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MEASUREMENT AND MANAGEMENT OF SUPPLY CHAIN PERFORMANCE: A BENCHMARKING STUDY

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ABSTRACT: Over the past few decades, the role of Supply Chain (SC) has been evolving from cost centre to competitive advantage. That is why measurement and management of SC performance become particularly essential. However, such an undertaking is difficult due to the growing complexity of SC. As the literature review highlights it, there is a lack of survey dealing with measurement and management of SC performance, collecting data through interview process and especially addressed to large companies. This is the bias of the present paper. First, the literature review clarifies SC management notion, performance measurement and management concepts, followed by an overview of the benchmarking published on the related topics. Then, are detailed the selected sample, the methodology used to collect and analyse data and the preliminary results obtained. To finish, conclusions are presented suggesting future research directions.

KEYWORDS: *Supply chain, Performance measurement, Performance management, Benchmarking study.*

1 INTRODUCTION

Over the past few decades, the role of supply chain (SC) has been evolving from cost centre to competitive advantage. The International survey “Global supply chain survey 2013”, led by PwC group, show that companies acknowledging SC as a strategic asset generate a 30% increase of profitability compared to the average (around 500 completed questionnaires from various sectors’ industries). Equally according to (Kaihara, 2001), supply chain management (SCM) is now recognized as one of the best means by which enterprises can make instant improvements to their business strategies and operations. Thus today’s competition has shifted from inter-company level to inter-supply chain level (Burgess et al., 2006; Lambert, 2008; Lummus and Vokurka, 1999; Mentzer, 2004).

Absolute growth lever of companies, SC formerly simple and linear, is nowadays considered as a complex system (Surana et al., 2005). Indeed, the globalization phenomenon and market volatility entail unavoidable permanent reorganisations of SC and directly feed SC complexity. Moreover, Information and Communication Technologies re-define SC boundaries in term of space and time. Besides, today’s environment is more dynamic (Kaihara, 2001). Simultaneously SC have to satisfy regulatory requirements (societal pressure for example) and profitability requirements (financial, flexibility, competitiveness...). In coherence, during the last few decades focusing on factory level management has been replaced by firm level management of SC (Gunasekaran et al., 2005). SC being considered as a key factor of corporate success (Estampe et al., 2010), measurement and management of SC performance become essential. Nevertheless, such an

undertaking is complex due to the transversal characteristic of these processes, involving numerous actors having to cooperate in order to reach given strategic objectives. So, the purpose of this paper is to review at what stage companies are about SC performance concepts, highlight their current practices and the related main issues they have to cope with. To do so, we choose to benchmark not only performance measurement area, as generally treated, but also performance management area. Moreover, the context considered is those of multinational companies. Besides, let us note that to gather data interview process is used in this study, rather than questionnaires, in a concern of reliability.

The rest of the paper is organised as follows: the next section presents a literature review focusing on SC perimeter, performance measurement and management concepts and on benchmarking survey dealing with SC performance measurement and management or related topics; Section 3 describes our empirical analysis, detailing the sample, the methodology used to collect and analyse data and preliminary results obtained; to finish Section 4 concludes presenting a discussion and suggesting future research directions.

2 LITERATURE REVIEW

In this section, first, in order to precise the perimeter considered in the rest of the paper, a clarification of Logistics and Supply Chain Management (SCM) notions is suggested. Then performance measurement and performance management concepts are defined. The last part of the literature review is an overview on benchmarking survey dealing with SC performance measurement and management concepts, or related topics.

2.1 Logistics and SCM: different perimeters

Originally, Logistics was associated to technical realisation of elementary physical operations (transport, handling, warehousing) (Le Goff and Bensebaa, 2009). (Lambert and Cooper, 2000) have pointed out the revised definition introduced in 1998 by the Council of Logistics Management (CLM) – since renamed the Council of Supply Chain Management Professional (CSCMP) – declaring CLM's position that logistics management is only a part of SCM. "Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point-of-origin to the point-of-consumption in order to meet customers' requirements". The American Production and Inventory Control Society (APICS) defines Logistics as "the art and science of obtaining, producing, and distributing material and product in the proper place and in proper quantities" (Blackstone et al., 2005). For (Estampe et al., 2010) the perimeter of Logistics notion has evolved from activities related to physical flow only to the management of physical and informational flows implying closed interactions with many other corporate functions among which management control, human resources, marketing, finance, engineering and IT. Although there are no generally accepted definitions of SC or SCM (Corominas, 2013), given the confusion that exists concerning SCM and its relation with Logistics (Cooper et al., 1997; Mentzer et al., 2001), it seems quite clear for a majority of practitioners and academics that a much broader range of areas has to be considered nowadays, based on the entry of additional stakeholders called partners or business partners, from suppliers' suppliers to customers' customers. According to (Corominas, 2013), the consideration of customers as members of the supply chain provides a clear differentiation between Logistics and SCM since in the former the customer is seen as the destination of the flow of materials only. In this sense, we will retain the following definition, coherent with the perimeter chose in this research paper. "A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain includes not only the manufacturers and suppliers, but also transporters, warehouses, retailers, and even customers themselves. Within each organisation, such as a manufacturer, the supply chain includes all functions involved in receiving and filling the customer request. These functions include, but are not limited to, new product development, marketing, operations, distribution, finance and customer service" (Chopra and Meindl, 2012).

2.2 Performance measurement and performance management concepts

The literature related to SC performance measurement systems (PMS) presents two major orientations: (1) Conceptual articles and (2) Empirical articles (Kurien and Qureshi, 2011). The first type of work mainly deals with performance definition, designing of new frame-

work for PMS development; metrics expected characteristics, classifications and issues. The second one, empirical type, tends to focus more on performance content than on measurement process. Empirical articles include descriptive studies, methods, taxonomies, benchmarking and prescriptive performance improvement activities (Keebler et al., 2001).

The literature related to SC performance management systems seems to be less abundant. More precisely, this area of research does exist but often under the phrase... "Performance Measurement". Performance measurement and performance management are closely intertwined in an iterative process; management both precedes and follows measurement, and in doing so creates the context for its existence (Lebas, 1995). The Key question is regarding frontiers for the performance measurement discipline. At the beginning the discipline thought is quite simple and expresses fundamental recommendations about performance measurement deployment (measurement, analysis, response (Smith and Goddard, 2002)). As expectations about performance measurement grew, more complex frameworks and systems appeared, taking into account the whole organisation but also strategy and external environment issues. From an intra-organisational orientation to an inter-organisational orientation little by little performance measurement focused on SC concepts and on extended enterprise concepts. Thus the two literatures are increasingly becoming synonymous as depicted by figure 1 (Folan and Browne, 2005). This paper focuses on these two key concepts: performance measurement and performance management. To sum up we will retain (Cohen and Roussel, 2013) definitions. "Using performance measurement, you put in place the right metrics for assessing the effectiveness of your supply chain. By contrast, with performance management, you track actual performance against targeted performance on all your metrics and use the resulting insights to make needed improvements. In other words, you use performance measures to evaluate how effective your supply chain is in supporting your business strategy; it is managing performance that effects performance change".

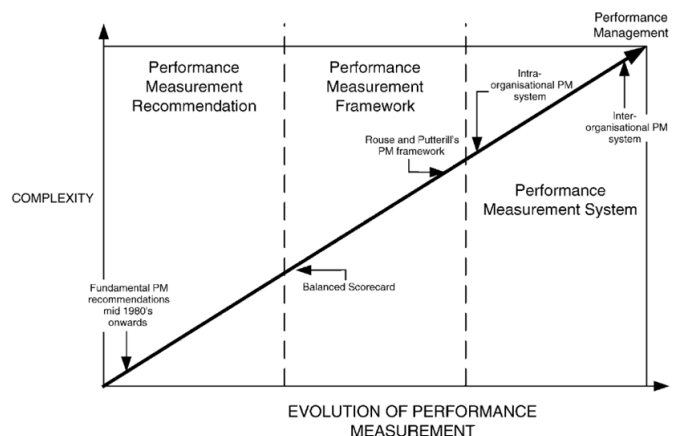


Figure 1: The evolutionary process of performance measurement (Folan and Browne, 2005)

2.3 Benchmarking classifications and overview of the published benchmarking studies

Benchmarking is a well-known process aiming to improve performance by learning from the best performers in the class (Fong et al., 1998). In this paper, the idea is to carry out such a comparative analysis, i.e. benchmarking survey, in order to observe the practices of several companies in the area of measurement and management of SC performance. This part aims to position the present benchmarking and the published benchmarking studies on a common framework.

2.3.1 Benchmarking classifications

Various benchmarking classifications can be raised in the literature. (Watson, 1993) suggested that benchmarking is a concept evolving since 1940s towards more complex type. He proposed five generations of benchmarking: 1. Reverse Benchmarking – comparing product and service offering, 2. Competitive Benchmarking – comparison of process with competitors, 3. Process Benchmarking – processes comparison with companies outside the related industry, 4. Strategic Benchmarking – understanding and adopting successful strategies from external organisations, 5. Global Benchmarking – comparison according to geographies. (Kyrö, 2003) added a sixth generation called Competence Benchmarking, i.e. Benchlearning, regrouping benchmarking on skills, competences and organisational learning methods. The present benchmarking survey belongs to the third generation “Process Benchmarking”, equally called by (McGonagle and Fleming, 1993) in its own classification “Transnational Benchmarking”. Indeed, this benchmarking work mainly focuses on the comparison of processes of measurement and management of SC performance with any industry and with organisations generally considered as world leading one. Moreover, it's important to notice the collaborative positioning of the survey, characterized by companies sharing their practices with other organisations. (Wolfram Cox et al., 1997) opposed Collaborative (or co-operative) Benchmarking to Competitive Benchmarking, where companies learn from the other companies aiming to gain superiority one over another. To finish, (Bhutta and Huq, 1999) introduced a matrix composed of two types of components. The first one answers the question: “What is benchmarked?” Three options are possible: Performance – how good performance is compared to others, Process – methods and processes used to improve organisational effectiveness and Strategic – changes in strategic directions and decisions. The second one answers the question “What to benchmark against?” It could be Internal – within the organisation, Competitor – within industry/sector, Functional – technology and techniques used, Generic – best practices from any sector or industry. This matrix will constitute the framework on which benchmarking studies reviewed will be compared.

2.3.2 Overview of the existing Benchmarking studies

In practice the starting point of benchmarking is the identification of “best practices” (Fong et al., 1998). However, what is a best practice? Is it a postulated characteristic? Probably not, nevertheless it is often the case whereas it requires confirmation of how the relevant practice impact positively performance in the company involved. In this sense, for instance (Quesada-Pineda and Gazo, 2007) developed a numerical approach to select and rank the best manufacturing practices. As the relation between practices and SC performance in each company constituting the sample has not been established, the rest of the paper does not mention best practices but referred only to practices.

Only external benchmarking studies are listed in this paper, giving it is the type of the present benchmarking study detailed in section 3. Indeed, by definition, internal benchmarking deals with comparison of processes or operations within an organisation only. In this type of benchmarking process, the acquisition of information is facilitated. However, information obtained can be shortened and/or oriented, each one wanting to protect the interest of its department or its own.

In the literature review, two kind of benchmarking studies can be distinguished: 1- Benchmarking process launched in order to validate a framework built, 2- Benchmarking studies without framework to validate.

2.3.2.1 Benchmarking aiming to validate a framework previously developed

The literature review shows that usually benchmarking process is used in order to validate a framework previously developed. For instance, (Lai et al., 2002) developed a measurement model and a measurement instrument for supply chain performance (SCP) in transport logistics, based on the supply chain operations reference (SCOR) model and various established measures. A 26-item SCP measurement instrument was constructed, reflecting service effectiveness for shippers, operations efficiency for transport logistics service providers, and service effectiveness for consignees. The empirical findings suggest that the measurement instrument is reliable and valid for evaluating SCP in transport logistics. (Li et al., 2005) conceptualized, developed, and validated six dimensions of SCM practices (strategic supplier partnership, customer relationship, information sharing, information quality, internal lean practices, and postponement) using data collected from 196 manufacturing firms. (Bayraktar et al., 2009) has empirically tested a framework identifying the causal links among SCM and information systems (IS) practices, SCM-IS related inhibiting factors and operational performance based on a sample of 203 manufacturing Small and Medium Enterprises (SMEs) within the greater metropolitan area of Istanbul in Turkey. Tests of hypotheses indicate that both SCM and IS practices positively and significantly influence the operational performance of sample firms. Equally in manufacturing industry, (Algren and Kotzab,

2011) examined which dimensions are used by the largest Danish companies to measure supply chain performance measurement (SCPM) at operational, tactical and strategic level, how can these dimensions be classified, and how do these empirical results have implications for practice and selected SCPM-theories. Furthermore, qualitative investigation was done by analyzing four case-companies in order to get more in-depth picture of how SCPM is used in practice. In that way, the SCPM model they proposed has been theoretically developed and empirically validated. (Chiang and Lin, 2009) attempted to develop an integrated framework to encompass the basic concepts of the balanced scorecards (BSC) and data envelop analysis (DEA) for measuring management performance. This study selected 39 enterprises mainly from Japan auto industry and 30 companies from USA commercial bank industry as the targets for empirical investigation. The results indicated that the interrelationships among four perspectives of BSC were empirically valid. However, the most crucial indicators in each perspective were distinct in different industries. About 46% of auto companies and 57% of commercial banks are located at efficiency frontiers. (Graeml and Peinado, 2013) analysed the perception of logistics professionals about the effectiveness of MMOG/LE (Materials Management Operating Guideline/Logistics Evaluation), a logistics performance evaluation tool on which they were trained and which they implemented in their organizations at least a year prior to their participation to the survey. Among other findings, it was noticed that the impact of the MMOG/LE recommendation is stronger with respect to activities that had not been previously addressed by quality norms and recommendations. Most respondents also considered that their organizations were already efficient in integrating their activities with their customers (car assemblers) but rarely with their suppliers. In the airline and airport field, (Barros and Peypoch, 2009) applied a two-step Data Envelopment Analysis (DEA) procedure to evaluate the operational performance of a sample of the Association of European Airlines, whereas (Schmidberger et al., 2009) developed a holistic Performance Measurement System (PMS) for airport ramp service providers with a process-based perspective, and conducted a benchmarking study in several European hub airports. The authors followed the action research approach for defining the PMS, which associates weights to the measures in an Analytical Hierarchical Process, and grouped measures into the perspectives of the Balanced Scorecard.

2.3.2.2 Benchmarking studies without a framework to validate

In the transport logistics context of Hong Kong, (Lai et al., 2004) conducted a benchmarking study considering efficiency (economic use of resources) and effectiveness (fulfilment of customer requirements) measures. The 134 responses obtained allowed to evaluate their perceived SC performance in transport logistics from both cost and service perspectives. The study results showed that all

the three sectors (air and sea transport, freight forwarding, and third-party logistics services) were mature, attaining a certain degree of sophistication in their SC performance, although there were significant differences in SC performance between firms in the three sectors. On the other hand, without specific context, in order to justify that leadership behaviour measurement can and should be part of any performance measurement system, (Kulmala et al., 2009) gathered exploratory empirical data from 11 Finnish SMEs located in Western Finland. The study results depicted that the leaders getting best evaluations in the profile measurement used worked also in the best performing organisations. In addition, improvements both in leadership behaviour and company performance correlated positively. Another kind of topic, investigate what relevant forecasting variables should be considered to improve companies' performance. (Danese and Kalchschmidt, 2011) analysed equally whether some forecasting variables can interact and influence performance with a synergistic effect by means of data collected by the Global Manufacturing Research Group (GMRG) from a sample of 343 manufacturing companies in 6 different countries. The paper highlighted three conclusions: when companies intend to improve cost and delivery performances, they should devote their attention to all the different forecasting variables, the existence of positive interaction effects between the collection and use of information on the market and the other forecasting variables, as well as the existence of a negative interaction effect between the adoption of forecasting techniques and the use of forecasts in several decision-making processes.

According to (Basnet et al., 2003), while there is plenty of published literature that explains or espouses SCM, there is a relative lack of empirical studies examining SCM practices. (Basnet et al., 2003) report the current status of SCM of manufacturing organisations in New Zealand. The outcomes suggest that although there is awareness of the SCM concept in New Zealand, the adoption of the newer concepts of SCM is not very advanced. (Quayle, 2003) surveyed SCM practices in UK, collecting data from 288 industrial SMEs. The findings indicate a lack of effective adaptation from traditional adversarial relationships to the modern collaborative "e" – supply chain and also identifies issues businesses need to address to improve the performance of their SC. Similarly, (Tan, 2002) investigated practices and concerns of SCM in United States and concluded that all of significant SCM practices positively impact performance. Still about SCM practices but this time in Finland, (Kempainen and Vepsäläinen, 2003) interviewed managers of six SC in order to analyse the change of SCM both in terms of operational practices and organisational capabilities. Some papers focus on metrics, as (Gunasekaran et al., 2004) which compared key performance indicators (KPIs) importance of 21 British companies, (Morana, 2009) studying which indicators from level 1 of SCOR model are used in fact by enterprises, and the collaborative survey (Kurt Salmon et al., 2013) aiming at highlight KPI's use and consistency with companies' needs

in France. While others are concentrated on process perspective, for instance (Neely et al., 1996) analysing the use of structured processes for the design of PMS in the UK (around 350 SMEs from a variety of industries) and (Bhagwat and Sharma, 2007) finding out about how SMEs in India apply Balanced Scorecard concept by the combination of three case studies and semi-structured interviews. The literature includes research works about strategy perspective as well. (Sahay and Mohan, 2003), using a representative sample of 156 organisations mostly from manufacturing, discuss SC strategies and structures in India whereas (Chin et al., 2004) conduct a survey that examines the success factors in developing and implementing SCM strategies for Hong Kong manufacturers. Finally, (Estampe, 2011) compare performances of 68 European enterprises based on 5 KPIs from SCOR model, calculated using data from enterprise financial review.

To conclude, each of these studies are positioned in an adaptation of the matrix proposed by (Bhutta and Huq, 1999) in table1 presented below. Indeed, as specified in the paragraph (2.3.2.), internal benchmarking is not reviewed in the present paper. Two main observations can be raised. First, obviously, there is an empty square at the intersection between strategy and competitor because for a start it is quite difficult to convince long term partners of an organisation to adopt this approach thus it seems even more unattainable to obtain competitors approval for such a partnership. Similarly, it is empty at the intersection between strategy and generic, as it seems to have little interest to compare strategy of companies from various industries. Moreover, by definition, strategy cannot be imitated (Fernandez et al., 2001). Secondly, by contrast, the majority of the studies are placed at the intersection between process and generic as the present benchmarking study.

Another distinction between the “process-generic” benchmarking, is the size of enterprises considered. Almost half of them concentrate only on SMEs (Bhagwat and Sharma, 2007; Kulmala et al., 2009; Neely et al., 1996; Quayle, 2003), three (Kurt Salmon et al., 2013; Li et al., 2005; Morana, 2009) include SMEs as well as large companies and the two remaining (Gunasekaran et al., 2004; Kempainen and Vepsäläinen, 2003) focus on large companies.

		What to benchmark against?				
		Generic				
What is benchmarked?	Process	Sample Data collecting	SMEs	SMEs+Large Companies	Large Companies	
		Questionnaires	(Neely et al. 1996) (Quayle 2003) (Kulmala et al. 2009)	(Li et al. 2005) (Kurt Salmon et al. 2013) (Morana 2009)	(Gunasekaran et al. 2004)	
		Semi-structured interview + Case studies	(Bhagwat & Sharma 2007)			
		Interviews			(Kempainen & Vepsäläinen 2003)	

Table 2: Comparison of “Process-Generic” benchmarking studies

As the literature review highlights it, there is a lack of survey collecting data through interview process and especially addressed to large companies and their related research in the area of SC performance. This is the bias of the present paper.

It should be highlighted that this study was not interested in evaluating the quality of the SCM that is performed by companies interviewed, even if this point is part of our future research works. Obviously, the selection of suitable metrics and measurement dimensions are key stages in the benchmarking process and recognized as the first step in SC benchmarking (Stewart, 1995). However, this study doesn't aim for the assessment or comparison of metrics and/or performance measurement framework used to benchmark (as SCOR model, MMOG/LE, Scandia Navigator, Balanced scorecard...). It only intended to identify SC performance measurement and management practices of multinational companies by making direct interviews.

3 EMPIRICAL ANALYSIS

The sample constructed referred to 11 multinational corporations which employ by far more than 5000 people. Three of them are Native American companies and the 8 others are French companies. The sectors represented are Fast-Moving Consumer Goods (FMCG), Household appliance, Automotive, Luxury, Distribution and Steel industry. The selected companies represent also different geographical locations in France as well as have SCM differently organised.

		What to benchmark against?		
		Competitor	Functional	Generic
What is benchmarked?	Performance	(Barros & Peypoch 2009) (Schmidberger et al. 2009) (Lai et al. 2004)(Chiang Lai et al. 2002) & Lin 2009)	(Danese & Kalchschmidt 2011)	(Estampe 2011)
	Process	(Bayraktar et al. 2009) (Graeml & Peinado 2013)	(Basnet et al. 2003) (Algren & Kotzab 2011)	(Neely et al. 1996) (Kempainen & Vepsäläinen 2003) (Morana 2009) (Quayle 2003) (Gunasekaran et al. 2004) (Li et al. 2005) (Bhagwat & Sharma 2007) (Kulmala et al. 2009) (Kurt Salmon et al. 2013)
	Strategy		(Sahay & Mohan 2003) (Chin et al. 2004)	

Table 1: Positioning of the studies reviewed on an adaptation of the (Bhutta and Huq, 1999) matrix

However, there is a difference among these nine research works in the way to collect data as illustrated in table 2. Seven (Gunasekaran et al., 2004; Kulmala et al., 2009; Kurt Salmon et al., 2013; Li et al., 2005; Neely et al., 1996; Quayle, 2003; Morana, 2009) use questionnaires (postal or email) whereas (Bhagwat and Sharma, 2007) use semi-structured interviews then case studies and (Kempainen and Vepsäläinen, 2003) lead interviews.

3.1 Methods employed to collect and analyse data

We met each company twice and led interviews of about two hours based on a previously developed questionnaire in order to guide the discussions. All interviews were held at the respective companies' office, which allows insuring an environment conducive to obtain information easily even the sensitive ones. Two or three persons by company have been interviewed. Respondents met are SC directors, with a national or worldwide perimeter and/or internal SC experts.

The first step to analyse data was to choose adequate comparison criteria. Further to interviews, we selected 11 coherent criteria from five key aspects related to the main area of current SC performance issues: SC organisation aspect (*chain perimeter, process perimeter, group organisation*), measurement aspect (*number of KPIs, shared KPIs*), management aspect (*who define KPIs, who set KPIs' targets, who manage in the sense of reaching objectives, management tools*), performance aspect (*type of performance measured*), and the last criterion but not the least, is about company performance culture. Indeed, the enterprise culture is rarely taken into account in benchmarking studies while it is an important factor which influenced decision-making in general. As interviews were rich in information, it was primordial to find a way to make the data comparable. To do so, we built synthetic profile of each company. We will not go into too much detail in this article and thus rather to present each companies SC profiles we illustrate in table 3 the synthetic solution chosen per criterion through an example. Regarding the first criterion, *chain perimeter*, five links are represented: Supplier plant, Manufacturer plant, Manufacturer warehouse, Distributor warehouse and Point of sale. By filling out the right links it becomes easy to visualize the SC perimeter and equally to distinguish a B to B company from a B to C company. *Process perimeter* criterion is a checklist of eleven processes. Company *organisation* is represented by a diagram allowing to underline the main organisational levels. So in the example, we find at the top the corporate management, below, Global Business unit (GB) which relate to product categories, then zones geographically structured and Business Unit (BU) referring to countries. Of course this diagram is only an example; another case could be corporate management, then geographical zones and BU per country. Culture criterion is a key motto. In the profile example is "Few KPIs but offering a wide vision of performance"; it could also be the well-known "We get what we measure" often demonstrating an important list of indicators.

Then, regarding measurement aspect, there is *SC KPIs number* linked with the decision-level of people we met; *Performance* corresponding to the type of performance measured in the SC according to the three pillars of sustainable development (economic, environmental, social); and *shared KPIs* indicating what is shared with whom. Concerning management aspect, criteria *Who define KPIs* and *Who set KPIs' target* can have for simplified answer: centralized SC, i.e. central SC, or decentralized

SC, i.e. local SC. *Who manage* criterion means who manage through KPIs in order to insure targets reaching. Starting from the same organisation diagram, we indicate at which level SC is present and in particular we circle twice the SC level that is in charge of managing the SC performance. The last criterion entitled *Tools* in table 3 aims to raise all tools supporting SC people in managing SC performance.

The following section shows the preliminary results obtained.

3.2 Preliminary Results

Among the companies selected, B-to-B companies are in majority (72%). In 64% cases, SC department is accountable for the nine processes forming the checklist presented in table 3. We notice that most of the companies considered are organized by global business unit (72%) under the corporate management level while the rest of the sample is organized by geographical zone. Two kinds of results can be distinguished and are presented below: tendencies and correlations.

Comparison criteria		Profile example
Perimeter	Chain	
	Process	<ul style="list-style-type: none"> ✓ S&OP ✓ Forecasting ✓ Inventory management ✓ Order-to-cash ✓ Route-to-market ✓ Sourcing ✓ Production planning ✓ Warehousing ✓ Transportation
Organisation		
Culture		"Few KPIs but offering a wide vision of performance"
Measurement	SC KPIs Number	20
	Performance	
	Shared KPIs	Forecast accuracy Sales
Management	Who define KPIs	Central SC
	Who set KPIs' target	Central SC
	Who manage	
	Tools	Platform including all problems met by SC team and the associated solutions as well as best practices

Table 3: Example of a company's synthetic profile

3.2.1 Tendencies

First, there is a tendency to have many KPIs, more than 20 in 45% cases, which participate to the complexity of PMS. However, we can notice that in 19% cases there is less than 10 KPIs. The assessed performance remains pre-dominantly economic, although we note ongoing project to evaluate environmental (36%) and social (28%) performance. Indeed, not only increasing societal pressures have an effect but also companies become more and more aware of the performance potential which could be resulting. Due to incomplete information about shared KPIs we feel inadequate to draw conclusions; however we observe a difficulty to answer to that question which highlights a lack of visibility of what is shared with whom. The definition of KPIs for the most part occurred in centralized SC (45%), which has the advantage to insure homogeneity of KPIs set of SC sites. Decision about KPIs' targets is also handled by central SC (36%) or sometimes collaboratively (27%) in order to align overall objectives, i.e. strategic objectives, with SC sites objectives. On the other hand, local SC (64%) managers are in charge of performance management through KPIs. In that, we detect the general wish to manage SC performance as closely as possible to the field. Regarding SC culture, of course influenced by corporate culture, the following key messages are conveyed: get unquestionable KPIs, get less KPIs more standardized, get a wide vision of performance, simplify measurement system, simplify reporting process, share more widely, measure collaborators performance, be committed. It shows the increasing awareness of current main issues related to SC performance measurement and management. Concerning the last criterion, there are three categories of tools used to manage SC performance. Those aiming to manage objectives as the traditional annual roadmap become unavoidable. Some companies use one page by SC entity defining objectives, goals (numeric value) related to objectives, one strategy per goal and measures associated to each strategy. This framework for aligning teams, links qualitative data, vision, to quantitative data. The second category brings together tools aiming to widely share data, problems and best practices. For instance, build one guideline per KPI, available from a database and thus easily reachable from anywhere. Guidelines contain KPIs' targets, formulas and locations of necessary information. Database is also useful to get information segmentation, for example, by reference, by BU or by department. Such database can be intern to SC function or can be equally used by collaborative functions. Visual management solutions also help to share easily within a team. The third category of tools aim moving improvement plan into action. Roadmap includes its objectives, reason for being, name of people who commissioned it, the related indicators of success and indicators' targets.

3.2.2 Correlations

Three correlations can be raised. First, B-to-B companies are organized by global business unit; have a process perimeter extended in comparison with B-to-C companies and make measurement system reviewed by central SC. On the contrary, B-to-C companies are organized by geographical zone and revise measurement system locally. Finally, in the majority of cases (80%), KPIs' targets setting process and performance management process, in the sense of manage through KPIs, are owned by the same level (local SC/local SC or central SC/central SC). However, we note two exceptions from this observation. KPIs' targets are set by local SC and the reaching of targets is managed by central SC. We understand that people from SC sites have a better knowledge of the field to choose ambitious targets but above all attainable ones. The second exception describes the opposite case, KPIs' targets set by central SC and management to reach targets owned by local SC. We explain it by the fact local SC as we said previously have a better knowledge of the field and thus are the most likely to make the objectives achieved.

4 CONCLUSIONS

As the literature review highlights it, there is a lack of survey dealing with measurement and management of SC performance and especially which collect data through interview process and addressed to large companies. This is the bias of the present paper. We studied the current SC performance measurement and management practices of multinational corporations established in France. In this way, we cover a reasonable spectrum of firms from varied businesses. We highlighted, on one hand, measurement current tendencies as the density of measurement systems and type of performance measured in fact. On the other hand, we raised performance management current tendencies as decision levels of KPIs definition, targets setting and performance management processes. We also showed correlations illustrating B-to-B and B-to-C companies' profiles. We underline that there is coherence between KPIs definition process and targets setting process being owned by the same decision level.

The question raised here, is related to the choice of centralization or decentralization of decision centre. Even if historically local SC had independence of actions, the growing complexity of organisations leads to ask this key question again. Delegation of operational management to SC sites is a natural attitude, however how a local level can know the overall constraints outside its responsibility perimeter but which will impact the decision to take? If criteria to make a choice between centralization and decentralization are numerous, existing scenarios are numerous too. Moreover, in practice no SC can be completely centralized or decentralized and both approaches have their advantages and inconveniences.

With this survey, we contribute with new findings that have implications for theory and offer to practitioners an up to date point of comparison. We proposed two cartographies positioning published benchmarking studies, concerning several sectors, related to the SC performance issue according three factors: the type of benchmarking, the data collecting process and the size-enterprise characteristic of samples. Moreover, we suggested a synthetic profile template to support the analysis phase of raw data. Then, through results, we delivered an overview of the state of progress of large companies regarding current key issues.

Nevertheless, we present only a snap-shot view of the topic. The results can be criticized from many aspects. First of all, a clear limitation to our study is the size of the sample. As we choose to proceed by interviews it would be difficult to drastically increase the number of companies to meet. Thus we can consider this study as an explorative one and not fully representative of the whole population. Besides, we collected data from SC directors and internal SC experts. It could be interesting to analyse the perceptions of other members of the SC or collaborators, such as suppliers or customers' points of view. It would allow highlighting the degree of collaboration between stakeholders for managing performance and, amongst others, help to find good practices between centralized and decentralized models. Future research is recommended in order to determine which practices or tools identified in this paper have most impact on SC performance. Considering the same sample, based on a quantitative benchmarking survey it become possible to look at companies SC performance against their practices; and then detect which one can be considered as a "best practice".

With the same idea of collaborative benchmarking, as specified in paragraph 2.3.1., a meeting day to share the conclusions of the study has been organised with all the companies involved. This event has been the opportunity to cross points of view by a brainstorming workshop focusing on two themes about SC performance: "To Measure" and "To Manage". Thus, complementary conclusions have been noticed. For each theme, first, a synthetic table has been developed. Regarding the first theme the table deals with the role of KPIs, the number of KPIs, the "lifespan" of a KPI, and its sharing. Among other findings, they point out that a KPI can have a "temporary contract" or a "permanent contract" and that sharing entails to create a common language because information in euros or dollars is insufficient. Also, four principles has been identified as essential by companies: OGSM (objectives, goals, strategy, measure), KISS (keep it short and simple), SMART (simple or specific, measurable, achievable, realistic, time-bound) and 4C (cash, cost, customer, revenue "CA"). To finish, typologies of KPIs has been discussed and to each type of KPIs three features are proposed: standard (for all SC actors), site-specific (specific to a local SC) and available as aggregated or disaggregated data. Concerning the second topic, "To Manage", the table deals with how to share, the role of internal and external benchmarking, and the

communication on objectives. Participants explained the importance to link indicators to the performance management system in term of actors, in other words, people in charge of this management. Analysis methodology detailed for each indicators and information about potential correlations with other indicators are also highly required in order to, respectively, insure right interpretation and help to decision making. Then, they conclude this topic in describing several performance management process in correlating three aspects (objectives, monitoring, and improvement) and three levels of management (Central SC, Local SC e.g. France SC director and Local BU e.g. France general director).

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