation of performance to treating them as one among a broader set of measures' (Gunasekaran and McGaughey, 2003), in empirical studies published in the most prestigious management journals, financial indicators continue to remain the most prevalent measure of organizational performance (Richard, Devinney, Yip and Johnson, 2009). This is why we have

chosen to employ accounting indicators as dependent variables in our quantitative estimation of the impact of supply chain performance on organizational performance. Our results document the important contribution that marketing performance in the context of a supply chains plays in achieving the overall organizational performance. Results also show that financial and innovation performances are also positively impacting the overall organizational performance. Information management has the greatest overall impact on organizational performance. Nevertheless the structural adaptation and internal communication do not have a statistically significant impact on organizational performance. We appreciate that our findings contribute to a better understanding of the impact of different areas of performance in the supply chains have on the overall organizational performance. This study offers Romanian managers a guideline to focus their efforts on those performance areas in the supply chains with most important impact on organizational performance.

As a limitation of this research we mention that estimating the impact of supply chain management on organizational perspective could benefit from a more detailed analysis of the performance in supply chains. Consequently we propose that future research should employ performance metrics relevant for every logistics process in the context of a supply chain. Furthermore, we propose that future research should measure the impact of logistics performance on all supply chain participants.

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