SUPPLY CHAIN MANAGEMENT AND PERFORMANCE: FRAMEWORK FOR STRATEGIC DECISION MAKING

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Abstract: *Fast paced technological innovation in the 21st century is continuously transforming the complex world of logistics, a performant strategy in the supply chain (SC) becoming a competitive advantage that all manufacturers strive to improve. Decision making to ensure the expected outcome is relying heavily on the SC with its associated partnerships and drivers. Customer service evolves at the same pace with technological innovation and it is backed up by qualitative and innovative SC processes, transferring the most important order winner criteria from the product itself to the product cycle from forecast to delivery. Manufacturers have to consider that integrating customers' needs in the design of their supply chain strategy (SCS) is going to become an order qualifier, rather than an order winner criterion. Internal and external integration foster progress and development in the organizational and financial performance of the company. This implies not only a financial investment in the subsequent infrastructure but also a tailored strategy that employs advantages derived from supply chain integration (SCI). The present paper proposes a structured framework that middle and top management can use to identify synergies for integration opportunities, exploitable competitive advantages and markers for improving decision making affected by and affecting financial performance. Supply chain management (SCM) strategy can be viewed as a revolving concept as it can be both a driver of performance as well as a consequence of performance. The first concept is at the centre of the paper as the authors strive to create a framework of operational and strategic factors that foster performance, assuming that levels of performance can conversely steer SCM strategies. Operational strategies, supply chain integration, management and strategies are leading the research field in the attempt to interlink SC and performance, mainly due to a surge in the attention paid to the connection and synergies in between.*

Keywords: *Supply Chain Management; Performance; Supply Chain Integration.*

JEL Classification: *L25; M11.*

1. Introduction

The evolution from Henry Ford's 20th century redesign of operations in the SC to the 21st century focalization on a customer driven change in the design of SCs has been a giant leap in the field. After having in place the technological progress that ensures productivity, even for the most innovative and rapid changing industries, SC professionals have been pushed towards the current global trend of customer oriented businesses. Therefore, most factors associated to having in place a productive and efficient SC structure when transforming raw material into a finite product have become order qualifiers rather than order winners. Companies such as Amazon or Zappos, globally known for their logistics success stories, have clearly

identified the untapped resource of SCM and their success is more often than not explained by their customer oriented business strategies. In order to achieve customer integration in their SC operations and strategy, companies must have a properly designed framework, accounting for perspectives of process, resource allocation, customer service or cost to name only a few, which is compatible with the long term strategy of top management.

The authors address in the present paper the issues arising when developing a framework for linking SC factors to financial performance of a company. Starting from a vast collection of most relevant publishing in the field, the authors propose in their case study a SCM framework that has potential for further testing and empiric validation. From the review of a comprehensive segment of literature directed towards SCM strategies, we have established as the cornerstone of our research the interconnected and integrated approach. In other words, SCI is the fundamental approach to our case study, aiming to create a synergetic framework interlinking the logistics factors and measurements that we build our model upon.

It is unanimously agreed upon in the literature reviewed that it is out of date to assess stand-alone factors of the SC when current degree of integration in the processes and participants clearly point towards a multi-level, cohesive structure. As a result, researches that have assessed the relationship of performance and singular SC factors have been frequently employed as part of an incorporated model for questionnaires, regressions or meta-analyses. Due to such outputs becoming available, the research field can devote effort to constructing adaptable frameworks that can be employed by SC mangers and top managers in developing the company's strategy.

Given the differences across countries' industrial development, industries specificities, approaches to management and choice of lean and agile supply chain strategies (SCS) the presented framework intends to be an easily adaptable tool that can be employed in a wide array of scenarios. In addition to this, the compiled framework includes both directly and indirectly measurable logistics factors that could be performance drivers. Especially when discussing non-quantifiable factors derived from integration, being difficult to assign a financial value or assess impact on performance, the authors choose to include such factors as intermediate measurements could ensue.

The interest dedicated to the liaison between SCM and financial performance, mediated by SCI and SCS, has been thoroughly investigated in the literature as a consensus from the perspective that SCM impacts performance and few studies has looked at it conversely. The present framework also identifies how performance can drive strategy in the SC, as it becomes more apparent for researchers that the current levels of performance may be at the forefront of decision making. To give a short but revealing example, companies highly performant from a financial point of view, have a better prerequisite for enhancing SCI as more resources are available and can be directed in this direction which is not an immediately gratifying return on investment. Opposite, companies short of financial resources, are reluctant to back up in their decision making process initiatives that do not show a direct financial benefit, direct or indirect.

The distinct value added this paper brings is the output of an integrated framework of SC factors that allows for a better assessment of impact on financial performance and, consequently, for developing more efficient SCM strategies. The relevance of the paper lies both in the field of logistics and finance, as most factors and

infrastructure necessary for putting such SC framework into place impacts the monetary resources' flow of the company. On one hand, logistics wise it offers knowledge that can support an enterprise from establishing a Key Performance Indicators structure and measurements to reporting the results and employing them in the development of management strategies. On the other hand, financiers of the company benefit from a 'translated' glimpse into the resources allocated and can make informed decisions for future contracts, benchmarks settings and budgeting.
The remainder of the paper is structured into two sections, literature review and case study, followed by conclusions of our research and the list of bibliographic references.

2. Literature review

The authors pursue in this chapter the goal of enlisting the present knowledge and most noteworthy contributions from the research field and identifying the potential for contributing valuably to the literature. We can split our literature review into two major segments, namely the studies that focus on the wide array of SC strategies and those that attempt to conceptualize and validate empirically the relationship between SCM factors and performance. Inspired by the idea of "choice architecture" put forward by Thaler R. and Sunstein C. (2009), we believe that in order for a performance evaluation based on SC elements to work, it is a prerequisite to have the appropriate design of tools. Starting from fundamental processes in the SC (e.g. production, inventory, order management etc.) to the top management view upon the SC strategies (e.g. balanced scorecard, SCOR model, management reports etc.), the design is a differentiating factor (e.g. for firm size, industry, business model, etc.). We believe that the custom architecture of SC frameworks – internal, supplier and customer oriented – yields a great potential contribution as an order winner criteria.
Research of Qi et al. (2017) focuses on the concept of integration in the SC, including strategic perspectives on operations and management, thus implying a full flow of the SCM with synergies, influencers and outcomes. The questionnaire methodology tests six hypotheses based on the theory of organizational capabilities, lean and agile operational strategies (OS), results showing the fitness of OSs in relation to firm goals and priorities. While leanness is adopted by cost driven firms prioritizing quality of product and its delivery, agile SCs are fit for flexible companies, whose adaptability to the requirements of the market is an order qualifier. SCI is an essential part of OS as both internal and external integration are drivers of performance and the market requirements show a tendency to better reward companies whose SC is designed best to keep up with product characteristics and customer service standards. The conclusions derived from the extensive literature analysed and the results of the applied questionnaire support the proposed flow: SC integration affects the design and output of OSs; further, OSs are a major influencer of SC strategies through organizational capabilities and subsequent decision-making; and last but not least, the corroboration of OS and SCS impacts performance measurements ranging from market share to cost and revenue indicators.
Qi et al. (2017) refer to developing economies as a potential niche for studying an atypical array of operational practices and strategies in the SC, as technological and managerial practices are relatively underdeveloped. The authors' study, using Chinese data, is developed under the assumption of an emerging market although

one may argue that recent progress shown both in the research field and production capabilities of China places it at the forefront of SCM evolution. Marinagi, Trivellas and Reklitis (2014) demonstrated the important role of sharing qualitative information in increasing performance by studying 61 Greek manufacturing companies. The premise is that information in SCM (inventory, cost, capital etc.) supports a strategic partnership with logistics suppliers and contributes to increasing LARG attributes of the SC. Therefore, we may consider the fact that a European emerging market can be positioned much behind China in the assessment of the potential to exploit SCM output of information and data.

An essential outlook of the SC is conceptualized by Beaumont, N. (2005) around the idea of a multi-level integrated process from raw material to the distribution of the finished product, which includes processes pertaining to manufacturers, suppliers, distributors and clients. All levels are exerting a certain degree of impact on a diversified array of financial performance indicators. The fairly restrained (data wise) case study in the paper of Frohlich and Westbrook (2001) has demonstrated that an increase in the degree of integration of this multi-level set up positively influences the evolution of such indicators. Considering the pertinence of the model employed and the well-rounded hypothesis, the paper can be undoubtedly classified as a starting point for future research. The meta-analysis of Chang et al. (2015) attempts to correlate SCI and degrees of intermediate (operational, relational and strategic) and financial performance of the company. The study eliminates selection bias in its collected data and accounts for generally neglected factors such as relationship quality and national culture considered in SCI context. The intermediate levels of performance ensure a better insight into the conclusion of SCI impact on financial performance. While results of the analysis prove that 'SCI enhances financial performance', the authors clarify that this is not a straight flow and mediate deviations through the intermediate performance levels. Therefore, although SCI can generate costs that do not contribute directly to return (e.g. supplier integration contributes to service level but negatively impacts cost) the authors show how attributing the gains from integration to intermediate targets of performance can 'generate superior customer value positional advantage'.

Findings of Ataseven and Nair (2017) place SCI at the core of a performant SC as a multitude of SCI and performance measurements are put together from the most relevant literature to date. The value added of the meta-analysis conducted consists, from a resource point of view, in putting together studies that have either singular or multiple measurements of SCI and performance for testing several hypotheses, with a larger degree of significance in the output. The authors gather in their study a vast theoretical background that establishes the conditions and implications of integration in the SC, proposing 7 hypotheses related to both internal and external integration. This paper incorporates the idea of an intermediate dimension positing cost, quality, delivery and flexibility as transitional dimensions to operational performance. In addition, it includes as well the unfixed and specific factors that favour integration in the first place: 'information sharing, collaboration in the design of processes and products, joint decision-making and coordination'. The results of the study demonstrate that supplier integration yields the widest impact on performance, followed by customer and internal integration. Importantly, the authors advise investing first and foremost in the internal infrastructure of SC integration as an internal clarification of processes and expected outcomes of strategies should be set first within the SC of the company.

Li et al (2006) examined the impact of SC factors on the overall performance of an organization and implied in their research a measurement for the degree to which they can be considered a competitive advantage. The factors that the study takes into account are, as follows: 'strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing and postponement'. Organizational performance – a concept that includes a wide array of financial and market criteria (for example: market share, returns on investments or profitability) – and competitive advantage are both supported with empirical results. The authors' research has brought forward proof that the efficiency with which an enterprise forms strategic partnerships with its logistics suppliers and postponement are contributing most to generating a competitive advantage. A strategic approach considering these two factors can make a company surpass its competitors in terms of costs, flexibility, quality and time advantages.

Boonjing, Chanvarasuth and Lertwongsatien (2015) have centred their research on the purpose of revealing the potential relationship between eleven SC components and companies' performance. The authors classify these analysed components and the output is a set of details revealing the top five components, in terms of impact on performance, targeting the goal of formulating a theory that explains how they exert a positive influence on performance. The study accounts for the data of 241 companies, from five different production sectors. Such diversity which brings to attention a series of relevant factors that are oriented both towards financial and strategic goals, thus proving that qualitative measurements can exert similar influence as quantitative ones. The limitation of the study lies in the exclusion of SC variables accounting for the production process and movement patterns – industry or even product specific variables – which constitute a key point in having a flexible, adaptive and agile SC.

Maropoulos et al (2008) have acknowledged the evolution of performance from a purely deterministic cost measurements to an 'assessment of multilevel criteria at a global basis'. The paper includes a wide array of instruments and means to assess performance in the SC, with detailed attention towards measurements of impact of externalized processes. The proposed evaluation process therefore derives from SCM with definition of strategy and objectives, which are further translated into constructing the Key Performance Indicators system. An evaluation of results translates into reporting targeting process owners and decisions of strategy and objectives can be affected consequently.

Wagner S. et al (2012) have compiled a comprehensive literature review and case study with the purpose of reaching empirical proof that SC fit has a positive impact on financial performance of the enterprise. The authors define SC fit as 'the perfect strategic consistency between a product's supply and demand characteristics'. Significant contributions of the paper are the recognition of the importance of targeting financial performance measurements perceptible from SC perspective, the fact that the developed model includes the competitive priorities from which SC trade-offs originate (cost, quality, delivery and flexibility) and it controls several structural variables (such as country, firm age and size, industry effects etc.). Nevertheless, the data sample is insufficient and the variables' causality is mainly unconfirmed which leaves an unfulfilled potential for a more comprehensive and dynamic research to be carried out.

3. Framework

This section proposes, based on knowledge gathered from literature and practical examples from successful companies, a framework for interconnecting SCM factors and performance, focusing on both financial performance and SC performance. Starting from levels of SCI, we propose the most significant factors of impact, relevant SCM and steps in creating and updating business strategy in respect to SC. Indisputably, such a broad framework is not a custom-made model and businesses should adapt qualitative and quantitative influence factors to its specificities (e.g. national, industry, corporate culture etc.) in order to achieve the best outcome. We have selected as a starting point the three levels of SCI because we have considered the distinct value added brought by each of them to be the most suitable differentiator for the subsequent impact factors. Placing internal integration first is backed up by literature with the straightforward argument that a company cannot be supplier or customer oriented integration without starting from its own process map and SC design. Integrating an external party requires an established internal structure thus ensuring that choice of partner and customer offer is fit to SC capabilities.

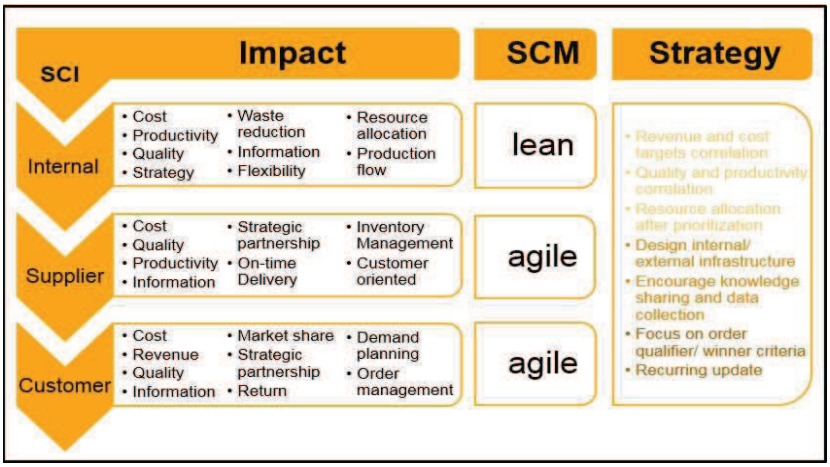

Figure 1: Framework for strategic decision-making

Moreover, SCM strategies – lean and agile – are correlated with SCI and impact factors and authors recognize that with a well-rounded strategy the two of them could intertwine. Lean strategies are fuelled, as Maropoulos et al (2008) acknowledged in their research, by 'new performance evaluation matrices based on key criteria of cost – quality – delivery' which are a direct outcome of customers and suppliers sharing information with the company. Agile SC rely just as heavily on input from suppliers and customers as it is the main guidance in having a rapid and on point response to change. 'Leagility' is frequently met in recent literature as a concept abridging the lean and agile strategies with a company being prepared to switch between the two as needs are signalled from suppliers and customers. Maropoulos et al (2008) assess that a constant interchange of lean and agile production is 'the best way to provide products of value to the customer, at a globally competitive cost, within a flexible supply chain'.

Internal integration is the cornerstone of SCI and it's the most accessible one in terms of design, implementation and resources involved as it implies change within the company, without direct implication of external stakeholders. Although indirectly, internal integration has consequences on suppliers and customers, on the long term such efforts are most likely to bring improvements to the relationship with these stakeholders. A lean SC implies vast efforts and experience with internal integration since it requires clearly defined processes and optimized production flow. Thus, the implications of cost, resource allocation and waste reduction are at the centre of the management efforts. Product quality is standardized and implications of flexibility may bring difficulties since adaptability to new processes and volatilities in demand are harder to process for lean SCs. In a way, if we look at quality and production flow as the core effort, it would mean that cost, resource allocation and waste reductions could have differently set targets, transforming the SC into a 'leagile' one. As a result, strategy in internal integration can have a major impact on the ability of the company to process market volatility and customer demand changes.

Supplier integration may or may not be formally formulated by the company but, in our opinion, it is unavoidable. Regardless of the place of the supplier in the SC process (e.g. from raw materials supplier to delivery services supplier) all companies set up their relationships with suppliers so that performance and cost efficiency can be measured. Getting past these usually contractual terms of the relationship, an additional step in supplier integration would focus on actively involving the supplier in the areas of internal SC flow that can be directly affected by its actions. For example, a company can actively collaborate with its raw materials supplier in reaching a stable and efficient inventory management or collaborate with its delivery service supplier to ensure that the image of the company is properly represented to the customers. Such management and marketing efforts can be easily quantifiable if the partners collect data and provide constructive and valuable feedback.

Supplier integration is compatible to an agile SC as the partnership is most valuable as an active feed of updated information, as well as a back-up of efforts in continuously changing business landscapes. Given the fact that substantial knowledge rests on both sides of this partnership, an agile SC inquires constant updates that allow the company to face changes. Strategic partnership implies not only a long term maintenance of the contract, but also the selection and growth of the relationship in a sustainable way. As we previously mentioned, if efforts of supplier integration come after setting up internal integration, it is easier for the company to formulate a list of requirements and differentiators that it looks for in a logistics partner.

Customer integration completes our matrix and closes the gap between what and how the company plans to deliver its product and what it is expected from the product and its delivery. Correlation of cost and revenue is majorly affected by customer integration as it gives the company an insight into a clear, constantly updated information of the requests for its product becoming the order winner. Agile SCs draw their flexibility from timely collected information on what is the expected change in order to qualify for or lead the market. Regardless of the level of interaction with the customer, from a SC perspective, a company should target a process design that states what are the information, feedback and indicators that it wants to follow.

As a result, processes at the top of the SC flow – such as demand planning and order management – can be better estimated and fulfilled. A real-time feedback on the quality of the product is the most valuable source of information and customer

service can be set up to fit best to the expectations of the customer and be prepared to deal with a wide array of potential scenarios. As a consequence, reverse logistics – dealing with returns for all reasons (e.g. quality, late delivery etc.) – becomes a stable process with the status of a service offered by the company, rather than mediator of a wrongdoing. Forging a strategic partnership with customers is most often than not separated from SC, as it is usually seen as a marketing and branding effort. Nevertheless, the information and knowledge that SC can draw from this relationship should encourage management to connect the two with a better infrastructure and clearly set targets.

After considering the broader context created by SCI, SCM and the aspects exerting most significant influence, the authors have listed seven directions for updating and designing corporate strategy. Correlating cost and resources inquires that the company's strategy does not treat separately the impact factors and therefore it can be assessed which one exerts most influence. A balanced long term strategy can establish periods when cost dominates the strategy and when revenue is the driver of decisions. If the factors affecting the two are not treated independently, the risk of neglecting one of these two targets is greatly reduced. Correlating quality and productivity yields the same benefits as the first strategic direction, if the company focuses on their intermediate drivers. A 'leagile' SC has the capacity to oscillate between the targets of quality and productivity and reach an output that satisfies the needs of the customer. Resource allocation is a strategic direction that uses the input from the first two to make the best decisions for the status quo and prepare for the long term expectations. Designing the infrastructure for SCI consumes the allocated resources and keeps together the information and knowledge in its most usable form. A proper architecture of the SCI network encourages knowledge sharing and data collection, guaranteeing updated input for the production and the maintenance of historical data to support strategic decision making. The authors accentuate the importance of establishing what order qualifier are and what are order winner criteria, a clarification that defines the boundaries of the company's strategy. If these six strategic points are continuously updated, the company has designed and works with the best correlation between SCS and business strategy.

4. Conclusion

In conclusion, a strategic framework including SCI, SCM and business strategy can positively influence company performance. Employing internal and external synergies in formulating the business' strategy in report to SC affects performance measurements as well as the strategic partnership that the company forges. The value added of employing the proposed framework for designing a firm's business strategy lies in addressing the major drivers of performance in an aggregated manner and the intermediate influencers are purposefully approached.

Middle and top management can rely on the present framework, with proper adaptations to specificities, to build a strategy that, in turn, influences the architecture of the SC. Although we noted that internal integration is the starter of the process, the design and implications of it are influenced by supplier and customer integration and internal SC must succumb to these inquiries timely and properly. As a result, 'leagility' becomes easier to manage and suppliers and customers can see their efforts paid off and demands respected.

The present paper aims at constructing a general framework, based on extensive literature and case studies analyses that does not take into account the needs for assigning measure, indicator or significance weights to the factors involved. Therefore, limitations of the paper are rooted in the lack of measures and indicators assigned to the proposed factors. Moreover, empirical correlation between measures and performance indicators would mean that management can decide on the strategic priorities with better estimations of the results.
Directions for future research, that the authors will pursue as well, are testing the framework with relevant data from several manufacturing companies. By having a correlation and degree of significance for the impact factors and measures proposed, we can better prioritize the actions in our strategy and make more informed decisions. Moreover, historical data correlated with outcomes could point out strengths and weaknesses of the framework and predict potential outcomes of different scenarios of the framework.

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