A Business Intelligence based scorecards for supply chain performance analysis

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Abstract: A supply chain could be characterized by a great number of suppliers and customers and represents one of the fundamental elements for the business management. The analysis of data that defines the state of the processes of the supply chain stakeholders and their evolution, is a key element for making adequate decisions to achieve business objectives.
The Balanced Scorecard, through the definition of key indicators (KPIs) based on the sector in which the company operates, gives a complete overview of business performance not only from the financial point of view, but also taking into account perspectives of internal processes and customers, and supports a balanced and targeted analysis.
In a complex, interconnected and extremely dynamic context such as Industry 4.0 and moving towards Industry 5.0 that brings with it an emphasis on customization, sustainability and resilience, However, there is also a need to obtain the results of the analyses in real time and in an automated way.
The aim of our paper is to propose a KPI Dashboard structure adaptable to very different business contexts and with low implementation and management costs. The efficiency of the supply chain has a strong impact on the performances of a company and the implementation of the SCOR model allows the phases of the company processes to be adapted to changes in the state of the customer and supplier side.
In this study a business intelligence software is used to implement a dashboard for the evaluation of business performance that can be adapted to different business contexts, by modifying a few sector-specific key indicators and adapting to the database used.

Keywords: Balanced Scorecard, KPI, Business Intelligence, SCOR model

1.Introduction

The Balanced Scorecard (BSC) is a significant tool for assessing and managing corporate performance, amalgamating both economic and company measures within a unified conceptual framework. Its primary objective is to examine and evaluate corporate behaviors to enhance future performance and provide a solid basis for competitiveness analyses. This approach requires the correlation between each business strategy into key performance indicators (KPIs), which represent a fundamental pillar for assessing progress towards predetermined objectives.
The attribute "balanced" underscores the importance of equilibrium among various measurement dimensions, aligning them with overarching corporate objectives. This model revolves around four principal perspectives:

- Financial performance
- Customer perspective
- Internal processes
- Learning and innovation

Each of these perspectives is underpinned by specific key performance indicators (KPIs), providing tangible measurements of corporate performance. This multidimensional approach allows for a comprehensive and balanced assessment of performance, offering stakeholders a clear and complete picture of corporate health and future prospects.
In recent years, the application of the Balanced Scorecard (BSC) framework has evolved significantly, with a growing emphasis on customer-centric approaches. While earlier literature on BSC implementation primarily focused on financial and internal process perspectives, recent advancements have underscored the criticality of incorporating the customer perspective as a cornerstone of company strategy. This shift reflects a deeper understanding of the crucial role that customer satisfaction, loyalty, and perception play in driving business success.
Instead of depending only on traditional approaches like financial metrics or internal process optimization, integrating the customer perspective within the BSC framework offers several advantages. Firstly, it provides a more holistic view of company performance by considering both financial outcomes and customer-related metrics. This comprehensive approach enables businesses to align their

strategic objectives with customer needs and preferences, ultimately fostering long-term sustainability and growth.
Furthermore, incorporating customer-centric Key Performance Indicators within the BSC allows for a more proactive and predictive assessment of business performance. By monitoring metrics such as customer satisfaction levels, market share, and brand perception, companies can anticipate changing market dynamics and respond swiftly to emerging trends, gaining a competitive edge in the process.
Moreover, the customer perspective enhances the strategic relevance of the BSC framework by fostering a customer-centric culture within the company. By emphasizing the importance of understanding and exceeding customer expectations, businesses can align their internal processes, resource allocation, and decision-making with the goal of enhancing overall customer value.
To achieve the underlying objectives of the Balanced Scorecard (BSC), business intelligence (BI) plays a crucial role. BI leverages a wide range of techniques and tools, including data mining, time series analysis, reporting, interactive dashboards, and predictive analytics, to extract value from corporate data and provide clear insights useful for decision-making processes aligned with the BSC.
The purpose of this study is to develop a dashboard for analyzing supply chain performance, using both data related to orders from suppliers and those received from customers. Another goal is to represent, through Key Performance Indicators (KPIs) automatically calculated by the dashboard and continuously updated, the state of the company's supply chain. This aims to simplify the analysis of a complex system such as the supply chain and consequently facilitate the resolution of any associated problems or, in any case, its improvement.
To achieve this, a methodology that is technically replicable and adaptable to different sectors has been employed, allowing it to be applied to a wide range of corporate contexts. The technologies used are also standardized and easily integrable into any business environment. The dashboard is built using MS Power BI, which allows integration with databases of various types, such as Excel spreadsheets, Access databases, MySQL databases, and many others.
The paper continues with a review of the existing literature in section 2, a detailed description of the methodology used in section 3, the specifics of the case study implementation in section 4, and the discussion of the results obtained in section 5. Section 6 is dedicated to the conclusions resulting from the analyzed study.

2.Literature analysis

The application of business intelligence (BI) in supply chain management has proven to be a fundamental strategic lever for enhancing operational efficiency, optimizing business decisions, and ensuring a competitive position in the global market. An in-depth study conducted by Qrunfleh and Tarafdar (2014) highlighted how BI enables an integrated and predictive view of supply chain processes, providing companies with a significant competitive advantage in an increasingly complex and dynamic business environment. Supply chain visibility emerges as a crucial aspect, as emphasized by Ivanov and Dolgui (2019), who examined the interconnection between visibility and business performance, underscoring the fundamental role of BI in enhancing transparency, traceability, and risk management across the entire supply chain. Cai et al. (2017) specifically explored the role of BI in the retail distribution sector, demonstrating how it can be employed to optimize inventory management, improve delivery efficiency, and increase customer satisfaction through a better understanding of demand patterns and buyer behaviors. Dehning et al. (2019) extensively analyzed the role of BI in supply chain data analysis, highlighting how it provides critical insights to support resource planning and optimization, enabling companies to anticipate and promptly respond to market fluctuations and customer needs. Lim et al. (2019) explored the impact of advanced data analytics approaches and predictive models on supply chain planning and optimization, uncovering BI's potential to enhance operational efficiency, reduce costs, and increase business flexibility and resilience in the face of emerging challenges such as demand volatility and instability in global supply chains. Popovič et al. (2018) examined the various applications of BI in supply chain management, identifying emerging trends and areas of innovation in the field, such as the integration of technologies like artificial intelligence and the Internet of Things to enhance visibility, efficiency, and sustainability of global supply chains. Finally, the proposal of a conceptual framework for integrating BI into the supply chain advanced by Shih and Yang (2019) offered strategic and practical guidance for maximizing the value derived from data analysis and computerized supply chain management.
Other researchers have contributed to this discourse. For example, the research by Eroglu and Hofer (2011) thoroughly analyzed the importance of data-driven decision-making in supply chain management, emphasizing how BI can positively influence the effectiveness of business decisions and the ability to promptly respond to changing market demands. Furthermore, the work of Giannakis and Louis (2018) explored the new frontiers of supply chain analytics, highlighting how technological evolution and the adoption of advanced analytical tools are radically transforming how companies manage their supply chains, pushing towards an increasingly data-driven and AI-based approach to improve accuracy, forecasting, and operational flexibility. The research by Wang et al. (2018) proposed a theoretical framework for measuring supply chain performance through the use of BI, offering an in-depth overview of key metrics and evaluation methods used in this context, as well as practical guidelines for the effective implementation and monitoring of data-driven performance measurement systems. Lastly, the work of Sharma et al. (2020) investigated the impact of emerging technologies such as blockchain on supply chain management, highlighting how these can be successfully integrated with the BI-based approach to further enhance transparency, reliability, and security of transactions along the entire supply chain. A key element in the connection between BI and supply chain management is represented by the Balanced Scorecard (BSC). The BSC, introduced by Kaplan and Norton (1992), is a strategic management tool

that allows companies to translate their vision and strategy into a coherent set of performance measures. In supply chain management, the BSC can be used to monitor and improve performance in various key dimensions, such as supplier management, operational efficiency, and customer satisfaction. Studies like that of Brewer and Speh (2000) have demonstrated how the integration of BSC with BI can offer a holistic view of supply chain performance, facilitating more proactive and informed management. Similarly, the research by Bhagwat and Sharma (2007) highlighted how the combination of BSC and BI can enhance visibility and control over supply chain processes, allowing companies to better align their operational strategies with overall business objectives.

3.Research Framework

The Balanced Scorecard (BSC) represents a robust strategic management framework widely adopted by companies to change their strategy into measurable objectives and concrete actions.
The BSC is based on the notion that business performance should not be evaluated from a financial perspective, but through a comprehensive framework that also encompasses customer experience, internal processes, and business learning and growth. The selection of perspectives to include depends on the specific strategy and objectives of the company, thus ensuring a balanced and complete view of performance.
Another widely used management framework is the Supply Chain reference-modes (SCOR) that, as the name suggests, is focused on Supply Chain analysis. This framework is organized in a hierarchical structure of 4 levels which analyze the supply chain on different levels of abstraction and is also focused on practical actions to apply for improvements.
In the analysis the focus is on the top level (the more abstract and focused on Data analysis) that is composed by 5 phases: Plan, Source, Make, Deliver and Return
In the middle of the BSC and SCOR frameworks are Key Performance Indicators (KPIs), which allow for assessing the achievement of strategic objectives across all crucial areas of the company.
Business Intelligence (BI) plays a fundamental role in the BSC and SCOR frameworks, as it provides the necessary tools and technologies to effectively acquire, manage, analyze, and visualize business data. BI enables the identification of the most significant KPIs for each perspective of the BSC, real-time monitoring of these KPIs, and generation of in-depth reports and analyzes to support strategic decisions.
Through the use of Business Intelligence, companies can gain deeper insights into their performance, identify trends and hidden patterns in data, and pinpoint opportunities for improvement. In this way, the BSC and Business Intelligence synergistically integrate to provide a clear and comprehensive view of business performance and support effective, results-oriented strategic management.

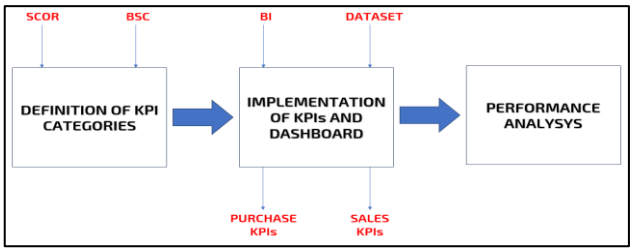

Figure 1: Research framework.

The stages to follow for implementing a business intelligence dashboard for supply chain evaluation are in the research methodology as shown in Figure 1.

Definition of KPIs and Evaluation Perspectives

The initial step involves delineating the perspective or perspectives of the Balanced Scorecard through which the company intends to examine its business context or, in the SCOR model, determining which phases of the Top Level are relevant for analysis. This defines which KPIs are necessary for effective analysis and what the starting data (raw data) is needed to calculate the value of the KPIs directly or indirectly.
In this analysis, Key Performance Indicators related to the purchasing and sales categories have been considered to analyze the supply chain. These KPIs align with the Balanced Scorecard model within the customer and internal process perspectives, as well as at the top level of the SCOR model, specifically within the Make, Plan, and Deliver phases.

Implementation of KPIs and Dashboard

In the analysis of both purchasing and sales categories, consideration has been given to KPIs aimed at enhancing organization, sourcing efficiency, and financial sustainability across production lines. These include Lead Time (both theoretical and real), which quantifies the time difference in days between order delivery and order release dates. Additionally, backlog (both quantity and economic value) is monitored to track the volume of products still awaiting production to fulfill received orders. Furthermore, assessment is made of the Costs and Value of orders placed with suppliers and received from customers.
Once defined KPIs, the first thing to do is defining technologies, analysis models and methods of Business Intelligence needed for the analysis. Datasets needed for the analysis are selected considering the defined characteristics from the company warehouse. In this context it will be important to keep track of every single order received and placed, with quantity and value of product, vendor or customer name, order release date, order requested delivery and real delivery date. If the company does not organize and structures data in a warehouse or more generically in a database, an "ETL" process will be needed.
This process is crucial for integrating and preparing data for analysis. It consists of three phases:
Extraction: During this phase, data is collected from various organizational storage sources, which may include

operational databases, log files, document management systems, and more.
Transformation: In this phase, extracted data is transformed to standardize its structure and ensure consistency and quality. This may involve data cleaning to correct errors, normalization of data formats, and enrichment of data with additional information.
Loading: Once transformed, data is loaded into the data warehouse or data mart for further analysis. This may involve loading data into a dimensional model, which optimally organizes data for OLAP (Online Analytical Processing) analysis.
Following the ETL process, the next step is storing the processed data in a database:
a model is created where data is organized to allow for efficient access, management, and updating of information contained within it. The structure to be given directly depends on the data contained within it and the existing relationships between them.
For better and more efficient data access it's possible to use a common practice in big data: data marts.
Data Marts are built to meet the specific needs of a particular group of users or business process. They can be of various types, such as process-oriented, department-oriented, or user-oriented data marts. Creating data marts allows for providing quick and targeted access to relevant data for end-users, reducing complexity, and improving efficiency in data analysis.
The business performance dashboard implementation is the final step and is designed to provide a visual overview of business performance, allowing decision-makers to monitor progress towards strategic objectives and identify areas for improvement. By integrating and automating the calculation of KPIs, representing them in graphical form and providing comparable views of data, the dashboard offers an effective way to monitor business performance in real-time and make informed decisions.
A common practice is to group and analyze for categories, for example in the environment of the supply chain, it could be interesting to group every order received from a customer and done to a vendor in categories regarding the nature of the ordered product.
In this way it's easy to compare between multiple categories that will affect, for example, different production lines, or the same category in different time periods.
The data in input to the dashboard will be the ones stored after the ETL phase in the database or eventually the data prepared after an elaboration in one of the data marts.

Performance Analysis

The detailed analysis of order data and lead times provides a comprehensive overview of the company's dynamics. This not only identifies critical areas for optimizing production and supplying but also helps maintain high levels of customer satisfaction. Through comparing the economic values of purchases across different categories, it's possible to evaluate overall management and identify potential areas for cost savings.

The comparative analysis of order values across different categories reveals valuable insights for optimizing business strategies. For instance, identifying categories that generate higher economic revenues allows for concentrating resources and efforts to maximize profits. In contrast, identifying categories with lower margins may indicate the need to review pricing or marketing strategies to make production more profitable. Moreover, comparing category performance over time allows assessing the effectiveness of actions taken to improve business performance. This comparison can reveal positive trends to consolidate or critical areas to address to maintain competitiveness in the market.
Furthermore, analyzing the differences between expected and actual lead times highlights potential operational misalignments that could compromise relationships with customers and suppliers. It also underscores the need to anticipate reorder times to avoid stockouts in the warehouse. When comparing theoretical and actual lead times for purchases placed with suppliers, a significant difference may indicate longer procurement times than expected. Consequently, adopting inventory management strategies that account for these delays, such as anticipating reorder times, is crucial to ensuring continuous product availability and avoiding disruptions in the supply chain. This approach helps maintain an efficient workflow and meet customer needs promptly. This process provides crucial information for implementing targeted corrective actions to improve delivery times and optimize overall business strategies.

4.Case study

Validation of the methodology is performed using Microsoft technologies such as MS Excel, MS Access, MS PowerBI and Visual Basic for Applications (VBA) on supply chain data of a company operating in Electromechanical components production.
The choice to use Microsoft technologies was due to the need of the company to make the system operational on any company machine, reading real-time updated data from a folder divided on the central server in a short developing time.
In addition, PowerBI interfaces perfectly with others Microsoft technologies and offers the possibility to perform visual Queries with the graphs and tables of the Dashboard, so it's really easy to create a comparison between multiple objects of the same categories, simply selecting them from a table and specifying a period of analysis on a slider: the whole dashboard will adapt his analysis on selected contents.
This study exemplifies the application and benefits of integrating the customer and internal processes perspectives within the BSC framework.
By focusing on monitoring purchases and sales, evaluating competitiveness, regionalizing the supply chain, and diversifying income sources, it effectively demonstrate how incorporating customer-centric KPIs enhances organizational performance and strategic decision-making. This approach not only provides a more comprehensive view of the business but also equips companies with the

tools to adapt and thrive in an ever-changing market landscape.

The work started with the extraction of 4 different datasets (4 Excel files): 2 of the datasets regarded order released and received from vendors and, the other 2, the orders received and shipped to customers.

The datasets were created by the platform the company shares with its affiliated vendors and clients for orders placing and management and were structured as described in the research framework. The export of this datasets we used as input of our dashboard, was a function already implemented in this platform we just described.

The extracted data needed to be uniformed and related in a database, that's why Access has been used to create a relational database model, organizing data in tables. VBA code has been used to import data from Excel datasets and elaborate/uniform them to the structure of the database, so the elaboration and Transformation process has been automatized.

A first view in MS Access as shown in Figure 2, allows to select starting datasets, import data in the tables, visualize clean data and launch PowerBI to visualize the dashboards.

Figure 2: Dashboards homepage

The dashboard is divided in 2 sections for an easier use: the first relative to sales and the second to purchases.

In both of them, orders (received or done) were grouped for categories of products and the analyses were performed on the basis of Categories.

Multiple screens were created for both sub-dashboards in a similar way, dividing costs and lead time analysis in separate views to avoid confusion in the user:

A first screen is focused on the analysis of value and quantity of the orders (emitted or received), confronting categories, vendors and customers among themselves and in different periods of time.

It is possible to personalize the view showing a compare between categories, articles or vendors depending on user needs. It is also possible to apply a filter that only shows the analysis on the most relevant items for an easier visualization, grouping less relevant items under a common class named "others".

KPIs analyzed in this screen were Backlog Value and Backlog quantity (Figure 3), representing quantity and value of the orders still to ship to a client (for sales dashboard) or to receive from a vendor (for purchases dashboard).

$$BacklogValue = PredictedValue - WithdrawnQuantityValue$$

Linea	Backlog_quantità	Backlog_valore
Emax_2	138537	1.823.504,95
Trasf	212286	1.737.316,11
Trip Coil	189889	1.479.891,07
Relè	83003	677.242,37
Differenz	17679	221.715,70
Stampaggio	17446	170.017,40
Service	11814	135.318,09
Service Mont	2273	56.730,62
Service elettr	993	23.746,19
RA0759	938	11.492,40
Avvolgimenti	500	1.995,00
Smart Coil	100	74,20

SALE	VALUE
1281	274.615,00
0201-23OR	234.850,00
576781	214.318,55
579770	165.471,00
0128-23OR	140.910,00
585364	131.284,50
577938	114.456,30
Totale	**12.073.136,34**

CATEGORY	VALUE	QUANTITY
	434.337,47	545484
AVVOLGIMENTI	6.856,70	4750
BOBINA ELETTROMAGNETICA	28.731,13	3731
Cespiti di proprieta ABB	23.760,00	2
Elettrom. a carrello (588064)	66.767,55	3725
EMAX2 - Chianti	3.045.563,14	196965
MATERIALE ELETTRONICO	0,96	96
Totale	**12.073.136,34**	**1575469**

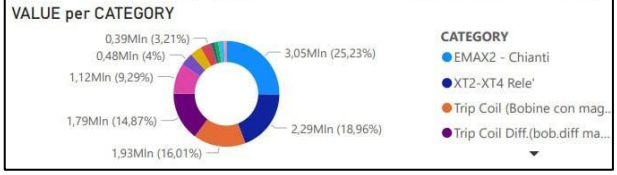

Figure 3: Backlog

Figure 4 shows the total costs and total value for orders issued and received.

$$TotalCost = \sum_i OrderCost_i \qquad TotalValue = \sum_i OrderValue_i$$

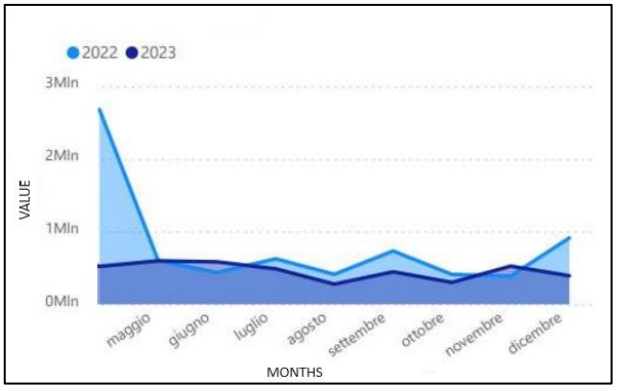

Figure 4: Value distribution vs categories and period

On the other hand, Figure 5 shows the second screen, focused on the analysis of KPIs Real Lead Time and Theoretical Lead time and their percentual difference.

$$BacklogQuantity = PredictedQuantity - WithdrawnQuantity$$

$$TheoreticalLeadTime = \frac{\sum_{i=1}^{n}(ExpectedDeliveryDate_i - OrderDate_i)}{n}$$

$$RealLeadTime = \frac{\sum_{i=1}^{n}(ActualDeliveryDate_i - OrderDate_i)}{n}$$

Lead time expresses the difference in days between date of delivery and date of release of the order. Theoretical Lead Time represents the difference between requested delivery date and order release date, while Real Lead Time the difference between effective delivery date and order release date.

CATEGORY	REAL L.T.	TEORETHICAL L.T.	diff %
VITI-DADI-ROSETTE	30,23	9,54	-69,29%
TORNITI	54,57	38,00	-56,99%
TARGHETTE-F.KIT	37,63	33,36	-10,90%
STAMPI/ATTREZZATURE	60,25	15,00	-62,66%
STAMPATI RAME	86,94	21,28	-87,76%
STAMPATI PLASTICI	60,58	42,98	-51,19%
STAMPATI OTTONE	44,00	19,14	-61,93%
STAMPATI FE-ACC	66,25	34,65	-58,69%
STAGNO	72,29	73,33	15,94%
RESINE	22,80	9,11	-64,04%
RAME	61,36	38,95	-39,41%

Figure 5: Lead Time

The choice of KPIs was performed after analyzing needed informations and available data of the company after studying importance and meaning of the principal existing KPIs. In this way we assured repeatability and significance of the analysis.
In the sales dashboard are considered orders made from customers to the company and in the purchases dashboard are analyzed orders the company is doing to its vendors.

5.Results and discussions

In the dynamic context of the corporate market, data analysis has become a fundamental pillar for guiding targeted strategic decisions. Specifically, the analysis of acquired and issued orders reveals a wealth of crucial information for effective resource management and process optimization within the company.
One category of particular importance for the company is the one regarding printed circuits and boards. In fact, during 2023, it was representing 21.87% of the total supplies (Figure 6). This analysis highlights the need to evaluate strategies to reduce procurement costs on most critic categories, such as seeking new suppliers or renegotiating existing contracts, to make production more sustainable.

Figure 6: Drill through on "printed circuit and boards" category

In addition to purchasing analysis, it is essential to examine the categories that generate the most significant economic revenues, to focus efforts on optimizing the procurement strategy. This targeted approach enables the reduction of associated costs and maximization of profits.

Moreover, comparing results obtained in different years within the same categories allows for evaluating the effectiveness of actions taken to improve company performance. For example, a comparison between 2022 and 2023 reveals a 7.5% increase in the overall value of orders in the "XT2-XT4 Rele'" category (Figure 7).

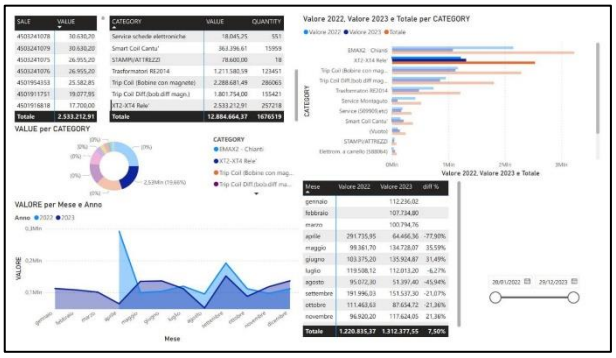

Figure 7: Comparison of purchase volume for the "XT2-XT4 Rele" category between 2022 and 2023

This analysis enables the identification of positive or negative trends and the adoption of appropriate measures to maintain or correct the company's course.

Transitioning to the perspective concerning lead time for orders received from customers (sales dashboard). The average theoretical and actual lead times, pertaining to a product category, and consequently their comparison through the percentage difference between these values, provide crucial insights that can aid in effectively reorganizing the company's production strategies. A substantial percentage difference between actual and theoretical lead times would suggest that the time required to fulfill the order issued by the customer significantly exceeds what the customer requested when placing the order. This could involve two scenarios: either the customer, during the ordering process, generally does not adhere to the minimum lead time required contractually by the company, or the company struggles to sustain production rates sufficient to fully meet all customer orders within the specified time limits. Naturally, this could jeopardize the relationships between the company and its customers.
In contrast, a highly negative percentage difference indicates that the company can fulfill the customer's order well in advance of the requested closing date during the ordering process. In this scenario, could be considered an increase in economic demand in light of the service provided or implementing strategies to expand the company's customer base for products within the respective category.
Similarly, regarding the perspective on lead time for orders placed with suppliers (purchasing dashboard): a markedly negative percentage difference between theoretical and actual lead times would indicate that the actual procurement times are significantly longer than those

theoretically proposed by the supplier. This underscores the need to anticipate reorder timelines to avoid stockouts in inventory, or alternatively, to consider engaging different suppliers.

CATEGORY	REAL L.T.	TEORETHICAL L.T.	diff %
VITI-DADI-ROSETTE	30,23	9,54	-69,29%
TORNITI	54,57	38,00	-56,99%
TARGHETTE-F.KIT	37,63	33,36	-10,90%
STAMPI/ATTREZZATURE	60,25	15,00	-62,66%
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RESINE	22,80	9,11	-64,04%
RAME	61,36	38,95	-39,41%

Figure 8: Comparison between theoretical and actual lead time by purchasing category

As evidenced in the Figure 8, within a critical category such as "Printed Circuits-Boards" the average theoretical lead time amounts to 105 days, while the actual lead time extends to 140 days, resulting in a percentage difference of -34.58%. Consequently, the insight gleaned from the dashboard indicates that articles belonging to this category should be ordered approximately 35 days in advance.

6.Conclusions

This work serves as a tangible example of the benefits derived from integrating the customer perspective within the Balanced Scorecard (BSC) framework. By focusing on monitoring purchases and sales, evaluating competitiveness, regionalizing the supply chain, and diversifying income sources, it demonstrates how incorporating customer-centric KPIs enhances organizational performance and strategic decision-making. Has been implemented a dashboard that provides key data on purchases acquired from customers, enabling more effective monitoring and forecasting of their needs. This included forecasting KPIs such as backlog quantity and value, as well as actual and required lead times. Data analysis was also conducted to evaluate the company's competitiveness by comparing sales performances across different customers, particularly comparing the performance of purchases acquired from major customers with other suppliers in the supply chain. This allowed the company to identify areas for improvement. By examining purchases acquired from customers, have been identified trends in supply chain regionalization, offering valuable insights for corporate strategy. Additionally, the analysis contributed to assessing the degree of dependence on major customers and identifying potential risks, advocating for income source diversification.

The adoption of a Balanced Scorecard approach provided a clear strategic framework to assess and enhance the company's performance. By integrating internal processes and those related to customers, has been developed a more comprehensive view of performance and long-term objectives. This enabled the company to make more informed and targeted decisions, enhancing its ability to adapt and compete successfully in the market. This study is only analyzing the supply chain under the light of order values, quantity and lead time. Introducing other analysis perspectives could help more a company in its decision making process.

Further development of this study could include the introduction of Back Order Rate KPIs for a more accurate analysis of baklog values, KPIs regarding product quality such as defects and complaint rate, financial analysis and more testing about the applicability of this case study in very different industrial sectors.

It might also be interesting to introduce different views in the dashboard for different corporate roles, for a more effective analysis and improve the visual organization of the dashboard.

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