Definition of an information control and management tool for direct store delivery suppliers

The Sonae MC Case Study

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Abstract

The economic difficulties experienced over the recent years have been reflected in the profitability of companies, along with a higher competitiveness, and even more sensitive and demanding consumers to the market offerings. In this context, the relationship between suppliers and retailers has gained increased importance, where the performance of each of these entities has direct and reciprocal impacts.

Sonae MC, the company in study in this paper, is one of the several areas of Grupo Sonae, responsible for the food retail business. Through three different insignias - Continente, Modelo and Bom Dia - the company offers a varied and broad range of products to its customers. Sonae MC identified the area related to the suppliers' service levels in the direct store delivery distribution channel as one of the areas for improvement, particularly regarding the performance of the industrial bread's direct suppliers - problem to be studied in this paper. In order to study this problem, it was developed an evaluation model with specific performance indicators for these direct suppliers, allowing the company to obtain the general service level verified, as well as the service level values by category of in store operations. With the application of the evaluation model in two distinct scenarios (two stores from different insignias), it were identified several areas of improvement regarding the direct suppliers' performance, wherein the long run it is intended to get control and continuously improve the service levels associated with this direct store delivery business.

Keywords: channel distribution, direct store delivery, service level, in-store operations, supplier evaluation, performance indicators

1. Introduction

Over the last few years, supply chain management has been receiving further attention as a major performance driver for many companies from different industries. Companies began to realize that their actions affect other supply chain partners and vice versa. In this way, retailers are becoming more dependent on their suppliers, causing that some business results of the companies are therefore related to the performance of its suppliers in the logistics chain (Weele, 2009). Historically, business relationships with suppliers were based on the economic impact of collaborations, rather than on the strategic partnerships that could result from this relationship (Dickson, 1966). Over the years, and with the improvement of the relationships with suppliers, companies have been realizing about the critical nature of these relations, to the point of referring to their suppliers as business partners. Thus, the suppliers' selection and management process has been recognized as a critical process for those companies that want to maintain a competitive strategic position (Chen, *et al.,* 2006).

It is in this particularly demanding environment that an "old" concept – direct store delivery – has become increasingly prominent in the logistics area. Direct Store Delivery (DSD) is a key method of product selling and distribution used in a variety of industries, particularly for the distribution of fresh and perishable products. It

is a business process in which suppliers sell and distribute their products directly to their client's point of sales, and still performing a series of activities or in-store operations, such as replenishment and merchandising (Otto *et al.,* 2009).

It is in this context that the present study appears, in which the main objective of this paper is to develop a supplier evaluation model, to assess the performance of the industrial bread direct delivery suppliers – companies Bimbo and Panrico – of the Portuguese company Sonae MC. By implementing the model and through certain indicators, it is intended to measure the performance of these suppliers in the activities they undertake in the company stores, since up to date there is no representative data of this performance. Additionally, to complement the data obtained from the evaluation model, it is intended to be built a management and information tool – management information dashboard – from the suppliers' evaluations results. The idea associated to this dashboard is to provide constantly updated management data to the industrial bread's category manager, regarding the service levels achieved.

In order to achieve the desired goal, this paper is structured as follows: in the Section 2, the literature about direct store delivery and supplier evaluation methods is reviewed; in Section 3 the problem in study is presented, as well as some of its features and particularities; in Section 4 the methodology created and used is presented; Section 5 presents the results of the implemented methodology, showing supplier performance data from two different scenarios (two stores of different realities); finally in Section 6 some conclusions and future work are drawn.

2. Literature Review

2.1 Direct Store Delivery (DSD)

In accordance to the literature, direct store delivery can be defined as a business process in which suppliers sell and distribute their products directly to the sales point (Point of Sales - PoS) or point of consumption (Point of Consumption - PoC), including additional product and marketing services, as merchandising, information collection, or equipment service, bypassing any retailer or wholesaler logistics (Otto *et al.,* 2009). According to an extensive survey aimed to the consumer goods retailers in the United States, conducted by the Grocery Manufacturers Association (GMA Study, 2008), this distribution channel structure represents 25% of the grocery store volume and 52% of retail profit. Product categories that have fast turnovers as soft drinks, fresh and packaged goods are the most common to the practice of direct store delivery (GMA Study, 2008; Chen *et al.,* 2008; Otto *et al*., 2009).

The main advantages of the direct delivery process for the logistics area are the following: DSD ensures faster supply cycles; it allows the products to be properly handled, and ensures a better product presentation on the shelf; reduces the inventory level; it also reduces the number of out-of-stock product times on average. There are other advantages, related to the sales and marketing areas, like as the fact that allows a better product communication, without obstacles and deterrents to customers and consumers; it also increases the company's profitability, the efficiency on introducing new products and promote the effectiveness of product promotions (Otto *et al.,* 2009).

2.2 Supplier Evaluation Methods

The link between efficient management of retailer-supplier relationship and competitive advantage has been reported by several authors in the literature (Gordon, 2008; Sarkar & Mohapatra, 2006; Talluri & Sarkis, 2002). In a study by Laarhoven *et al.* (2000), it was shown that in those supplier-retailer relationships where there is a strong emphasis on performance reviews, better successful results were achieved rather than in those relationships where there is less focus on performance.

Thus, in order to measure the supplier performance, it is necessary to create some performance indicators. Indicators that measure performance within or outside of an organization can be configured in various ways, but an indicator should be created in order to meet the following parameters presented by Franceschini *et al.* (2007): i) be representative; ii) be easy and simple to interpret; iii) be quick and easy to update; iv) be sensitive to changes within or outside the company; v) be easy to collect and process in terms of quantitative data; vi) be able to indicate trends over time.

Now regarding some evaluations methods, the balanced scorecard (BSC) is a strategic measurement model that integrates financial and non-financial measures. BSC does not focus on historical data, but data from the past is used to generate information for the future. Past performance is complemented with drivers' performance measures for future performance (Bhagwat & Sharma, 2007). Kaplan and Norton (1996) proposed the balanced scorecard tool for assessing performance through four perspectives: financial, internal process, customer, and learning and knowledge. With BSC, company's mission and business strategies can be translated and converted into targets and measures in the four perspectives described above. Then, the model can provide a basis for companies' strategic management system (Kaplan & Norton 1996).

Scorecards and supplier rating (or vendor rating) are among the most common methods for evaluating supplier performance, as well as methods such as site visits, questionnaires, third-party assessment, and/or internal or external certifications (Gordon, 2005; Weele, 2009; Wheaton, 2009).

At last, in the literature, there are many authors who have made different types of studies that focus, or at least suggest, different ways to implement a supplier evaluation system into a company's business strategy (Bourne *et al.,* 2007; Cohen & Roussel, 2013; Gordon, 2005; Ross *et al.*, 2006; Vokurka *et al.*, 1996) . Gordon (2005) presents seven steps to implement and evaluate the suppliers performance: 1. Align supplier performance targets with the company objectives; 2. Define an evaluation method; 3. Develop a method to collect information about the suppliers; 4. Create and develop a vigorous evaluation system; 5. Implement a supplier performance evaluation system; 6. Provide feedback to suppliers about their performance; 7. Produce results by measuring the supplier performance.

3. Case Study

3.1 Brief description of the industrial bread supply chain

The industrial bread supply chain is outlined in figure 1. The responsibility of the ordering operation is of both supplier's distributors (mainly) and/or company's store employee (responsible for the ordering operation), in which existing stocks are managed and controlled, and orders are placed. The production operation, performed by the suppliers, involves the fulfillment of production plans in accordance to orders placed by the stores. Then, the distribution operation is carried out by the suppliers' distributors, whose function is to deliver the goods into Sonae MC stores. Finally, in-store operations involve the reception, storage, shelves replenishment, product management (returns) and ordering suggestion. These operations are mainly performed by the supplier's representative, but can also be done by the store employees (rare exceptions).

3.2 Service Levels

Considering that the industrial bread suppliers' distributors (or representatives) are the primarily responsible for most of the operations performed at Sonae MC stores, it was conducted a study in 24 different stores of the company. The objective of this study was to determine the actual status-quo in terms of existence of some kind of operations control,

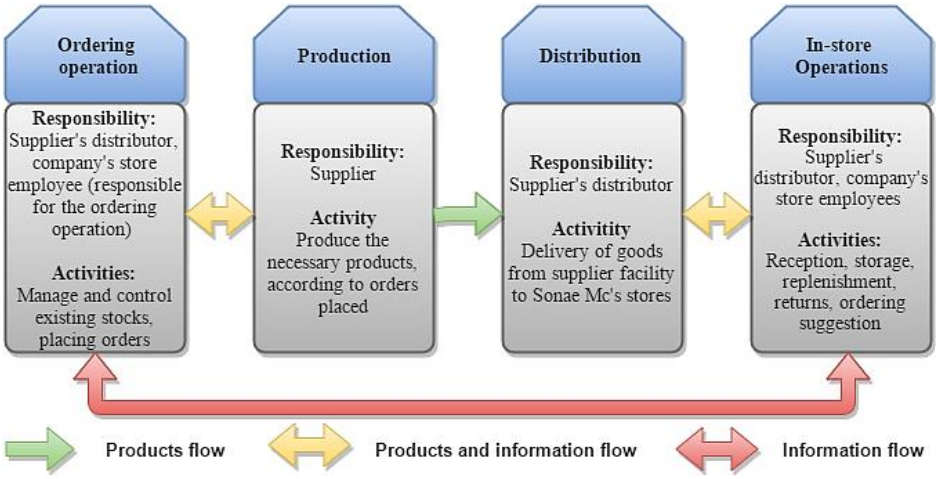


Figure 1 – Industrial bread supply chain operations – Direct store delivery channel

considering the principle operations or areas such as: reception, replenishment, ordering, product management and returns. It was concluded that there is a general lack of control in operations performed by the suppliers' distributors, as well as the measurement of their performance. Among the main observations, it follows that:

• In only about 37% of the visited stores exists some kind of control on the distributor's punctuality;

• In about 70% of the stores – which corresponds to 17 stores – there is not a monitoring on the quantities ordered/indicated and subsequently delivered by the distributor;

• Only in 7 stores – 29% of the number of shops visited – there is a control regarding the replenishment operation of the products (and their presentation thereof) on the shelves and islands (promotional spaces); and in 46% of the stores there is no kind of control;

• What regards the multi-replenishment issue, in 13 stores (54%) there is not any kind of multi-replenishment on a sales day, which means that if this replenishment is not performed by the store employees, then it will not be performed at all on the day in question;

• Lastly, which concerns the product and returns management, only distributors acting on 4 stores collect the products (as returns) whenever they exist; the most usual trend, observed in 54% of the stores, is the returns' collection 2-4 times per week, which may have some implications in terms of management and logistics store warehousing.

4. Methodology

4.1 First Stage – Definition of the performance indicators

Thus, taking into account the theoretical support (BSC, scorecards and supplier/vendor ratings) and the critical points observed in stores visits, they were defined five categories/operations that are related or directly affect the in-store service levels, and they are: reception, replenishment, supply/provision service, product management and returns and communication and relationship. The defined performance indicators that characterize each one of these categories are described in table 1. Regarding the performance rating scale, the decision-maker of this work – the director of Sonae MC's bakery business unit – has decided that the minimum acceptable level would be 50%. Therefore, the base level implemented in each indicator was as follows: 0% for an unacceptable level; 50% is the minimum acceptable; 75% for an intermediate value; 100% is the desired or ideal service level.

4.1.1 Questionnaire survey and weights determination

Prior to the weights allocation for the categories and indicators, it was carried out a questionnaire to the bakery section chiefs of Sonae MC's stores. This questionnaire was submitted to all the 3 types of stores (insignia Continente, Continente Modelo and Continente Bom Dia), and was aimed to collect data on the importance classification of the indicators developed throughout this work. In the questionnaire, consisting of three sections, it was only asked to the stores employees to ordering by importance order the categories and indicators under study. This in order to collect data sample than can subsequently be translated into relative weights.

Regarding to the weights determination, in the literature, several authors suggest specific functions to assign weights to rated indicators. Stillwell *et al.* (1981) presented three functions or different techniques: reciprocal rank, rank sum and rank exponent weights. Solymosi and Dombi (1986) and Barron (1992) proposed the rank order centroid weights technique. Lootsma (1996) suggested two geometric types of assigning weights. Of the methods mentioned above, the chosen one used in the present work, with the aim of determining the weights of the different categories and indicators, was the rank order centroid (ROC) method. The justification for this choice, was due to the fact that the weights obtained by the ROC method have a more appealing theoretical basis, and appear to perform better in terms of accuracy choice than other rating based schemes (Ahn & Park, 2008). The formula that represents this methodology for weights determination it is presented in equation 1:

$$w_i\,(ROC) = \frac{1}{n}\sum_{k=i}^{n}\frac{1}{r_k} \qquad [1]$$

where:

- w_i indicates the relative weight of indicator *i*;
- n is the total number of indicators;

- r_k represents the classification or rank of the indicator *i*, being *i* = 1, 2, … *n.*

By applying this method, it was possible to determine the weights for the categories/in-store operations and performance indicators that characterized the evaluation model developed. All the values obtained from the ROC method are presented in table 1.

Table 1 – In-store operations, performance indicators and weights assigned

In-store operations	Perfomance Indicators	Relative weights	Absolute weights
Reception	Punctuality (delivery)	52%	16%
	Order fulfillment	24%	
	Quality of the goods	16%	
	Transport conditioning	12%	
Replenishment	Punctuality (shelves replenishment)	45%	45%
	Time spent	4%	
	Planogram compliance	26%	
	Multi-replenishment	16%	
	Product rotation/turnover (FEFO)	9%	
Supply/provision service	Suggested order amounts	61%	26%
	Responsiveness	11%	
	Stockout level	28%	
Product management & Returns	Regularity of returns collection	75%	9%
	Product identification & management	25%	
Communication & Relationship	Flexibility & helpfulness	61%	4%
	Communication of potential problems	11%	
	Communication of immediate needed changes in store	28%	

4.2 Second Stage – Development of the supplier evaluation model

Once defined the performance indicators, the operations in-store or direct delivery categories, and the established weights, it was carried out the development of the evaluation model. The model construction took into account the existing resources on the implementation stores, and such considerations as be simple to use, practical and intuitive, so as to facilitate the employees evaluation and do not take too much time to perform. Therefore, and although there are many formats for suppliers monitoring and evaluation (Gordon, 2008), the evaluation model was developed in Microsoft Excel. This selection was due to the ease of implementation, the reduced (inexistent) cost, the flexibility and the innumerous features that characterizes the Excel application.

In figure 2, are presented two illustrative representations of the developed model. The image on the left corresponds to the home menu screen, while the right side shows a template of some category assessment. The role of the person in store responsible for the evaluation is very simple: he/she only has to register the suppliers performance observed over the week, for the defined categories.

4.2.1 Mathematical model for service levels determination

Regarding the service levels observed in store, these can be obtained from the developed model. Taking into account the supplier's performance on the various indicators and their associated weights it is possible to obtain the operational service level for each category of the direct delivery business. The service level verified for each category and in general (or final) is automatically calculated on the evaluation model in store. The mathematical operations that the model runs to determine the service levels – by category and general – are shown below:

For the service level per category: the service level is calculated by doing the sum of the multiplication of each indicator's weight by the respective performance score assigned by the store employee. Equation 2 represents the formulation for the service level calculus within each existing category:

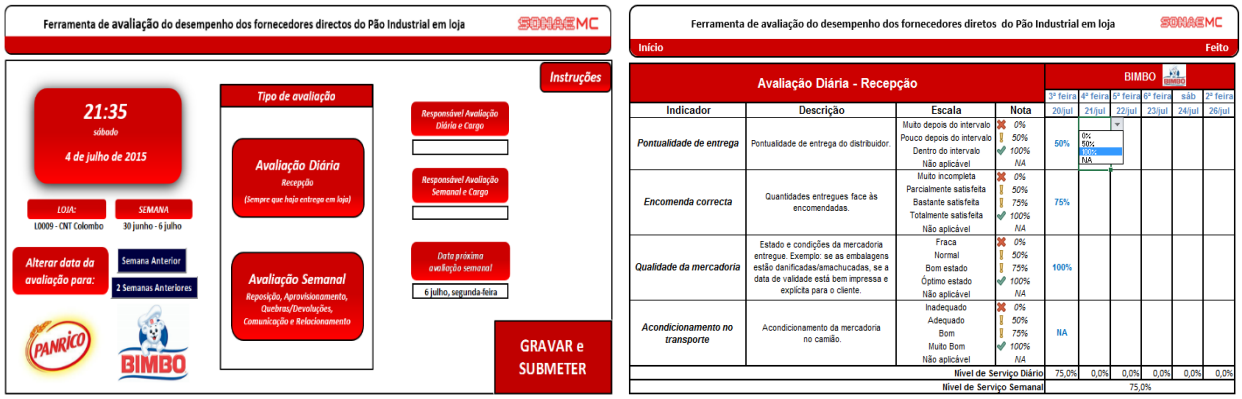


Figure 2 – Illustrative representations of the supplier evaluation model

$$Service\ Level_{operation}\ (\%) = \sum_{i=1}^{n} (Performance_i \times Relative\ weight_i) \quad [2]$$

where:

- n indicates the number of indicators i, belonging to the operation/category, being $i = 1, \dots, n$;
- $Performance_i$ (in %) refers to the supplier performance registered in the indicator i;
- $Relative\ weight_i$ represents the weight assigned to the indicator i.

As regards the final or general service level, this is calculated by multiplying the sum of the service levels verified in the different categories by their respective and assigned weights. Equation 3 shows the representative formula for the final or general service level calculus:

$$Service\ Level_{final}\ (\%) = \sum_{j=1}^{c} (Service\ Level_j \times Absolute\ weight_j) \quad [3]$$

where:

- c indicates the number of operations/categories j, being $j = 1, \dots, c$;
- $Service\ Level_j$ refers to the service level verified at category j;
- $Absolute\ weight_j$ represents the weight assigned to category j.

4.3 Third Stage – Information consolidation process

In order to be possible the construction as well as the sustained and continuous development of a management dashboard, it is necessary that the model assessments made in stores (via excel) to be transmitted to the commercial department, in the form of management and information data, concerning the suppliers performance in study. It is therefore necessary to create a database to register all the necessary data obtained from the evaluations in store. This database should be automatically updated with new evaluation data records. That said, it was developed an information consolidation process, represented as a scheme in figure 3, which was complemented with the use of tools such as Microsoft Excel and Access and their features (macros, hyperlinks, mathematical functions, etc).

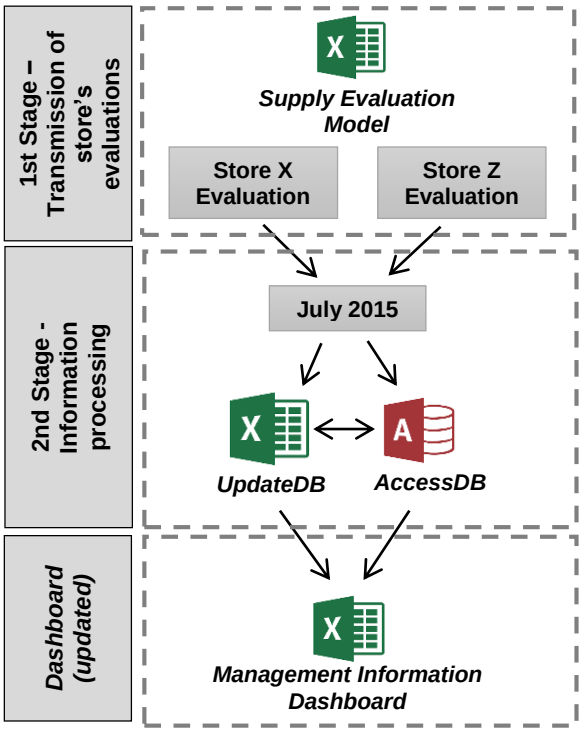


Figure 3 – Data transmission and consolidation process from Sonae MC stores to commercial department

5. Results

In order to test the methodology developed, the supplier evaluation model was implemented in two very distinct stores, CNT Colombo and MDL T.Merces, (considering such things as impact on sales and dimensions), over the period of 3 months – since June until August of 2015 – and analyzing the performance of just one of the industrial bread suppliers – Bimbo company. A minimum desired service level of 80% was set. By observing the graph of figure 4, it is possible to analyze the service levels evolution over the period. It can be concluded that were carried out 14 evaluations to the supplier performance in these two stores. Given this number, it can be stated that in the Colombo store 8 evaluations revealed a performance below the standard required, while in the remaining 6 evaluations the average service level was positive, about 85%. Regarding the MDL T.Merces store, for only 2 times was registered an acceptable service level value – in the first 2 weeks of June. In the other 10 assessments, the average service level was 75%, with the worst records being verified in August (71 and 72%). In both stores, the worst service level values were registered in August, which can be a standard problem or pattern regarding the supplier representative performance: this service level

decrease (from July to August) may be related to the transition from a normal month of sales to a seasonal month.

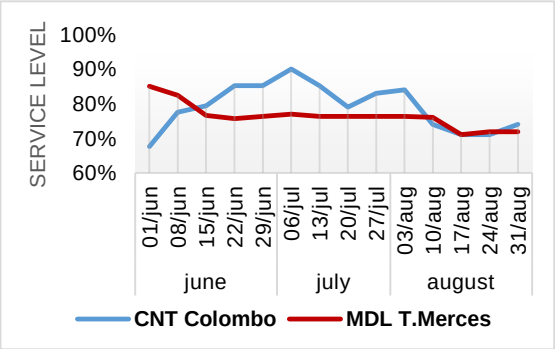


Figure 4 – Weekly service level evolution on selected stores

Then analyzing the graph presented in figure 5, it can be concluded that there is an inverse proportionality between the service levels and sales. In the two stores, there was an increase in sales between the months of June and August (around 5000€ for the Colombo store and 1500€ regarding the Merces one). However, and excluding only the month of July on CNT Colombo, service levels decreased in both stores. Therefore, this denotes an opportunity for improvement that should be explored by the company's responsible manager, in which by demanding a better performance from suppliers, could enhance sales further. Also, taking into account the seasonality question (August, main peak of summer), it must be identified some possible patterns during this time. All of this in such a way to avoid similar future situations, in order for suppliers being properly informed and take more worries – like store reinforcements – during these seasonal periods, by alerting their representatives for a greater need and better service provided to follow the increase in sales.

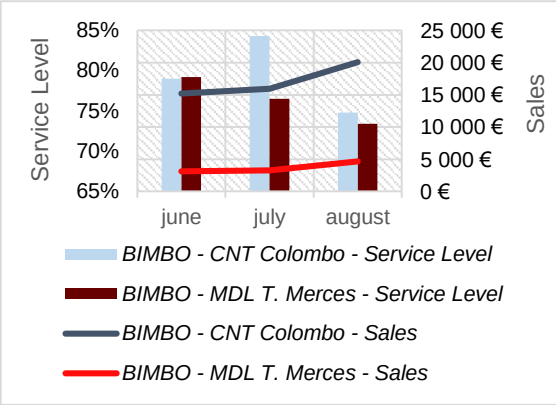
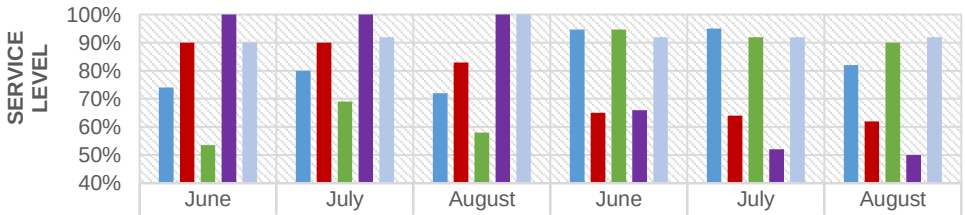


Figure 5 – Comparison of service level evolution with the sales on selected stores

Now it follows in figure 6 the service level evolution by category on the selected stores. Subsequently, it is presented next the analysis of the service levels for the categories in which the supplier performance was the worst, for each store (two different scenarios). For the remaining observations, it will only be considered the months of July and August, since it is intended to be determined the performance differences in this transition period – between a normal month of sales and a seasonal one.

5.1 Scenario 1

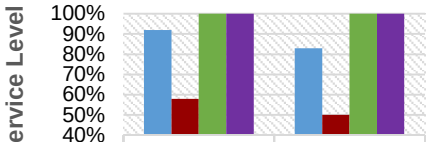
Therefore, and considering first the CNT Colombo store, in figures 7 and 8 there are presented two representative graphics of the service levels verified for the reception and supply/provision operations. In figure 7, it is possible to observe that of the four indicators comprising the category, it is on the order fulfillment indicator that the supplier's distributor has been performing worse, with very low service level values (58% and 50%).



	CNT Colombo			MDL T.Merces		
	June	July	August	June	July	August
Reception	74%	80%	72%	95%	95%	82%
Replenishment	90%	90%	83%	65%	64%	62%
Supply/provision service	54%	69%	58%	95%	92%	90%
Product management & returns	100%	100%	100%	66%	52%	50%
Communication & relationship	90%	92%	100%	92%	92%	92%

Figure 6 – Service level evolution by categories/operations on selected stores

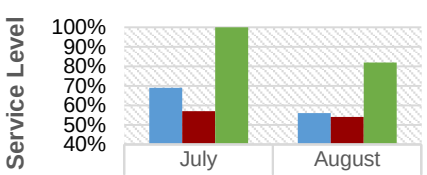
Having regard to what was defined and it is present in the evaluation model criteria, this performance score is equivalent to 2 months of very incomplete orders. This situation compromises the availability of the product in store, making it impossible to maximize sales – one of the major Sonae MC's objectives.



	July	August
	Reception - CNT Colombo	
Punctuality of delivery	92%	83%
Order fulfillment	58%	50%
Quality of the goods	100%	100%
Transport conditioning	100%	100%

Figure 7 – Service level evolution for the reception category – CNT Colombo

Now considering the figure 8, it is intended to analyze which indicators reflected a level of very negative values on the supply/provision category (69% in July and 58% in August). By observing the graph in the figure 8, it is possible to identify that on two indicators – suggested order amounts and stock out level – the average performance of the supplier was much lower than required, with values around 50%. The indicator referring to the suggested order amounts, where performance fell for 13% between the two months, it can be concluded that the suggested order amounts made by the distributor are inconsistent with the store reality and true needs. In which concerns the stock out level indicator, the registered service level for August it has also decreased, and the observed value (54%) corresponds to an average frequency of stock outs in store (promotional



	July	August
	Supply/provision Service - CNT Colombo	
Suggested order amounts	69%	56%
Stockout level	57%	54%
Responsiveness	100%	82%

Figure 8 – Service level evolution for the supply/provision service – CNT Colombo

articles) around the 3/4 days per week. Once again, all this information must be communicated to the supplier, since these service levels are unacceptable and may have direct consequences for Sonae MC.

5.2 Scenario 2

Considering now the scenario 2, for T.Merces store, the service levels evolution in the replenishment and product management (and returns) categories are represented in the graphs of the figures 9 and 10. Regarding the replenishment operation (figure 9), there was no sharp fall related to the service levels from July to August. However, it is worth noting the service level verified in the multi-replenishment indicator, that represents the absence of this operation particularly in these type of stores. This is one of the most important indicators to retain from the supplier evaluations, since the reinforcement in the replenishment operation can solve many in-store problems. Also in this category, it was verified an average service level of 69% for the punctuality indicator. This, unlike the multi-replenishment issue, it is something that can be solved almost immediately.

	July	August
	Replenishment - MDL T.Merces	
Punctuality	69%	69%
Time spent	100%	100%
Planogram compliance	82%	75%
Multi-replenishment	0%	0%
Product rotation/turnover	88%	82%

Figure 9 – Service level evolution for the replenishment category – MDL T.Merces

It is shown in the figure 10 the service level evolution for the product management and returns category on the T.Merces store. By observing the chart, it can be concluded that the distributor's performance was much lower than the desired (80%) for the two indicators. Regarding the regularity of returns collection indicator, the average level verified was even lower than 50%. This means that the supplier's distributor generally accumulates a lot of disposable products on the store warehouse.

Allied to this poor performance, the average service level for the indicator related to product identification and management on the store's warehouse, was about 69% in August. With these two negative performances (but mainly the one verified in the first indicator), it can be concluded that the distributor does not contribute to the proper running of the store warehouse, which can cause some logistical problems to the store.

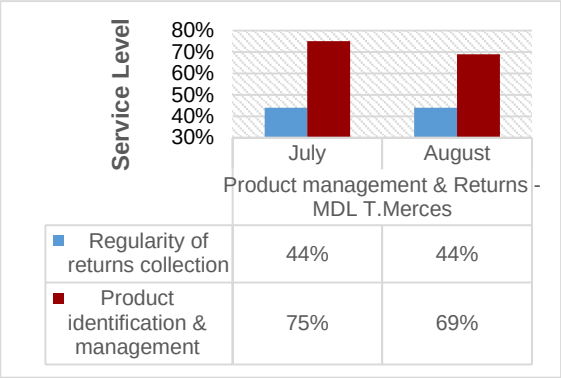


Figure 10 – Service level evolution for the product management & returns category – MDL T.Merces

Finally, and to complete this section, it can be stated that with this type of analysis, it is possible to identify performance standards and service levels verified over different periods of time. Additionally, it can be created a recorded history, and based on that, it would let the company to handle better possible similar future situations. Using the management dashboard, the responsible manager can get all the necessary comparisons, considering that there is available evaluation data from such periods. Taking into account the service levels verified, it is also recommended for the manager to inform the supplier about the most concerning results, wherein the supplier should take immediate actions to ensure that its representatives' performance is improved.

6. Conclusions

In this paper, it was developed an evaluation model in order to determine the service levels of the industrial bread direct suppliers of Sonae MC company. The direct store delivery business is characterized by being performed mostly by the distributors' suppliers, and so this study arose from the company's need to obtain quantitative data on these suppliers performance at their stores, regarding the various areas/operations of activity. The developed model, which comprises a series of performance indicators corresponding to the five categories/fields of the direct delivery business, provides the company with quantitative data values about the general and by category service levels, which were unknown up till now.

Concerning the analysis of the results from the model application, this was performed in two distinct stores (two different scenarios) of Sonae MC, in order to identify and distinguish the supplier's performances in different contexts and situations (different types of store, impact on sales and size). Given the observed results, it was concluded that the trend of the service levels in the two stores was similar over the evaluation period of 3 months, in which the transition of a normal sales month (July) to a seasonal month (August), is directly related to a worse performance by the suppliers. This event goes against the sales reality, which allows the identification of opportunities to improve.

In a more detailed analysis, related to the categories/operations and performance indicators, it were identified some differences in the categories with the worst performance, which can help to identify the different realities of distinct types of stores.

As future work, the main development suggestion is to improve the information presented on the management dashboard, with the introduction or addition of new data such as the potential sales estimated for the promotional items, by store, supplier, week/month, taking into account the frequency of stock outs verified. In addition, it is safe to state that the developed model can be transversal to other areas that involve the direct delivery business, which may serve as groundwork to develop future work – in both theoretical and practical aspects.

In conclusion, it is expected that this work will be useful for Sonae MC, and that the developed tools can serve as support not only for the decision-making questions related to the industrial bread suppliers, but also to help identify opportunities for improvement in this direct delivery business, and consequently increase industrial bread sales.

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