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Abstract

The fast fashion sector is characterized by a short time-to-market which adds to the fluctuating demand faced by this industry where competition requires to introduce a number of new designs in clothing each season. In such a context, some firms have started creating independent companies in charge of managing logistics operations. This strategy allows a direct control over logistics activities enabling to save time and costs and increase quality. However, in order to obtain the promised benefits, independent logistics companies need to be sustainable from both an operational and an economic point of view. To this end, an appropriate performance management appears to be essential. The paper develops a structured performance measurement system for an independent logistics organization part of an Italian fast fashion company. After reviewing the existing logistics performance measurement models, the LOGISTIQUAL model was selected because it balances all the perspectives of the logistics service. The company processes were mapped to identify the activities to be monitored. KPIs were defined and classified according to each performance area of LOGISTIQUAL. Prior to its implementation, the performance measurement system was validated by applying the indicators to past data. This work provides fast fashion firms with a methodology to design and implement logistics performance measurement dashboards that can be used to understand the current organizational behavior. Such knowledge assists in defining effective strategies to ensure competitive advantage and long term sustainability. Also, monitoring performances stimulates people to operate in order to achieve the company's goals.

Keywords: Supply Chain Management, Logistics, Fast Fashion Industry, Key Performance Indicators.

1. Introduction

Nowadays, the ever increasing competition in the fast fashion industry forces companies to introduce several new designs in clothing for each season. In order to gain sustainable and enduring success and growth in this environment, fashion companies need to build a strong brand identity, especially with young consumers (Ross and Harradine, 2011), as well as implement effective brand extension strategies, which means that companies need to increase their offering by reaching new market segments characterized by different price targets (Truong et al., 2009; Stegemann, 2006). Besides these marketing and product-oriented factors, on the operational level managing and controlling the whole distribution process is fundamental for fashion companies (Caniato et al., 2011). Fast fashion companies, such as Zara and H&M, created an efficient supply chain in order to produce new clothing items rapidly to quickly respond to consumer demand (Watson and Yan, 2013). This demand-pull model requires following consumer trends and reducing the lead time for arrival of new products to stores. Furthermore, consumers' purchases are characterized by being impulsive and following the latest fashion trends (Ghemawat and Nueno, 2006, Cagliano et al., 2011). As a consequence, the demand is highly fluctuating and this adds pressure to logistics activities, requiring agile supply chains (Purvis et al., 2013). Keeping in mind the abruptness and the quick approach of logistics needed in the fast fashion industry, some firms have developed their independent logistics companies. From an organizational point of view these are stand-alone entities, but they are typically controlled by the manufacturing company that founded them. Their mission is to perform the entire logistics process for such company, in an exclusive way. Several groups, mainly in the apparel, footwear and food&beverage industries, such as Benetton, Geox, Granarolo, and Heineken, have already adopted similar strategies in the last ten years (Gorziglia, 2012). Such approach allows companies to focus on their core business, as logistics outsourcing strategies, while maintaining a direct control over their supply chains, which could not be

completely achieved when partnering with logistics service providers. This in turn gives some specific advantages, such as saving time and costs related to logistics operations and reducing expenses caused by quality issues during the delivery process. In order to verify that such promised benefits are actually gained by an independent logistics company, thus contributing to its operational and economic sustainability, performance management appears to be of paramount importance (Gunasekaran et al., 2004). Performance management, in fact, provides the basis for monitoring and maintaining organizational control (Yigitbasioglu and Velcu, 2012). The first step of performance management is evaluating performances through indicators, which directly describe the effectiveness and efficiency of processes and are useful for assessing how a firm compares against its competitors. This property is fundamental in a highly competitive environment, where companies struggle to reach a sustainable competitive advantage (Schläfke et al. 2012; De Waal and Kourtit, 2013).

This work develops a dashboard for performance measurement for the independent logistics company (hereafter named Logistics Company) created by an Italian firm operating in the fast fashion industry (hereafter named Fast Fashion Company). The dashboard is based on the Logistiqual model. Performance measurement enables the Logistics Company to define effective strategies to ensure competitive advantage and stimulates people to operate in order to achieve the set goals. Also, the outcomes of the analysis can support fast fashion companies in either developing their logistics performance measurement systems or improving them.

The paper is structured as follows. First, the focus company is presented together with the methodology of the research. After that, the analysis of relevant performance measurement models is carried out and the dashboard is proposed. Finally, discussions and conclusions are provided.

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2. Company presentation

The Fast Fashion Company is one of the most important companies in the industry. It counts more than 13,000 employees, has 9 production plants, and sells its products in 33 different countries through 2,100 retail stores and 130 outlets. Its logistics activities have been always monitored and it has been implementing a performance measurement system for several years. This experience has allowed the company to become confident with logistics activities in the Fast Fashion arena. In the light of this acquired familiarity, the company has created its own Logistics Company dedicated to the management of the logistics activities. This choice has been inspired by the need to optimize the available resources and by the opportunity to improve the quality of the logistics service in order to comply with the latest market trends. Furthermore, current volumes do not fully exploit logistics facilities and this implies inefficiencies. Also, transport costs are significantly increasing. Finally, the company faced a lack of experienced and reliable providers that could offer the high level of service required. Such circumstances have encouraged the management to create an independent organization dedicated to logistics activities. The mission of this new Logistics Company is to become a model in the fast fashion market in the provision of logistics services. It is expected to yield advantages in terms of reduction in logistics costs, increase in revenues through the acquisition of new customers, and decrease in the organizational complexity. In the end, such effort is expected to turn into a competitive advantage for the Fast Fashion Company.

3. Methodology

The research has been carried out according to the following steps. First, main performance measurement models and associated Key Performance Indicators (KPIs) existing in literature are reviewed and an appropriate reference framework is identified. Second, the logistics processes of the focus company

are mapped to find out the activities to be monitored. To be more precise, the supply chain is decomposed in processes; for each of them sub-processes and stakeholders are identified. Then, operational KPIs for each sub-process are selected by looking at both the indicators retrieved in literature and those already used by the Fast Fashion Company. Finally, economic aspects are assessed. In particular, the costs associated with the operational performances under analysis are measured. The obtained dashboard is validated by applying the selected indicators to past data, between January 2012 and October 2012, in order to check their ability to actually represent the real behavior of the logistics process at issue.

4. Analysis of performance measurement models

Several supply chain performance measurement models have been proposed in literature. Some of the most widely applied ones are here compared in order to find a suitable framework supporting the design of a KPI dashboard for the Logistics Company. In particular, the following models are analyzed: Logistiqual (Rafele, 2004; Grimaldi and Rafele, 2007), Balance Scorecard (BSC) (Kaplan and Norton, 1996), SCOR (Supply Chain Council, 2010), Performance Prism (Neely, et al., 2002) and the Gunasekaran and others' model (Gunasekaran, et al., 2004).

The Logistiqual model aims to assess the level of logistics service perceived by customers, being them either other companies in the supply chain or final consumers. Based on SERVQUAL (Parasuraman, et al., 1988), a well-established model for service quality measuring, Logistiqual evaluates the logistics performance of a company by means of three macro-classes: Tangible Components, Ways of Fulfilment, and Informative Actions. Each of them includes some sub-classes (e.g. the Tangible Component macro-class is divided into Internal Assets, External Assets, Personnel, and Inventory/Availability sub-classes) inside which specific KPIs can be placed according to the logistics service at issue. The detailed description of

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performance dimensions and sub-dimensions makes Logistiqual a quite simple tool to be applied by organizations not very familiar with performance measurement models. In fact, the existence of sub-classes in addition to macro-classes provides users with a valid guideline in order to identify all the specific aspects of a logistics process that should be monitored. The Logistiqual model is also quite flexible because it does not bind the user to predetermined performance indicators, but appropriate metrics can be defined according to the context under investigation.

The second model that is discussed is the BSC. It is a framework for organizing performance measurement processes in supply chains (Brewer, 2002) made up of four dimensions: Financial, Customer, Internal Business Process, and Learning and Growth. Besides financial indicators, reflecting past events and not suggesting how an organization should operate to create future value, the BSC also includes non-financial measures, which can be viewed as drivers of future performances. Long, medium, and short run KPIs are usually part of the BSC. Compared to Logistiqual, the BSC only defines general performance dimensions, without suggesting detailed aspects to be measured for each of them. Additionally, the BSC is not specifically focused on the logistics service but it analyses also different supply chain processes, such as for instance product innovation.

The SCOR model aims to provide a structured approach to supply chain analysis by means of five processes: Plan, Source, Make, Deliver, and Return. Each process is decomposed into sub-processes and elementary activities. Performance measures and best practices are defined for each activity. The purpose of this model is to improve the management of supply chains and support communication among their members. SCOR gives a standard description of management processes as well as of the relationships among them. Thus, the main goal of SCOR is not assessing performance but rather offering a reference framework to represent supply chain processes. Moreover, like in the BSC, processes other than the logistics one are considered, such as the manufacturing or the resource planning process.

Names of the authors will be added from the website.

The structure of the Performance Prism is quite similar to that of Logistiqual. This model looks at performance from five interrelated perspectives: Stakeholder Satisfaction, Strategies, Processes, Capabilities, and Stakeholder Contribution. Each of these categories has a number of sub-categories inside which KPIs can be defined. For instance, Strategies includes corporate strategy, business unit strategy, brand, product, service strategy, and operating strategy. The Performance Prism is quite comprehensive in nature as it considers a large variety of supply chain aspects, such as business strategies, processes for developing new products or services, demand generation, demand fulfilment, and planning and managing the enterprise. Again, it is not exclusively focused on the logistics process.

Finally, the supply chain performance measurement model developed by Gunasakaran and others is based on the three planning levels within an organization, namely strategic, tactic, and operational. Additionally, the model is organized around the four main supply chain processes: Plan, Source, Make/Assemble, and Deliver. For each intersection of a process and a planning level, single performance indicators are specified. Such model assesses the performance of all the main supply chain process, even those that do not deal with logistics. Furthermore, its structure lacks an intermediate layer between the macro-dimensions (i.e. planning levels and processes) and detailed KPIs. Such layer would help users in identifying the relevant activities whose performances are to be measured.

The literature review suggests that all the analyzed frameworks can be potentially applied to a fast fashion company. However, their purposes and structures are different. Among them, the Logistiqual model proves to be the most suitable tool in order to define a performance dashboard for a company whose core business is providing a logistics service. Three reasons can be mentioned. First, Logistiqual is specifically dedicated to assessing logistics performance. Second, it gives a comprehensive view of both the inventory control and the transport service, the two main concerns of the company at issue. Third, the Logistiqual structure, made up of not only macro-classes but

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also sub-classes, is able to assist users in taking into account all the important performance areas, avoiding neglecting some of them.

5. Logistics process mapping

The main processes associated with the new Logistics Company are warehousing and transport. The first one includes all the activities from unloading raw materials to shipping garments to retail stores. The Fast Fashion Department, the Administrative Department of the Logistics Company, and its central warehouse are the main stakeholders involved. The warehousing process can be split in three different parts: the inbound sub-process, which encompasses all the activities until the unloading, the warehouse sub-process, and the outbound sub-process, including those tasks carried out after picking. The process begins with the check of the bill of lading of the incoming items. If the control is positive, the unloading is authorized and the inbound sub-process finishes. The warehouse sub-process defines the activities carried out in the central warehouse. Garments arrive at the warehouse with a label applied by the supplier during the production phase. This label gives information about the model, the fashion season, and the size. Through a sampling, some garments are inspected in order to check their quality. If the items have to be urgently delivered to retail stores, the outbound process is directly activated through a cross-docking procedure. Because the cost of potential mistakes made during cross-docking is lower than the cost associated with a late delivery, some warehouse operations are avoided in order to save time. Instead, not urgent items go to the count phase. All the items are counted in case of new suppliers; a sample count is applied otherwise. After this stage, the items are ready to be stored based on the fashion season, the model, and the size. When the warehouse operator receives an order, the picking process is carried out and then the dispatching preparation phase can be performed. Items are processed by two automated sorting conveyor systems, one for folded garments and the other for hung garments, and are associated to customers through an

identification number. The package is then carried out by an operator that also controls if the items match with the order. Items that cannot be managed by the sorter because of their dimensions are processed separately, in a manual way. The outbound sub-process includes the measurement of the weight, and the loading of the consignment. After that the transport process starts. Deliveries are managed by the Transport Office and are carried out through logistics service providers (LSPs) that collect the items in the central warehouse. It is worth mentioning that, until recent years, the Fast Fashion Company used to send its products to a network of regional platforms, which served as consolidation centers for several local retailers. The new Logistics Company instead relies on a more centralized distribution process, enabling shorter lead times to stores. As a consequence, the number of deliveries is increasing, leading to the need for the Fast Fashion Company's management to rely heavily on the integration between the internal warehousing process and the LSPs' distribution process.

6. KPI definition and classification

The knowledge provided by the process mapping task as well as the analysis of the structure of the Logistiqual model allows to understand the critical areas and activities that need to be monitored. Together with the management and the personnel of the Logistics Company the specific aspects to be measured are identified. Then, based on the analysis of existing literature and the company experience appropriate performance indicators are defined. In particular, both operational and economic KPIs are considered in order to evaluate not only how efficiently the Logistics Company carries out its activities but also how such performance influences economic outcomes. The following sections discuss relevant indicators in detail together with the results of the validation test.

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6.1 Operational performance indicators

Operational performance indicators assess factors having relevant impacts on competitiveness, such as time, quality, flexibility, productivity, and inventory availability. As mentioned in Section 3, operational KPIs for the Logistics Company at issue are selected and classified according to Logistiqual model. Appendix A shows the complete operational performance dashboard.

6.1.1 Tangible components

The Tangible Components macro-class of Logistiqual basically includes KPIs assessing the performance of the central warehouse and the productivity of its personnel and facilities.

Among them, "Sorter utilization" is an interesting metric given the importance of the automated sorting conveyor systems in the warehouse sub-process. In fact, it allows to monitor the daily utilization of these machines. The KPI is measured for the two sorting conveyors separately and is defined as follows:

$$Sorter\ utilization = \frac{Nº\ of\ hours\ of\ operation\ in\ a\ day}{Daily\ production\ capacity}$$

If overtime is not scheduled, the production capacity of each sorting conveyor system is equal to 10 hours per day. On average, the utilization of the folded garment conveyor ranges between 30% and 130%, when the quantity of items to be processed requires working more than 10 hours per day. The utilization of the hung garment conveyor is between 10% and 90%. Considering the nature of items involved in this process, there is a high need for a dynamic, flexible and fast warehouse, requiring therefore more automation.

The percentage of utilization of the warehouse is expressed by the indicator "Warehouse utilization", which is computed on a daily basis.

$$Warehouse\ utilization = \%\frac{Nº\ of\ stored\ items}{Nº\ of\ items\ that\ can\ be\ stored}$$

This KPI can be evaluated for both folded and hung garments separately or for all the kinds of items together, irrespective of their size. Nonetheless, it is considered an accurate indicator for medium-sized garments, which accounts

for the most percentage of stored items. This KPI is meaningful for at least two reasons. First of all, it returns a clear indication of the seasonality of sales: in fact, it reaches its peak, which is around 65%, in the early months of each season, which are February and August. In addition to this reason, the warehouse utilization can be used to estimate potential revenues deriving from renting out space during the off-peak periods. Figure 1 shows the warehouse utilization for folded garments, from January 2012 to October 2012.

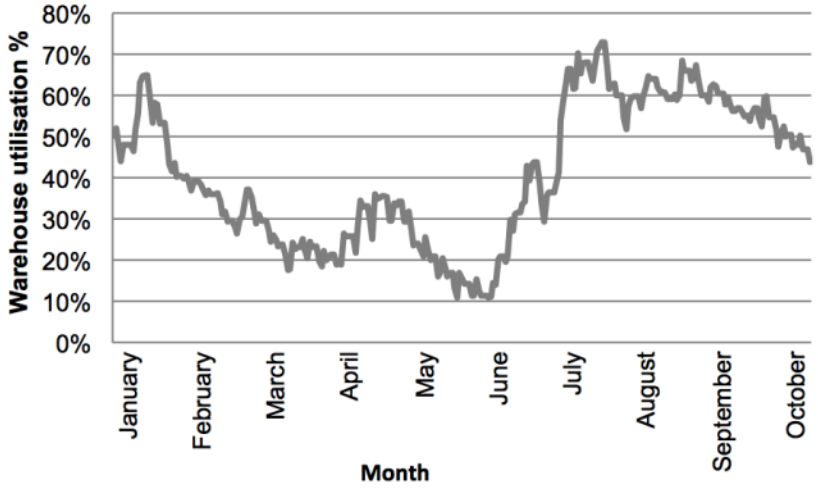

Figure 1: Warehouse utilization for folded garments

The global performance of the warehouse can be expressed by the "Number of items dispatched per hour":

$$Nº\ items\ dispatched\ per\ hour = \frac{Nº\ outgoing\ items\ in\ a\ day}{Nº\ working\ hours\ in\ a\ day}$$

This indicator is also a proxy of productivity, which is here evaluated based on the number of outgoing items because the activity of preparing garments for dispatching is the most time consuming one in the warehousing process. The application of the metric to past data shows that the number of items

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dispatched per hours goes from a minimum of 30 units to a maximum of 320 units, depending on the size of orders and the characteristics of the items to be processed.

Finally, the effectiveness of the inventory management strategy can be controlled by "Inventory turnover":

$$Inventory\ turnover = \frac{Nº\ outgoing\ items}{Average\ nº\ items\ in\ stock}$$

This KPI is measured on a monthly basis and enables to assess how many times the inventory is renovated in such period. Figure 2 shows the values of Inventory turnover from January to September 2012.

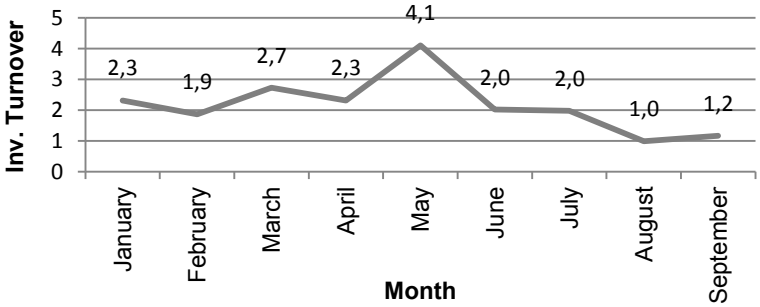

Figure 2: Inventory turnover

6.1.2 Ways of fulfillment

Many aspects can be measured by the Logistics Company in the Ways of Fulfilment macro-class of the Logistiqual model. For a fast fashion organization, whose competitive advantage is mainly constituted by time, three issues are worth to be mentioned: the flexibility to quickly accommodate every kind of order, the timeliness of deliveries, and the total flow time of items in the warehouse.

One important aspect related to the flexibility of the service provided by the Logistics Company is its capability to process not ordinary orders. This capability is expressed by the indicator "Ability to satisfy not ordinary orders":

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$$Ability\ to\ satisfy\ not\ ordinary\ orders = \frac{Nº\ of\ not\ ordinary\ orders\ satisfied}{Total\ nº\ of\ not\ ordinary\ orders}$$

Table 1 shows the values assumed by the KPI from January until September 2012 for national deliveries. The data show a very high level of service provided.

Month	Total nº of not ordinary orders	Nº of not ordinary orders satisfied	Ability to satisfy not ordinary orders
January	3	3	100%
February	21	21	100%
March	6	6	100%
April	11	11	100%
May	1	1	100%
June	9	9	100%
July	21	21	100%
August	16	16	100%
September	8	7	88%
Total	**96**	**95**	**99%**

Table 1: Ability to satisfy not ordinary orders

“Time for managing not ordinary orders” calculates the time from the request for a not ordinary order issued by the Sales Department of the Fast Fashion Company and the arrival of a logistics provider at the warehouse to perform the service. It mainly assesses the efficiency of the Transport Department. Fast fashion requires supply velocity and thus order management procedures are as standard as possible. Therefore, not ordinary orders are connected to opening, closure or revamping of retail stores. They need to be carefully managed in

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order to comply with the timing of these planned events. The metric is assessed every month. Past performance proves that the focus organization is able to fulfill such orders in about 0.5 days.

"% on time deliveries" allows the Transport Department to monitor the performance of the LSPs. It is measured on a daily, weekly or monthly basis as required:

$$\%\ on\ time\ deliveries = \frac{Nº\ on\ time\ deliveries}{Total\ number\ of\ deliveries}$$

The number of on time deliveries is obtained by calculating the indicator "Delivery time" (Lead time sub-class of Logistiqual) for each delivery and comparing it with the standard value corresponding to the geographical area where the customer is located. If the actual delivery time is less or equal to the standard time, the delivery can be considered on time. Table 2 presents the values assumed by the KPI from June until September 2012 for national deliveries. As it can be seen, most of the deliveries have been performed on schedule.

Area	Jun-12	Jul-12	Aug-12	Sep-12
North	93%	96%	84%	93%
Center	91%	93%	81%	87%
South	88%	94%	74%	86%

Table 2: % on time deliveries - Italy

Finally, "Total warehouse flow time" is a useful indicator to evaluate the performance of the warehouse sub-process. It gives the average number of days between the time an item enters the warehouse and the time it leaves it. The Logistics Company computes the KPI on a monthly basis as:

$$Total\ warehouse\ flow\ time = \frac{Average\ nº\ items\ in\ stock}{Average\ number\ of\ outgoing\ items\ per\ day}$$

Names of the authors will be added from the website.

The total warehouse flow time from January until September 2012 is around 10-15 days except for August when it reaches one month. This is due to a decision to bring forward the suppliers' delivery of items for the incoming fashion season, with a consequent increase in the average level of inventory and in the warehouse flow time. This also influences the value of the KPI in September (Figure 3).

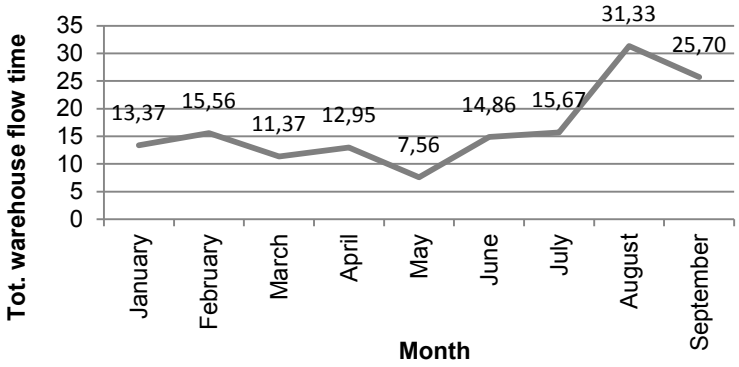

Figure 3: Total warehouse flow time

6.1.3 Informative Actions

The Informative Actions macro-class includes metrics concerned with the time to solve problems about the order fulfillment process, the level of customer satisfaction, the management of products after they have been delivered to retail stores, and the easiness of use and effectiveness of the Fast Fashion Company website.

The metric "Customer satisfaction" is measured on a yearly or seasonal basis and is defined as:

$$Customer\ satisfaction = 1 - \frac{Nº\ of\ claims}{Total\ nº\ of\ deliveries}$$

Before the creation of the Logistics Company, customer claims were managed by the Sales Department of the Fast Fashion Company in collaboration with the

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Logistics Department. The new Logistics Company aims to deal with claims by directly interfacing with the retail store managers.

"Website accessibility" and "Easiness of online operations" assess the Fast Fashion Company website that, besides giving information about products, also supports the retailers' interaction with the company. They can be measured once a year through an online questionnaire to retailers. These are quite important aspects because the website should facilitate retailers' operations with a consequent indirect benefit for final consumers.

Customer satisfaction depends on several aspects. One important aspect can be identified with the number of incorrect deliveries, which is expressed by the indicator "% incorrect deliveries". A delivery is defined as incorrect in case of a missing item, or when it contains more items than ordered.

$$\%\ Incorrect\ deliveries = \frac{N^{\underline{o}}\ of\ incorrect\ deliveries}{Total\ n^{\underline{o}}\ of\ deliveries}$$

In order to be effective, this KPI is computed on a weekly and monthly basis.

Figure 4 shows the value of the KPI for the first 36 weeks of 2012 (from January until September). It is worth mentioning that a significant correlation between the peak of deliveries and the level of service provided exists. In fact, faults in the delivery service are more frequent when more deliveries are performed.

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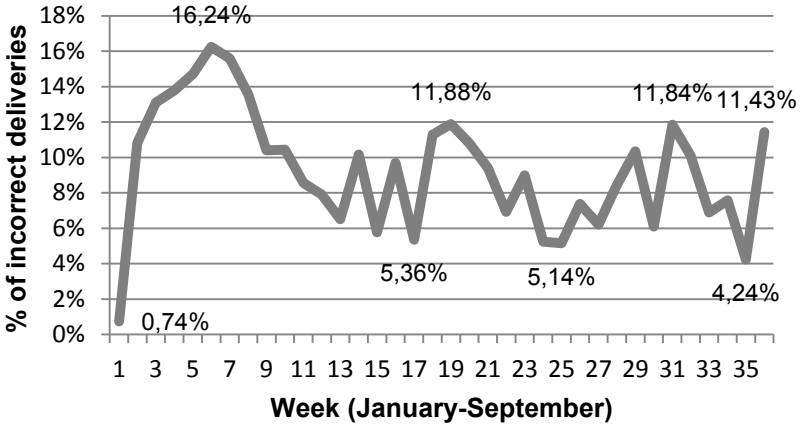

Figure 4: % of incorrect deliveries

6.2 Economic performance indicators

The economic indicators are mainly costs associated with the two processes of the new Logistics Company: warehousing and transport.

Warehouse management costs can be divided into overheads, labor costs, and in-sourcing costs. Overheads include energy costs, maintenance expenses, assurance costs, amortization, etc. They are fixed costs that do not change with the quantity of items that are processed. Labor costs are represented by the salaries of the employees of the Logistics Company and again they do not depend on the quantity of items. Finally, in-sourcing costs refer to temporary workers whose salary depends on the number of items processed. Therefore, a value per item can be defined for such costs.

Transport management costs are based on yearly contracts with logistics service providers that define the cost of the service either per item or per container. These values depend on the distances, the volumes, and the frequency of shipments. In the case of fast fashion, air shipments, which are paid according to either the weight or the volume of products, are rare as well

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as full truck loads. Transport costs can be monitored for each different geographical area that is served.

7. Discussion

Developing independent logistics companies is a strategy to focus on core competences while ensuring a direct and complete control on supply chain activities that is not possible if logistics operations are outsourced to LSPs. However, the approach is effective only when these new organizations are sustainable from both an operational and an economic point of view allowing achieving the promised benefits in terms of costs, time, and level of service.

This contribution develops a dashboard of indicators to measure the performance of a recently founded independent logistics company in the fast fashion industry, where short lead times and superior quality are key competitive factors. The proposed approach provides the case organization with a structured methodology to quantitatively assess the behavior of its logistics system as well as the associated effects on customers. This assists in constantly monitoring processes and controlling them by implementing policies to have performances meet the business goals. Furthermore, the implementation of the dashboard stimulated information sharing among the Logistics Company's functions as well as motivated people to operate in order to achieve the set goals. From a methodological point of view, such approach benefits from adapting a well consolidated performance evaluation model in order to reflect the actual conditions of the processes under consideration. Logistiqual revealed to be a valuable model for monitoring logistics processes. In fact, its taxonomy of performance dimensions allowed to focus on all the relevant activities that need to be controlled. Additionally, it led to the identification of KPIs that can be easily calculated with the data already available in the information system of the Fast Fashion Company.

Names of the authors will be added from the website.

The suggested methodology can be useful not only to define a new performance measurement system but also to update an existing one according to the changing needs of an organization.
The work poses some limitations. First of all, the developed method requires a strong organizational commitment in order to be applied, which may lack in some companies. Also, the suitability of the dashboard for the Logistics Company has been just validated through its application to past data prior to the actual adoption by the firm at issue. A post validation of the outcomes of its implementation should be performed in order to fully state the effectiveness of the approach. Moreover, the economic part of the dashboard is less developed than the operational part, also due to the fact that the Fast Fashion Company was traditionally more focused on assessing operational performance. In order to complete the measurement system, it would be appropriate to define stronger relationships between operational and economic KPIs. Finally, it would be interesting to study how the proposed approach works in different industries and how it should be modified to comply with their peculiar characteristics.
This is where future research is directed. In collaboration with the Logistics Company the authors are planning to monitor the results of the application of the dashboard over an appropriate period of time in order to check their consistency and refine the measurement system should it be necessary. After that, the operational activities determining the economic performance and the related KPIs will be identified and analyzed in order to understand the economic impact of a given level of service. Finally, the dashboard will be tested in multiple cases and industries.

8. Conclusions

The work proposes a dashboard of KPIs to measure the performance of an internal firm managing the logistics activities for an Italian company leader in the fast fashion industry. The ex-ante validation revealed that this structured set of metrics is able to appropriately reflect the behavior of the Logistics Company

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thus supporting the implementation of strategies to ensure long term organizational sustainability. Further analyses of the outcomes of the implementation of the approach, together with refinements, are required. Also, applying the dashboard to different industries would give insight about its improvement.

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Names of the authors will be added from the website.

APPENDIX A. THE LOGISTICS COMPANY OPERATIONAL PERFORMANCE DASHBOARD

Table 3: Tangible Components Macro-Class

Sub-classes	Indicators
Internal assets	Sorter performance Sorter utilisation Warehouse utilisation N° of items processed per hour
External assets	N° of logistics service providers
Personnel	Productivity of warehouse personnel Productivity of loading/unloading activities Warehouse management productivity N° of items dispatched per hour Productivity of the Fast Fashion Office personnel Productivity of the Transport Department personnel Logistics Company turnover Problem solving attitude
Inventory/ availability	Inventory turnover Inventory accuracy % high errors % medium errors % low errors

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Table 4: Ways of fulfillment Macro-Class

Sub-classes	Indicators
Flexibility	% personalised items
	Item flow time with cross-docking
	% cross-docked items
	Time for managing not ordinary orders
	Ability to satisfy not ordinary orders
	% not ordinary orders
	% customs operations causing delays
	% ordinary dispatches
Service care	Delivery accuracy
	Late shipments
	Item quality
	Logistics service provider reliability
	% on time deliveries
	% deliveries with no damages
	Logistics service provider effectiveness
	% items shipped on clothes hangers
Supply conditions	Vehicle saturation
	Container saturation
	Container optimisation
	Average delivery delay due to container optimisation
	Average N° of items per container
	N° of deliveries per store
	Average N° of items per delivery
	% deliveries of hung items
	Transport mode
	Performance of item transfer between stores
Lead time	Total warehouse flow time
	Delivery time

Names of the authors will be added from the website.

Table 5: Informative Actions Macro-Class

Sub-classes	Indicators
Order management	Time to solve order management problems
After sales	% end of season returns
	Customer satisfaction
	% incorrect deliveries
	% items missing or not in the correct
	% high errors
	% medium errors
	% low errors
E-business	Website accessibility
	Easiness of online operations
	Effectiveness of online notification of wrong

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