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A comprehensive framework for measuring performance in a third-party logistics provider

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Abstract

Today, Third-Party Logistics Providers (3PL) face a great pressure in order to meet its clients' needs: customers demand a high level of time and place value for their deliveries, at lower prices, making the last mile activity not only a challenge whilst meeting the clients' requirements but likewise in managing the profitability and the financial balance of the operation. In order to meet the logistics' operation efficiency, several 3PL monitor their activity assisted by a variety of ex-post systems of performance indicators that assess the quality and efficiency of the logistic process. Whereas most of the times 3PL do not fully exploit the potentiality of those performance systems.

The objective of this paper is to provide comprehensive and innovative performance measurement framework for a Third-Party Logistics Provider, transferrable for other stakeholders. The framework is supported in a thorough revision of the existing literature regarding performance indicators systems, with particularly significance in the field of logistics and freight transport.

The rich variety of logistics' performance indicators arrays frequently focus on a specific domain or follow a typical framework which includes metrics for cost and asset management, customer service, productivity and quality. In order to meet the specifics of a 3PL, we believe that a more detailed framework would be beneficial.

The framework we propose is organized in three levels: the activities dimension (e.g. transport, warehousing, and customer service), the decision level dimension (operational, tactical and strategic) and the different actors dimension (e.g. carriers, 3PL and consolidation centers). A case study of *Urbanos*, a Portuguese 3PL firm, was used to validate the proposed framework.

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Keywords: Performance Measurement Framework; Third-Party Logistics Providers (3PL); Outsourcing

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1. Introduction

Logistics is one of the dynamic activities that enables the connection between production and consumption (Bartolacci, et al. 2012). According to the Council of Supply Chain Management Professionals, logistics consists of a set of processes encompassing planning, implementing and controlling the flow of goods, services and related information (Vitasek, 2013). Logistics is a complex business and that can be measured from different perspectives. One of the objectives of logistics is to guarantee the efficiency and the efficacy of all the procedures from the point of origin to the point of destination whilst meeting the customers' required quality, including information reliability and sensibility to customers' needs.

Logistics is not only relevant for the production sector but it is also crucial for enterprises from all segments, e.g. banks, retailers, government and institutions. Logistics plays a key role in the competitiveness of organizations whilst creating value by providing time and place utility (Christopher, 2005; Lambert et al., 2006).

Waters (2003) refers that "without logistics, no materials move, no operations can be done, no products are delivered, and no customers are served". To position the right products close to the right consumer, several activities have to be performed, including transport, customer service, information technology and communications, finance, warehousing and outsourcing (Frazelle, 2002). In order to perform these activities the participation of several actors is required: freight forwarders, carriers, third-party logistics providers (3PL), warehouses, shipping companies, manufacturers and retailers, to name a few. In addition to the ones mentioned there are two vital participants in the complex logistics system: the first one is responsible for the demand - the consumer – the second one is in charge of regulating the activities – the authorities.

Logistics has an increasingly important role in the economy of the global marketplace representing approximately 8,5 percent of the gross domestic product (GDP) in the USA and accounting, on average, for 10 percent of the GDP of European countries, (Arvis et al. (The World Bank), 2012; Council of Supply Chain Management Professionals, 2012). Logistics is estimated as one the major expenditures for businesses, though varying widely across sectors (Waters, 2003). Consequently, in today's competitive environment there is a pressing need to control logistics costs and performance measurement has proven to be a successful tool in achieving business objectives. Performance Measurement Systems (PMSs) are frameworks that integrate performance information - Performance Indicators* (PIs) and Key Performance Indicators (KPIs) - in a dynamic and accessible way in order to achieve consistent and complete performance measurements (Lohman et al., 2004). PMSs provide companies with the necessary tools to support the planning and monitoring of a process while revealing historical data that offers important feedback (Ramaa et al., 2009). PMSs contribute to effective control of business progress enhancing the overall efficiency thus profitability (Rushton et al., 2010). Firms have been adopting a wide range of PMSs for the past decades, the question that is raised is whether these systems meet the competitive environment needs or the PMS are out-of-date. In fact, Minahan and Vigoroso (2002) found in their study that nearly 60 per cent of the investigated enterprises were not satisfied with their ability to measure and manage performance.

As the global market becomes more sophisticated, the difference between the operations a company wants to achieve and what a company manages to perform in-house is increasing. The tendency among firms from all sectors is to outsource their logistics activities that are more costly and time consuming to external entities, namely in logistics, third-party logistics providers (3PLs) (Lambert et al., 2006). 3PL firms provide a variety of logistics-related services, including, for instance, transportation, warehousing, distribution and freight consolidation. Outsourcing these activities enables companies to reduce costs and focus on their core activities where they build a competitive advantage over adversaries (Christopher, 2005). Nevertheless, choosing the right partnership is often a complex decision.

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* Performance indicators (PIs) are quantifiable metrics used to evaluate the performance of actions, whereas Key performance indicators (KPIs) are the PI that refer to the most critical actions, on which depend the success of an organisation (Lindholm, 2010; Posset et al., 2010)

The literature shows that outsourcing decision-making is usually highly structured (Aktas et al., 2011; Feng et al., 2011; Fill and Visser, 2000; Nielsen et al., 2014). The selection of outsourcing companies involves several stages (observation, data collection, analysis and discussion) regarding the evaluation of accounting information alongside with data concerning quality, customer service and flexibility, to name a few. Hence, PMS play an important role in facilitating the outsourcing decision, as they provide historical performance data regarding various categories (e.g. finance, quality and customer service) that offer a thorough feedback about the outsourcing partners. Despite its usefulness, there is a limited body of literature of 3PL PMS in particular with respect to 3PL outsourcing services.

The aim of this paper is to propose a 3PL performance measurement system with a comprehensive scope that is easy to adopt and to use and that is compatible with the remnant organization's systems. The framework we propose is intended to be efficient and effective while supporting the benchmarking of the 3PL outsourcing services.

The organization of the paper is as follows: Section 3 provides a brief overview of the selected literature on performance measurement systems in logistics with particular focus in 3PL, revealing the trends, weaknesses and strengths. The proposed framework and its validation are presented in section 4. Section 5 is dedicated to the conclusions and future research recommendations.

Nomenclature

3PL	third-party logistics provider
GDP	gross domestic product
PMS	performance measurement system
PI	performance indicator
KPI	key performance indicator

2. Methodology

This section explains how this research was designed and the methodology that conducted to the proposed performance measurement framework.

At an initial stage, a review of scientific literature on the field of performance measurement in logistics, with particular focus on 3PL PMS, was performed. When conducting the literature review examination the content analysis approach – a research method based on qualitative and quantitative systematic description - has been adopted. After this step, a comprehensive list of performance indicators 3PL specific with above one hundred PIs was compiled from the literature and was prompt categorised. Followed an iterative approach consisting on a set of expert interviews and field observations, in which we successively isolated the relevant performance until reaching a total of 25 PIs and KPIs. In this process, we concluded that some of the specificities of 3PLs operations were inadequately captured by the existent PIs. Hence, our framework for measuring performance consisting of a total of 25 PIs and KPIs was proposed.

3. State-of-the-art on Performance Measurement Systems in logistics

Bearing in mind the main objective of this literature review, to systematize the PMS proposed by the selected authors, the literature was classified taking into account the logistics structure, built on three dimensions: activities, actors and decision level.

Essentially, logistics is a multidimensional value-added activity involving a wide set of actors performing several activities that have particular impact in the different decision levels within an organization.

Therefore we think it is appropriate to organize the logistics reality in three dimensions, as shown in Figure 1: the activities dimension (e.g. transport, warehousing, and customer service), the actors' dimension (e.g. carriers, 3PL and warehouses) and the decision level dimension (operational, tactical and strategic).

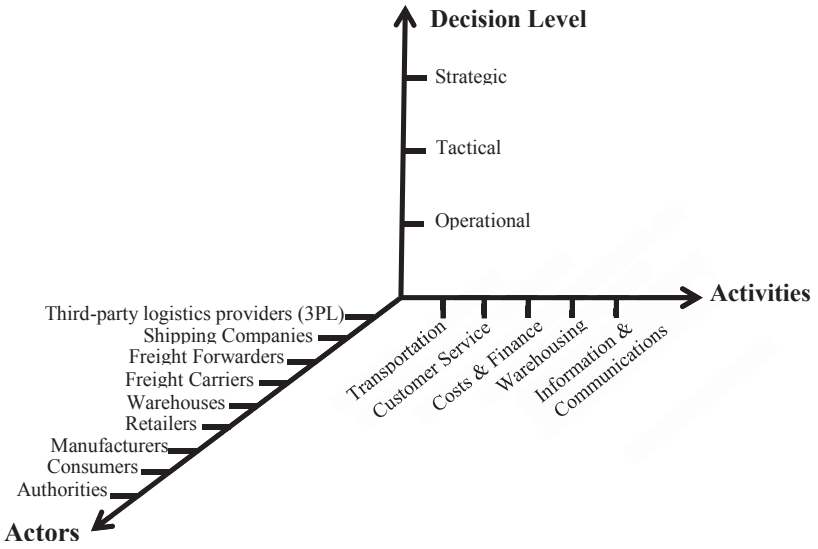

Fig. 1 - Logistics three dimensions: Decision Level, Activities and Actors

This classification along three dimensions depicts logistics into its constitutive elements providing a comprehensive classification. For instance, one actor, corresponding to a single company, may be in charge of several activities, each of them concerning different departments within the company that perform distinct decision levels. By fixing one dimension, for example when fixing the actors dimension in "carrier", we get the variety of indicators that result from the combination of activities and levels of decision for the designated actor, the "carrier". This approach of deconstructing logistics is corroborated by Rafele (2004) who states that logistics should be broken down into its elementary components in order to efficiently analyze performance.

Likewise, Holmberg (2000) refers that several authors have been questioning the traditional PMSs, above all, due to the lack of connection with businesses' strategy. In fact, performance connects in different ways to the various domains of responsibility: from a complex approach linked to strategy to the simple day-to-day approach linked to operations (Neely, 2007). The proposed model aims to exceed the stated fragility by classifying the performance indicators in three different decision levels – strategic, tactical and operational.

According to Rushton et al. (2010) the strategic level measures top level management decisions (e.g. competitiveness), the tactical level deals with mid-level management decisions (e.g. resource allocation) and operational level measures the low level managers' activities (e.g. achieving delivery correctness). Moreover, this classification also reflects the different planning time horizons and the control hierarchy accordingly (Rushton et al., 2010).

The logistics three dimensions approach will be the foundation of the present study supporting simultaneously the literature review framework and the PMS framework.

For the purpose of the specific analysis of the *Urbanos* case study, which falls under the 3PL category, we will fix the actor's dimension in 3PL. Nevertheless, the same reasoning is transferrable to the other actors, activities and decision levels.

3.1. Description of content analysis framework

The literature review analyzed in this study is based on 15 references. With the purpose of distinguishing the elements of differentiation between the authors' work, in terms of logistics coverage, scope and specific characteristics, a classification was performed.

The framework used to classify the literature follows the logistics three dimensions approach, redesigned and adapted in order to illustrate each of the analyzed frameworks' purpose and scope. Therefore, two generic classifications were added to distinguish the scope of the analyzed work: Supply Chain[†] and Logistics.

Alongside, two further categories were added:

- Perspective: Internal or External.
- Validation: Literature Review, Case Study, Questionnaires and Expert Interview

We consider it is relevant to show which is the overall perspective expressed by the PMS, that actually corresponds to the recipient entity of the PMS, and which is its relative weight. The internal perspective refers to the focus on the enterprise, expressing the processes where management and employee must excel. The external perspective refers to the focus on the customer and the society. Finally, regarding the validation category, we believe it is appropriate for the aim of this study to identify the methods the authors used to validate the proposed PMS frameworks.

3.2. Classification and review of 3PL literature

The summary of the literature analysis is shown on Table 1 and will be followed by a discussion highlighting some key findings from contributions within each category.

This literature review was not meant to be exhaustive; on the contrary it was a collection of relevant articles that reflect a broad view of the performance measurement in logistics, particularly in 3PL.

The selected literature identified several important performance indicators in the evaluation of logistics efficiency and effectiveness. Virtually all of the selected authors – thirteen out of the fifteen selected works – developed researches on the field of logistics, while nine of them (Bagchi, 1996; Beamon, 1996; Bowersox et al., 2013; Garcia et al., 2012; Gunasekaran et al., 2001; Gunasekaran et al., 2004; Lohman et al., 2004; Schönsleben, 2012; Supply Chain Council, 2012) deriving from the broader supply chain view. The aforementioned authors established comprehensive PMS with a good coverage of the logistics activities. However, only three of the reviewed works have focused their researches towards the development of 3PL performance indicators covering all the logistics activities (Krakovics et al., 2008; Krauth et al., 2004; Krauth et al., 2005). As shown on the table, the most heavily investigated activities are respectively transportation, customer service and costs & finance. Another finding from the literature analysis is that the decision level is not commonly assigned to the performance indicators and when it is, it only encompasses the strategic or the operational level. The exception is observed in the works of Gunasekaran et al. (2001) and Gunasekaran et al. (2004), where the three decision levels hierarchy play an important role in the PMS, being the central differentiating feature among the performance indicators.

[†] "Supply Chain: starting with unprocessed raw materials and ending with the final customer using the finished goods, the supply chain links many companies together. 2) the material and informational interchanges in the logistical process stretching from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers and customers are links in the supply chain." (Vitasek, 2013)

Table 1 – Summary of the literature review of PMS logistics and 3PL specific

Author (year of publication)		Bagchi (1996)	Kaplan and Norton (1996)	Lambert et al. (1998)	Beamon (1999)	Gunasekaran et al. (2001)	Gunasekaran et al. (2004)	Krauth et al. (2004)	Lohman et al.(2004)	Krauth et al. (2005)	Neely et al. (2007)	Krakovics et al. (2008)	Schönsleben (2011)	Garcia et al. (2012)	Supply Chain Council (2012)	Bowersox et al. (2013)
Supply Chain		x	..	..	x	x	x	..	x	..	x	..	x	x	x	x
Logistics		x	..	x	x	x	x	x	x	x	..	x	x	x	x	x
3PL		..	..	..	..	..	..	x	..	x	..	x	..	..	..	..
Decision Level	**S**	..	x	..	..	x	x	x	x	x	..	..	..	..	..	..
	T	..	..	..	..	x	x	..	..	..	..	..	..	..	..	..
	O	..	..	..	..	x	x	x	x	x	..	..	..	x	..	..
Activities	**Tra**	x	..	x	x	x/..	x/..	x	x	x	..	x	x/..	x	..	..
	CS	x	x	..	x	x/..	x/..	x	x	x	x	x	x/..	x	..	x
	CF	x	x	..	x	x/..	x/..	x	x	x	x	x	x/..		..	x
	War	x	..	x	x	x/..	x/..	x	..	x	..	x	x/..	x	..	..
	IC	..	..	..	..	x/..	x/..	x	..	x	..	..	x/..	..	..	..
Perspective	**I**	..	+++	---	..	+++	+++	+++	+++	+++	+++	++	++	+++	..	-
	E	..	+	---	..	-	+	+++	+++	+++	+	+++	-	+	..	-
Level of detail		---	-	+	+	-	+	--	-	--	--	+++	+++	+++	-	-
Validation		1 2	1	1	1	1	1 3	1 4	1 2	1 4	1 2	1 2	1	1 2 3 4	1 2 4	1

Legend

x – referred

.. – not referred

x/.. – lightly referred

--- to +++ – relative weight

Decision Level: S – Strategic; T – Tactical; O – Operacional

Activities: Tra – Transportation; CS – Customer Service; CF – Costs & Finance; War – Warehousing; IC – Information & Communications

Perspective: I – Internal; E – External

Validation: 1 – Literature Review; 2 – Case Study; 3 – Questionnaires; 4 – Expert Interview

Based on the observation of the comparative table, the relative weight given to the internal perspective in the PMS conception is smoothly noticeable. In fact, there is a growing concern on the external perspective in the line with the increase of social awareness about the effect of businesses' externalities on the society as well as greater urge in fulfilling the clients' requirements. With regard to the level of detail, as the distribution of literature on Table 1 shows, it is highly perceptible the general lack of detail the authors attach to their PMS. Whereas three of the selected articles, respectively Garcia et al., (2012), Krakovics et al. (2008) and Schönsleben (2012), offer remarkably detailed PMS, contributing to a greater knowledge about the proposed PIs. In these works, the reader is presented the meaning of the PIs and their relation to the business unit, the various PIs methods of calculation, the respective units of measure and frequency of measure. Finally, all of the selected authors PMS frameworks presentations were preceded by a thorough revision of previous works. Generally, the authors took advantage of further validations, essentially practical case studies and expert interviews.

The literature reveals that only a reduced number of authors propose frameworks where a detailed description and metrics (calculating procedures) are available. Hence, we truly believe our approach will be beneficial and will facilitate the framework's usage.

4. Proposed Framework

Each of the selected authors proposed a set of indicators that we compiled and promptly analyzed. Filtered through the validation from experts, based on interviews with top executives from *Urbanos*, the case-study company, we reached the set of indicators that fits *Urbanos* reality and needs. *Urbanos* is a 3PL firm that performs several logistical activities, from warehousing and transportation to total logistics management of a company. Similarly to their own clients, *Urbanos* outsources part of its activities to external companies. This strategy has particular impact in transportation, where a large proportion of the service is outsourced to external carriers that provide both human resources and vehicle fleet. The carrier service contract defines the payment according to the number of items delivered, penalizing delivery failures –completeness, punctuality and correctness failures – as well as freight loss and damage, if within the carrier scope of responsibility. Looking more closely at the *Urbanos'* requirements we came to the conclusion that the activity that had greater need to be monitored was transportation. Therefore, we confined the focus of our framework to the transportation activity, fixing both the actors' dimension in "3PL" and the activities' dimension in "transportation".

The result of *Urbanos*' validation is a PMS framework with 25 performance indicators that are 3PL and transportation specific, as shown on Table 2.

The listed PIs were implemented in several authors PMS however, owing to space limitations, we only present one of the references. Due to the fact that several authors did not provide a full description and formula of the PI or KPI, it was necessary to complement the literature review with further authors' publications, specifically Christopher (2005), Frazelle (2002), Neely et al. (1997), Posset, Gronalt and Häuslmayer (2010) and Rafele (2004). The proposed PMS framework focused on the transportation activity of a 3PL firm offers a clear guide to compute and organize the PIs, with a user-friendly interface. In this framework the principal details are presented: Decicion Level (DL), PIs description, PIs formula and PIs units of measure.

Table 2 – Proposed Performance Measurement Framework for the transportation activity of a 3PL firm.

No.	Performance Indicators	DL	Description	Formula	Units of Measure	References
3	Capacity	T	Total loading capacity of the fleet of vehicles (in terms of volume or weight)	Σ Loading capacity per vehicle	kg or m^3	Schönsleben (2011)
4	Distance travelled per day	O	Total number of km travelled during a certain period of time over the period number of days	Σ km travelled in a certain period of time / No. of days of the given period of time	km / day	Krauth et al. (2004; 2005)
6	Turnover per km	S	Turnover of a certain journey divided by the total number of km of the designated journey	Σ Turnover per journey / No. of km of the given journey	€ / km	Krauth et al. (2004; 2005)
7	Delivery Frequency	O	Total number of deliveries that took place in a certain period of time	Σ No. of deliveries (in a certain period of time)	No. of deliveries	Krauth et al. (2004; 2005)
8	Profit per delivery	T	Profit per delivery refers to the benefit produced by each delivery	Σ (Delivery tariff - delivery cost) / Total No. of deliveries (€/delivery)	€ / delivery	Krauth et al. (2004; 2005)
10	On-time In-full	O	Correct and complete orders delivered on-time = service level	(Σ No. of On Time In Full deliveries / Total No. of deliveries) x 100	%	Krauth et al. (2004; 2005)
10.1	Correctness	O	Percentage of orders delivered with errors or damages by the total number of orders	(Σ No. of deliveries with errors or damages / Total No. of deliveries) x 100	%	Garcia et al. (2012)
10.2	Completeness	O	Percentage of full/ complete orders dispatched by the total number of orders	(Σ No. of complete deliveries / Total No. of deliveries) x 100	%	Garcia et al. (2012)
10.3	On-time delivery performance	O	Percentage of orders received on time (date and hour) defined by the customer	(Σ No. of punctual deliveries / Total No. of deliveries) x 100	%	Schönsleben (2011)
16	Vehicle loading capacity utilized per journey/vehicle	O	Utilized loading capacity per journey (or vehicle) over the total available loading capacity	(Σ Utilized capacity per journey/vehicle / Total loading capacity per journey/vehicle) x 100	%	Krauth et al. (2004; 2005)
37	Product changeover time	S	Change in the product weight range or type the economic activity the product belongs to) during a certain period of time	Σ No. of product types (or weight grade) dispatched during a certain period	No. of product types or grades	Krauth et al. (2004; 2005)
53	Supplier performance index	T	It measures the supplier's performance in a specific period of time, as a percentage	(Σ No. of claims of supplier's responsibility / Total No. of deliveries) x 100	%	Garcia et al. (2012)
53.1	Claims due to quality fails	T	Percentage of claims that resulted from damaged or lost items	(Σ No. of damage or loss claims / Total No. of deliveries) x 100	%	Garcia et al. (2012)
53.2	Claims due to out of time deliveries	T	Percentage of claims due to deliveries executed after the agreed date	(Σ No. of out-of-date claims / Total No. of deliveries) x 100	%	Garcia et al. (2012)
53.3	Claims due to costs	T	Percentage of Claims due to reported cost/account/tariff data	(Σ No. of cost claims / total No. of deliveries) x 100	%	Garcia et al. (2012)
58	Order to delivery cycle time	O	The average elapsed time from the moment the order is ready to the reception by the customer (includes loading/unloading)	Σ (Reception date by customer – Order ready date in the Warehouse) / Total No. of deliveries	days and hours	Gunasekaran et al. (2001)
58.1	Lead time for domestic market	O	The average elapsed time from the moment the order is ready to the reception by the customer at a national level.	Σ (Reception date by customer at national level – Order ready date in the Warehouse) / Total No. of deliveries	days and hours	Garcia et al. (2012)
58.2	Lead time for overseas market	O	The average elapsed time from the moment the order is ready in the warehouse to the reception by the customer overseas	Σ (Reception date by customer overseas – Order ready date in the Warehouse) / Total No. of deliveries orders	days and hours	Garcia et al. (2012)
58.3	Vehicle loading/unloading time	O	The average freight loading/unloading time	Σ (start time – ready to load time) / Total No. of delivered orders; Σ(Order reception – End time of the journey) / Total No. of deliveries	hours and minutes	Garcia et al. (2012)
66	Productivity	S	Number of deliveries by employee by day/hour or by monetary unit during a certain period of time	Σ No. of orders dispatched in a certain period / No. of employees or No. of hours of the given period or the turnover of the given period	orders per employee / day	Bowersox et al. (2013)
70	Loss and Damage frequency	O	Number of loss and damaged during transportation, in relation to the total number of products transported	(Σ No. of damaged items delivered + Σ No. of lost items / Total No. of deliveries) x 100	%	Bowersox et al. (2013)
78	Transportation accidents	O	Number of accidents occurred during the transportation journey of products during a certain period of time	Σ No. of transportation accidents	No. of accidents	Kravokics et al. (2008)
79	Cargo theft	O	Number of theft events during transportation of products, during a a certain period of time	Σ No. of theft during transportation	No. of thefts	Kravokics et al. (2008)
80	Out-of-date deliveries	O	Percentage of deliveries executed after the agreed date.	(Σ No. of out-of date deliveries / Total No. of deliveries) x 100	%	Kravokics et al. (2008)
94	Cycle time improvement	O	Percentage of cycle time improvement relatively to the previous year	[(Average cycle time on the present year – Average cycle time on the previous year) / Average cycle time on the previous year] x 100	%	Bagchi (1996)

Following the general presentation of the 25 performance indicators we propose an individual KPI and PI record sheet where a more detailed description and usage recommendations are presented. Due to space restrictions we will solely present one representative indicator file. For that purpose we selected the On-time In-full KPI and respective PIs file, Table 3. The remaining record sheets are available in the Appendix A.

Table 3 – On-time In-full record sheet as a representative KPI and PI file.

		10. On-time In-full			
		Description	**Formula**	**Target**	**Unit**
KPI	**10.**	Service level of the delivery activity, also known as On Time in Full. Evaluates the number of correct and complete orders delivered on time.	(Σ No. of On-time In-full deliveries / Total No. of deliveries) x 100	#	%
PI	**10.1**	**Correcteness** - Percentage of orders delivered with errors or damages by the total number of orders delivered	(Σ No. of deliveries with errors or damages / Total No. of deliveries) x 100	#	%
	10.2	**Completeness** - Percentage of full orders dispatched by the total number of orders delivered	(Σ No. of complete deliveries / Total No. of deliveries) x 100	#	%
	10.3	**On-time delivery performance** - Percentage of orders received on time (date and hour) defined by the customer	(Σ No. of punctual deliveries / Total No. of deliveries) x 100	#	%
Relates to		**Activity:** Transportation	**Decision Level:** Operational		
Frequency of measurement		Daily			
Responsible		Department and respective employees in charge of collecting data and reporting the performance indicator			
Data Source		The exact location of the necessary raw data/ raw information to calculate the metric of the KPI and PIs			
Drivers		Factors - business units, other PIs, events, etc. - that influence both the KPI and the PIs			
Notes & Comments		Particular issues related to the KPI and PIs that should be taken into account			

Legend

Decision Level: Operational | Tactical | Strategic

Frequency of Measurement: Daily | Weekly | Monthly | Quarterly | Yearly

The proposed record sheet follows a simple template organized in two sections. The first section resumes the essential information available on Table 2, description, formula and units for the KPIs and PIs, and completes with the disclosure of the respective target value. The target value (symbolized by "#"*) represents the benchmarking

* The target value was not presented; instead it was symbolized by "#". The target value definition is case specific and due to the comprehensive

value, the value corresponding to the best performance of the given indicator, and the unit stands for unit of measurement of the PIs and KPIs. The second section encompasses further attributes and it is practical to:

- Locate the indicator in the company (department, hierarchy, etc.) – "Relates to: Activity and Decision Level"
- Facilitate the metrics construction – "Data Source"
- Guarantee the correct recording and reporting – "Frequency of Measurement"
- Allocate the department or person in charge of collecting the data and reporting the indicator – "Responsible"
- Assist the performance measurement analysis, revealing the factors influencing the PI and KPI – "Drivers"
- Add important information to the ones implementing the PI and KPI – "Notes & Comments"

This indicator file template was first corroborated by Neely et al. in 1997 and in the recent past it was reintroduced by Lohman et al. (2004).

5. Conclusions

Logistics plays a crucial role in the competitive business environment we face today. While promoting efficiency and efficacy in the connection between the point of production and the point of consumption, logistics assures the quality the clients require. Third-party logistics providers (3PL) have a growing importance worldwide as they enable the provision of fast pace and varied services to companies from all sectors in order to encourage them to reduce costs, to focus on their core differentiating activities and, consequently, to allow them to achieve higher levels of performance. There is a strong necessity to control performance and Performance Measurement Systems play, definitely, a crucial role in monitoring and enhancing performance. Though it is available in the literature a rich variety of PMS suitable to evaluate the performance of the supply chain and logistics, the incidence of PMS 3PL specific is scarce. The purpose of this article was to propose a detailed PMS framework, 3PL specific whilst meeting the case study company – *Urbanos* – requirements. We went further in this investigation and developed a performance indicator framework for *Urbanos* transportation activity, comprehensive in scope, though not exhaustive in extent. The framework was complemented by a performance indicator record file template. Although this PMS was developed for the particular necessities of a 3PL it can be transferrable for other logistics actors with the adoption of the adequate performance indicators. As future work recommendations we suggest the application of this PMS framework to a case study 3PL company, namely *Urbanos*, where the framework can reveal its usefulness and convenience in the benchmarking analysis of the company partners and suppliers.

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Appendix A.

Due to space restrictions we present both the exhaustive KPI and PI list and the proposed framework's KPI and PI files in the following webpage: https://fenix.tecnico.ulisboa.pt/homepage/ist165234.

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scope of this framework we believe it was not beneficial to present the benchmarking value for the case study company, *Urbanos*.

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