

# Logistics Outsourcing: Performance Models and Financial and Operational Indicators

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**Abstract**—The growing outsourcing of logistics services resulting from the ongoing current in firms of costs reduction/increased efficiency means that it is becoming more and more important for the companies doing the outsourcing to carry out a proper evaluation.

The multiple definitions and measures of logistics service performance found in research on the topic create a certain degree of confusion and do not clear the way towards the proper measurement of their performance. Do a model and a specific set of indicators exist that can be considered appropriate for measuring the performance of logistics services outsourcing in industrial environments? Are said indicators in keeping with the objectives pursued by outsourcing? We aim to answer these and other research questions in the study we have initiated in the field within the framework of the international *High Performance Manufacturing* (HPM) project of which this paper forms part.

As the first stage of this research, this paper reviews articles dealing with the topic published in the last 15 years with the aim of detecting the models most used to make this measurement and determining which performance indicators are proposed as part of said models and which are most used. The first steps are also taken in determining whether these indicators, financial and operational, cover the aims that are being pursued when outsourcing logistics services.

The findings show there is a wide variety of both models and indicators used. This would seem to testify to the need to continue with our research in order to try to propose a model and a set of indicators for measuring the performance of logistics services outsourcing in industrial environments.

**Keywords**—Logistics, objectives, outsourcing, performance measurement systems

## I. INTRODUCTION

OUR research is framed in the International *High Performance Manufacturing* (HPM) project, the objective of which is to test how the various advanced production practices (TQM, Lean Manufacturing, Supply Chain Management, etc.) influence companies' production

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performance. The theoretical base takes aspects into consideration relating to human resource management, organisational behaviour, strategy, operations management, international business and other relevant fields.

One critical part of the project is the establishment of an international database of parts manufacturing plants in the consumer goods, electronics and automotive sectors. Through the use of a series of questionnaires, this will enable a range of hypotheses to be tested on the factors that contribute to the success of high performance manufacturers and how they relate to plant performance. This database is designed using a stratified sample that allows the desired number of plants to be obtained for each country-industry combination.

The HPM project was begun in 1991, and three study rounds have been carried out to date. In the third round (2004), the number of participating countries increased to 270 in nine countries. The project is currently in the initial stages of the 4th round and the number of countries has increased to sixteen.

New aspects have also been included for analysis. Given increased pressure to reduce costs and improve performance has led many companies to outsource services, it was decided to include scales for outsourcing in the HPM project's 4<sup>th</sup> Round. Some of these scales relate to logistics as these are one of the services that are most outsourced; it has been estimated that 40% of global logistics are outsourced, [1] cited in [2]. Outsourcing logistics can provide the companies that outsource with multiple advantages (e.g., costs savings, improved performance, inventory level reduction and improved customer service [3], [4].) It is therefore clear that systems need to be created that enable companies to measure the performance of this outsourcing properly. What is more, performance measurement is widely considered in the literature as one of the key points for the relationships between the agents involved to be developed properly [5].

Logistics research has defined and measured the performance of logistics service in many ways [4]. As no study on the different models used was found, the primary objective of this study is to fill this gap by conducting a review of the models most used for measuring the performance of outsourced logistics services and to determine the specific performance indicators that are proposed as part of these models.

In this latter respect, it should be stated that there are not many studies that propose indicators for measuring the performance of logistics services outsourcing. In other respects, we consider that those which do, do not clearly justify their choice of indicators over others.

We share the opinion of numerous authors [6]-[9] in considering that a major element for establishing the indicators that enable performance to be measured is the objectives being pursued in outsourcing the logistics services. The performance indicators should therefore be able to measure all the pertinent aspects and be consistent with the objectives set [10].

Although there are common objectives for different services as far as outsourcing is concerned (such as costs reduction, for example) there are, nonetheless, other objectives that are very closely linked with the specific type of service outsourced [11].

In this respect, different authors have conducted studies that state what the objectives to be covered are when outsourcing general services [11] and in the more specific case of outsourcing logistics services [12], [13]. In other respects, there are also (a few) studies that propose a series of indicators for measuring the performance of logistics services outsourcing [14], [15]. However, we have found no study that analyses the relationship between the two aspects.

In this study we also propose to take the preliminary steps that enable us to fill this gap. This would also allow us to analyse in the near future whether the indicators proposed in the literature for measuring the performance of logistics services outsourcing cover the objectives pursued by said outsourcing. Should this not be the case, we shall detect which objectives are not taken into consideration and shall attempt to make a coherent proposal regarding indicators that cover all the goals being pursued.

We have undertaken a bibliographical review to cover the objectives of this study, selecting and analysing articles that deal with the measurement of the performance of logistics services outsourcing. The bibliographical review that was done is set out in greater detail in Section 3 and the results are given in Section 4. Section 5 provides a review of the objectives that are being pursued when outsourcing logistics services. Finally, the last section presents the final considerations and future research. Prior to all this, Section 2 sets out the main performance measurement models which will serve as a reference framework for classifying and subsequently analysing the articles identified in the study we have conducted.

## II. REVIEW OF PERFORMANCE MEASUREMENT MODELS

The design of an adequate performance measurement system is a topic of increasing interest both for academics and professionals [16]. This has led to the appearance of different models in recent decades. Neely et al. [17] conducted a review and analysis of the main performance measurement systems. One of the best known and most used in practice is the *balanced scorecard* [18]. This scorecard solved one of the performance measurement systems' weak points -that they were basically financially-oriented- and proposed that companies should also use other, non-financial indicators, all organised into four areas or perspectives: financial, customer-related, internal processes and learning/growth.

Other integrated systems have also been developed along with the scorecard. One of these is the *European Foundation for Quality Management's* (EFQM) Business Excellence Model, which also takes both financial and non-financial aspects into account. These are organised into two subgroups: agents and results. The former are aspects of the management system that can leverage changes that result in the optimisation of a firm's results.

In this same integration line, in 1989 a *performance measurement matrix* was proposed that distinguished between financial, non-financial, internal and external performance measures [19].

Another alternative is the *results and determinants model* developed by Fitzgerald et al. [20] in the framework of service sector performance measurement. Said authors suggest there are two basic types of measurements in any organisation: those linked to results (competitiveness and financial performance) and those that focus on the determinants of the results (quality, flexibility, the use of resources and innovation). This system highlights the fact that the results obtained depend on the past performance shown by the determinants.

Some authors have proposed specific measurement models. A case in point is that proposed by Azzone et al. [21], whose model attempts to identify the most appropriate measures for competing companies that take the time factor as the basis of their differentiation strategy.

Meanwhile, *Du Pont* proposes a *pyramid of financial ratios* [22] and, very similarly, the *Institute of Chartered Accountants of Scotland* (ICAS) proposes a list of what are considered the most important financial and non-financial measures which should be taken into consideration for the proper measurement of performance.

The *performance pyramid* [23] envisages measures relating to agents that are external to the company and its own internal interests. The model proposed by Brown [24] differentiates between measures relating to the inputs, the processes, the outputs and the results (these last linked to meeting customers' needs).

Finally, our review concludes with the so-called *Performance Prism* [25]. This model takes into consideration all the groups with relevant interests compared to the company: investors, customers, employees, suppliers, etc., and envisages, on the one hand, the wants and needs of the stakeholders and, on the other, what the company wants and needs from the interest groups with which it is linked.

Many different models can therefore be seen to exist. As commented in the introduction, we have found no study that specifically analyses the models used in logistics services outsourcing. However, we do have the findings of a study by De Toni et al [26] which analyses, among other things, the models used for measuring performance in services, for which the authors use as their base a bibliographical review for the 1993 – 2006 period. The findings state that the systems used are (in order of importance): the balanced scorecard, the EFQM excellence model, the results and determinants model and the performance pyramid. We shall return to these

findings in Section 4 when the findings will also be given of our bibliographical review, which is detailed in the following section.

### III. DESCRIPTION OF THE BIBLIOGRAPHICAL REVIEW CONDUCTED

In view of the core objective of this study, we conducted a bibliographical analysis to pinpoint articles that present methods for measuring performance in logistics services outsourcing. This was done in five stages [27]: identification of the field of study and the period to be analysed; selection of information sources; search, management and screening of the results, and analysis of the results.

Firstly, we defined the field of study and the time period to be analysed as scientific articles on logistics services outsourcing performance measurement systems in the last 15 years (1996-2010). The chosen information source was *ABI/INFORM* and *SCOPUS*, two databases that provide access to the main journals in the field of management, in broad terms, and logistics and performance measurement in particular. As is known, both of these databases allow searches of scientific documents to be made filtering parameters in different parts of the text, including: the abstract, title, key words, etc. The type of document we decided to search for using these electronic resources was scientific articles, as they are the most used in analyses of this type (e.g., [26], [28]).

As a criterion of selection, we searched for article abstracts in which the following terms appeared: “*Outsourc\**”, “*Procurement*”, “*Performance measurement*”, “*Performance measurement system*”, “*Purchas\**”, “*Sourc\**”, “*Performance indicators*”, “*Key performance indicators*”, “*KPI*”, “*offshor\**”, “*Logistic*”, “*Transport\**”, “*Warehous\**”, “*3PL*” and “*4PL*”.

The *ABI/INFORM* database provided a total of 27 articles. These were analysed so that any ‘false positives’ [27], i.e., any that were outside our field of study, could be ruled out. This analysis was done in the first instance by reading the Abstracts of the studies and, when there were any doubts, by reading the whole articles. When this was done, only 9 articles remained that addressed performance measurement systems in logistics services outsourcing, and these were selected for the subsequent analysis. 31 scientific articles that met the search criteria were retrieved from the *SCOPUS* database. Once those that had already appeared in the earlier *ABI/INFORM* search had been rejected, and when the remaining articles had been analysed, only 2 remained that were of any interest for this study.

As a result, when the described process had been completed, 11 scientific articles had been selected. These articles have been analysed in great detail<sup>1</sup> using bibliography cards on which general data (authors, journal, year, etc.) about the articles was noted along with more specific data for our study, such as the research method used in the article, the

<sup>1</sup> The full text of one of these eleven articles could not be consulted. This hampered the subsequent analysis task, as will be seen in the following section.

sector that outsourced the logistics service, the performance measurement method used and, when indicated, the indicators used. The results of this analysis are presented below.

### IV. PERFORMANCE MODELS AND INDICATORS USED IN THE OUTSOURCING OF LOGISTICS SERVICES

The first thing that might come as a surprise out of the bibliographical review is that, despite the importance of performance measurement and of the service under study, the number of articles that propose performance measurement systems for the outsourcing of logistics services is very low. Nevertheless, this is in keeping with findings of other similar studies on the outsourcing of other services, such as *Facility Management* services, for which De Toni et al. [26] only identified 5 articles of interest after a bibliographical review of 51 journals for a fourteen-year period.

Using the selected articles as our basis, we analysed the methods of performance measurement in logistics services outsourcing and classified them according to the De Toni et al. typology [26]. The last row in Table I shows our findings.

TABLE I  
PERFORMANCE MEASUREMENT MODELS IN SERVICES  
OUTSOURCING

		Balanced scorecard	EFQM Excellence Model	Results and determinants	Performance prism	Other	Total
De Toni et al. (2007)	Services (Except Facility Management)	39	7	2	2	0	50
	Facility Management	4	1	0	0	0	5
Logistics		2	0	5	0	4	11

As can be seen, there is a divergence of opinion between authors over the method to be used for measuring performance in logistics services outsourcing. However, the bibliographical review shows that there are two methods that are more used than others. These are the *balanced scorecard* and the *results and determinants* model. It is interesting to point out that while the former is clearly the most used according to the De Toni et al. study [26] (see findings in Table I), the same is not true in the case of logistics services outsourcing, for which the most popular performance measurement method is the *results and determinants* model, used in 5 of the 11 articles analysed.

We further identified four more performance measurement models (*Others* column in Table I) apart from those included in Section 2 and those given by De Toni et al. [26]. One of these is the so-called *LogistiQual* [29], which is based on the performance measurement model in *ServQual* services and develops a series of logistics indicators linked with quality

management in the service. Giannakis [30], meanwhile, develops an analytical model called *RelPerf* which detects the critical factors in the supplier-customer relationship and takes these relational aspects into account as a unit of analysis so that inefficiencies are eliminated, enabling performance to be improved. Finally, there are two more *Benchmarking*-related models. One of these was specifically developed for the aeronautics sector [31] and develops a performance measurement tool for evaluating logistics suppliers. The other uses the *Data Envelopment Analysis* (DEA) method to include a series of financial and operational measures that contribute towards the continuous improvement of the organisation where they are applied [32].

With regard to the use of indicators, only five of the articles selected included a list of specific indicators alongside their performance measurement models. Table II provides a summary of these grouped according to the performance measurement model in which they are formulated (results and determinants (R&D) model and balanced scorecard (BSC) model) and to whether they are financial indicators or not.

TABLE II  
PERFORMANCE INDICATORS IN SELECTED ARTICLES

	R&D			BSC		Total
	Power et al. (2007)	Sahay & Mohan (2006)	Andeja Krizman (2009)	Krakovics et al. (2008)	Rajesh et al. (2010)	
Value creation	1					1
Innovative ideas		1				1
Perceived quality	1			1		2
Valuation of mistakes and damage				1		1
Information availability		1		1		2
Employee morale				1		1
Flexibility	1					1
Reduced delivery times	1			1	1	3
Improved service	1			1	1	3
Inventory control	1			1		2
Productivity	1					1
Cash flow	1			1		2
Sales revenue		1				1
Improved capital performance		1				1
Cost savings	1	1	1	1	1	5
Capital goods reduction		1		1		2
Total	9	4	3	5	8	

As can be seen in Table II, the divergence between the indicators listed by each of the proposed performance measurement methods is even greater than that found between

the proposed methods. Even when indicators framed within the same model are compared these only coincide minimally and there are no clear common patterns in said models.

Non- financial indicators can clearly be seen to dominate with 11 being found compared to financial indicators, which totalled 5 in all. The most used indicator proposed in all the articles analysed is costs reduction. It therefore seems clear that this is one of the main objectives pursued by companies that outsource logistics. Of the others, the most proposed relate to reductions in delivery time and improved service, and both are recommended by the two models that base their proposal on the *Balanced Scorecard* (BSC). No type of common behaviour pattern was found for the three studies that base their proposals on the results and determinants model.

#### V.OBJECTIVES OF LOGISTICS SERVICES OUTSOURCING: PRELIMINARY RESULTS

Logistics is one of the most outsourced services as global operators are able to execute logistics services better, faster, and more cheaply than the companies that contract them [33]. Be that as it may, the improvements that outsourcing bring must be quantified empirically by way of indicators [34].

As commented in the introduction, and as has been seen in the previous section, there are very few studies that propose indicators for performance measurement in logistics outsourcing and, when they are proposed, no justification is given for their selection.

In keeping with other authors, we consider that the objectives pursued by outsourcing logistics services should serve as a guideline for the choice of indicators. In this respect, Engelbrecht [7] and Deepen [8] indicate that achieving objectives in outsourcing agreements is a relevant part of performance measurement. The literature on strategic management and marketing has also linked performance to the measurement of the degree to which the objectives are achieved [6]. In the same line, Krakovics et al. [9] indicate that for performance indicators to be defined, the objectives that are to be measured must first be set. These theories have a precedent in Drucker [35], who established that objective-based measures were the most appropriate for evaluating performance.

Determining the objectives that are to be achieved by outsourcing logistics services is, therefore, a fundamental building-block for measuring achieved performance. In this respect, the objective that most frequently appears for logistics is a reduction in overall costs: having the right materials in the right place at the right time [36]. Nevertheless, this general objective can be broken down into a series of more specific objectives [13]:

- To make timely deliveries
- To operate at low cost
- To meet customers' special request
- To offer short delivery lead times
- To be flexible and responsive
- To support other departments' logistical needs
- To maximise value added to products/services

Murthy et al. [37] also indicate that the final customer's requirements must also be satisfied efficiently as far as costs are conceded through integration with the supplier firm. Other authors, such as Richardson [38], state that companies outsource logistics functions in order to achieve savings in distribution costs, a greater control over their business, better service and satisfaction for their customers and, also, the experience that complements the organisation's internal capacities.

Following Wynstra et al. [11], outsourcing logistics services is framed in instrumental services, which are the services that directly affect how the purchasing company carries out its primary processes. The authors established that the objectives being pursued by the purchasing companies for these types of services are as follows:

- The service should affect the purchasing company's primary processes in the desired way.
- The service should fit in with one or other of the existing processes.

Furthermore, a common objective for all types of outsourced services is to achieve maximum cost efficiency in the service delivery process.

As can be seen, a number of authors have addressed the objectives both of general outsourcing and the outsourcing of logistics services, as well as those relating to logistics on the wider front. If we identify the most relevant aspects for performance measurement we shall be in a position to tackle the future research that we present below along with some final considerations.

## VI. FINAL CONSIDERATIONS AND FUTURE RESEARCH

The findings set out above clearly show that measuring performance in services outsourcing is a topic that has not been greatly addressed in the literature. At the same time, a wide range of both methods and indicators used can be found, which does not make the task of tackling such an important subject easy. This could be due to a number of different reasons, such as, for example, the fact that no clearly accepted model and set of indicators exist for the topic under analysis; in each case the person doing the analysis has used those which s/he considers most appropriate. To this is added the subjectivity that comes from the different perceptions of reality that each has, logically resulting in different findings. To this must be added the complexity of performance measurement in general, and this is even greater in the case of services. The different contexts in which the different cases analysed are framed might also justify the diverse range of methods and indicators used. The consideration of the objectives when determining whether the indicators used to measure logistics services outsourcing are correct or not is, meanwhile, clearly a manifestly relevant topic.

It would therefore seem evident that there is a need to conduct more detailed research on the topic under study that might lay the foundations to enable a method and a set of specific indicators that can be used in the outsourcing of logistics services in industrial environments to be proposed. In

our specific case, this would reinforce the research that we have initiated in the field in the framework of the international *High Performance Manufacturing* project.

In said future research we aim to analyse the relationship that exists between the indicators listed and the objectives identified in the study. This would enable a reliable model to be proposed that covers all the various aspects of the customer-supplier relationship to the full and which can be widely applied by industrial companies that need to measure performance in logistics services outsourcing.

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Dr. González-Zamora is a member of various scientific associations: EurOMA (European Operations Management Association) and ACEDE (Economics and Business Management Scientific Association). She shares the following awards in this field: the 2001 *Wickham Skinner Award on Teaching Innovation Achievements*, awarded by the *Production and Operations Management Society*; nominated for the prestigious *European IST Prize (2001)*; 2002 *AEDEM-MED Academy of Management Award on Management Education*; Honourable Mention at the 2002 *Instructional Award Competition (Decision Science Institute)*