

# Application of business intelligence as a strategy for decision-making in the sales area of SMEs

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**Abstract**– *The problem of research lies in the separation of information and the difficult analysis from different points of view according to the client's needs. The purpose of the research is to design a Business Intelligence solution in the sales area. Likewise, the type of research is applied and the design is pre-experimental. Next, the population was based on the stored data of the companies and the sample was made up of data from the company's area, the sampling is non-probabilistic. The results were favorable, it was possible to increase the indicators of sales growth, sales productivity and the level of effectiveness in sales-related decisions. Finally, it can be concluded that the implementation of a technological solution such as Business Intelligence positively influenced decision making in the sales department of SMEs and provide more accurate and timely information. Furthermore, by having access to real-time data and analysis, company management was able to make more informed and faster decisions, resulting in a significant improvement in the efficiency and profitability of SMEs.*

**Keywords**-- *Decision making, Business intelligence, SM*

## I. INTRODUCTION

Business Intelligence (BI) This concept evolved and underwent further development in the 1980s. During that period, Howard Dresner proposed the term Business Intelligence, also known as business intelligence, as a tool designed to improve business decision making using supporting fact-based systems.

At an international level, several investigations highlight the value of technology as a key resource for the decisions made in relation to sales. The possibility of companies achieving their objectives and success largely requires the process of the decisions made. However, they often face challenges such as the lack of analysis of large volumes of data can impede the effectiveness of their decisions. Reference [1], states that in companies it is increasingly complex due to the rapid increase in data volume; The manual collection of transcendental and complete information becomes increasingly difficult, additionally the making decisions is crucial to guarantee the success of an organization, likewise. Reference [2] highlights that it is a

crucial process in companies since they allow decision makers or companies to monitor and control the basis of their decisions. Reference [3], finally, reinforces the importance of technological solutions in decision making and how they can improve administration, performance, goods and services offered by companies. In the business environment, organizations are in a continuous struggle to find the best way to leverage the value of technological systems for decision making and make their implementation a success. To address this problem, it is crucial to have efficient access to the information stored in data systems, through simple and effective models that allow timely and accurate decisions to be made.

Ref. [4] at the Latin American level, 75% of companies in Mexico fail within the first two years due to the lack of process and analysis indicators since the problem of decision making is a challenge for small companies. Ref. [5] likewise as in that the proportion of updated, systematized, and timely information allows companies to make correct decisions and increase the profitability of the companies. Ref. [6] on the other hand, according to Neubert and Van der Krogt in Paraguay there are few companies that use technological solutions for decision making, the majority want to do so because they expect it to have a positive impact on their performance and competitiveness. Decision making in companies involves a series of stages that must be followed to find solutions to problems. Employees evaluate options, consider evidence, and choose a path forward. It is a crucial process that determines the success of a company and requires a careful and objective evaluation to guarantee the best possible decision.

Ref. [7] in Peru, a study carried out by Chura, states that the decisions made in the sales department are a crucial element for the success of an organization, it has been shown that it can significantly improve times. report delivery and sales team satisfaction, with 85% and 90%, respectively. Ref. [8], likewise, states that after the use of technology, an increase in job satisfaction was recorded in terms of the effectiveness of the decisions made, with a 22% increase. Ref. [9], on the other hand, states that, currently, Peruvian companies are facing a greater demand for advanced analysis

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and models to make effective decisions in the market. Additionally, ref. [10], reinforces the that companies face challenges in making decisions in various aspects of their operation. Currently, both large and medium-sized companies are generating a large amount of information without limits, which makes it difficult to manage and can result in congestion in the delivery of information. Ref. [11], finally, maintains that, in a highly competitive business environment, the decision-making process is crucial to guarantee the success of a business. The effectiveness of critical decision making depends on the effective management and use of information by the company. However, when information is insufficient or inadequate, this can have negative consequences on decision making, such as additional costs, delays, downtime, and risks. Therefore, it is crucial that companies properly manage information to ensure accurate and effective decision making.

This research will be carried out in SMEs, currently the management of the organization requires generating reports in a weekly time interval, this process is currently carried out by hand in an inefficient manner with an average duration of two days since all the data generated is transferred to sheets. calculation in Excel to be analyzed and obtain results, which causes inefficient decision making. Likewise, a decrease in the indicators of service level, level of information effectiveness and level of management satisfaction could be identified during the last 4 years.

If all the problems continue without any improvement, it is expected that making effective and timely decisions will be difficult. This can translate into decreased sales and lower efficiency in the customer service process, which can lead to a loss of customer loyalty and a decrease in company profitability. Consequently, the implementation of Business Intelligence is proposed that will allow better management and analysis of data, which in turn will allow more precise and efficient decision making in the sales department. Next, the background of the respective investigation will be presented.

## II. RELATED WORKS

Ref. [12], according to Raj, in their research “Training SMEs to make better decisions with Business Intelligence: A case study”. The problem presented in the article is that SMEs have difficulty using the large volume of historical data they have collected, due to the lack of financing and technical knowledge to adopt a business intelligence (BI) solution. The objective of the article is to present some possible tools and strategies that could help SMEs overcome these challenges and reap the benefits of adopting an effective BI solution. The type and research design of the article provided is a case study. The population and sample of the article provided are SME users. The results of the article provided show that the Business Intelligence solution was successful. The bottom line

is that business intelligence (BI) provides multiple benefits for businesses, and while many large companies have been using this technology for years, SMEs have struggled to adopt an effective BI solution.

Ref. [13], according to Dahr, in their research “Implementation of a sales decision support system through BI based on OLAP, KPI and data mining approaches.” He tells us that the problem in organizations and companies is that they strive to expand their resources, their profit margin, and a solid management system. Managers look for tools that adapt organizational data into information that supports their strategic decisions to improve the organization in terms of performance and profits. The purpose is to develop a Datamart in order to provide decision-making support to manage data and provide analytical results that help make correct decisions. Application-based research with an experimental design was used.

Ref. [14], in their research propose that to survive in a dynamic and hypercompetitive business environment, companies are forced to introduce incremental and radical innovations. While it is recognized that business intelligence (BI) can support innovation and provide organizational value, it provides limited understanding of its impact on balancing different innovation activities and ensuring performance gains. The research used data collected from medium and large companies in Slovenia, applying partial least squares models.

Ref. [15], according to Eleodoro in their thesis they propose managing rates in a way that meets consumer demand, both now and in the future, an analytical tool is needed due to the problems of low demand and price competitiveness.

Ref. [16], in their research carried out in Lima, had the main objective of determining the degree to which the use of business intelligence improves managerial decision making in the sales area of Indurama. To collect the information, a descriptive, applied research method was used, with a pre-experimental design, and a sample of 30 process flows for decision making. The results showed that the use of the BI system allowed the data loading time to be reduced by 89%, which made it possible to work more effectively and efficiently in less time. This system also contributed to facilitating access to information, it had a reduction from 36.54 minutes to 14.75 and it was concluded that the information is 100% available, in real time, immediate and permanent.

Ref. [17], to manage rates to meet consumer demand, both now and in the future, an analytical tool is needed due to the issues of low demand and price competitiveness. The objective is to create a system that stores customized data for the administrative area of the company to improve the effectiveness of the decisions made related to price management. In this study, descriptive research with a non-experimental design was applied. The population was limited

to 9 employees. As a result, the organization that achieves the goal established a Datamart. In conclusion, it was determined that an adapted BI solution is necessary to improve the ability to make decisions in price management.

Ref. [18], the problem is that although system reporting is now necessary in sales and purchasing, although it provides a variety of information, it lacks the necessary analysis and agility, preventing proactive performance management. The objective is to introduce BI in the company as support for decision making. The research is of an applied type, and of a transversal, non-experimental design. Six managers make up the research population, and a non-probabilistic sample was used. As a result, the development of the BI solution throughout the organization allowed strategic decisions to be made. In conclusion, the use of BI improved the ability to make strategic decisions in the company, since it facilitated access to previous data converted into knowledge.

### III. METHODS AND MATERIALS

In the materials section, a business intelligence system has been developed that allows efficient decision making. According to Business Intelligence, it is the technology that allows data to be extracted, transformed, and analyzed to generate scenarios, reports, and forecasts that support decision making, which translates into a competitive advantage. This research uses the following software for its construction: SQL Server, Visual Studio and Power Bi. Additionally, the process involves the use of methods to develop applicable information or business intelligence, allowing organizations to remain competitive in an increasingly globalized world. As a product, it refers to information that allows organizations to predict the behavior of competitors, suppliers, customers, technologies, acquisitions, markets, products, and services, as well as the general behavior of the business environment with a certain degree of accuracy.

#### A. case study

The present investigation will be carried out by Galagarden company, currently the management of the organization requires generating reports in a weekly time interval, this process is currently carried out by hand in an inefficient manner with an average duration of two days since all the data generated is transferred to spreadsheets in Excel to be analyzed and obtain results, which causes inefficient decision making. Likewise, to measure this variable, different indicators were used, which are: the level of service, the level of information effectiveness and the level of management satisfaction, which will then be reflected in the following graphs:

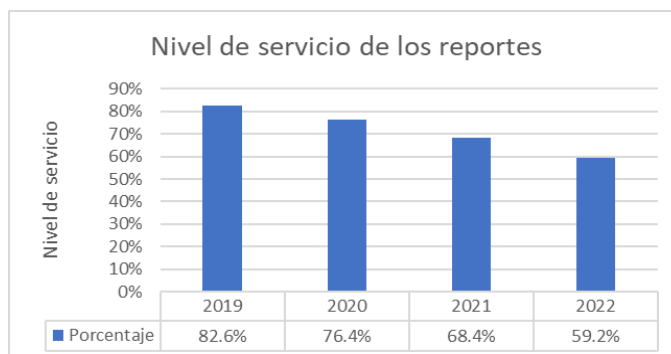


Fig. 1 Decrease in indicator 1 (service level) in the last 4 years

Note: According to Figure 1, there is a bar graph of the service levels of the reports in the decision-making process in the last 4 years, in which we can observe that the service level is not the desired one, having a decrease in 2020 of 6.2%, continuing a decrease in 2021 with 8% less and ending in 2022 with a decrease of 9.2%.

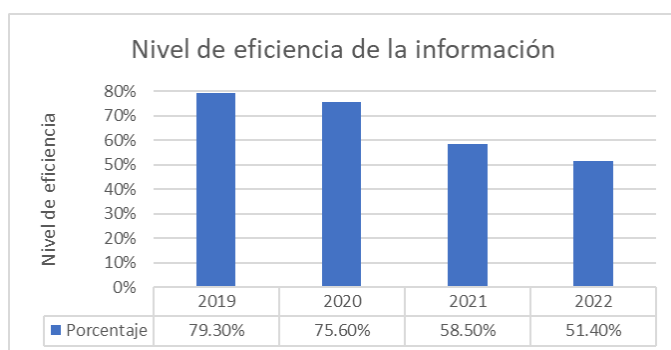


Fig. 2 Decrease in indicator 2 (level of effectiveness) in the last 4 years

Note: According to Figure 2, there is a bar graph of the levels of effectiveness of information for making decisions, in which we can see that the level of effectiveness presents significant variations in the last 2 years, having a considerable decrease in the year 2021. 17.1%, continuing to decline in 2022 with 7.1% less.

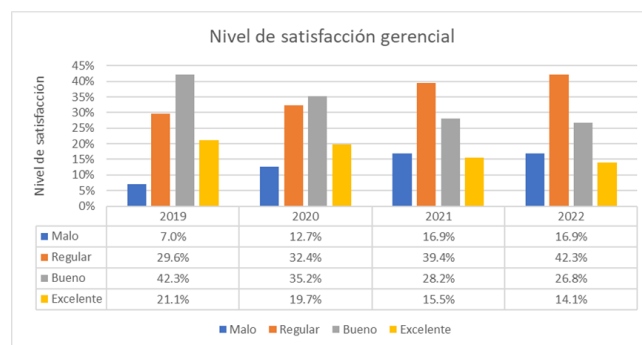


Fig. 3 Decrease in indicator 3 (satisfaction level) in the last 4 years

Note: According to Figure 3, there is a bar graph of the levels of effectiveness of information for decision making in the last 4 years, in which it can be seen that the level of excellent and good has progressively decreased and in turn the level of fair and bad has increased.

If all the problems continue without any improvement, it is expected that making effective and timely decisions will be difficult. This can translate into decreased sales, which can lead to a loss of customer loyalty and a decrease in business profitability.

The solution to the problem is the application of BI as a strategy. This tool will allow for better data management and analysis, which in turn will allow for more accurate and efficient decision making. In this way, it is expected to achieve growth in sales and greater productivity. For this reason, this research work proposes organizing and structuring the data generated by the organization and processing it. With this processed data, the goal is to understand the behavior of your customers in order to make decisions based on the processed information.

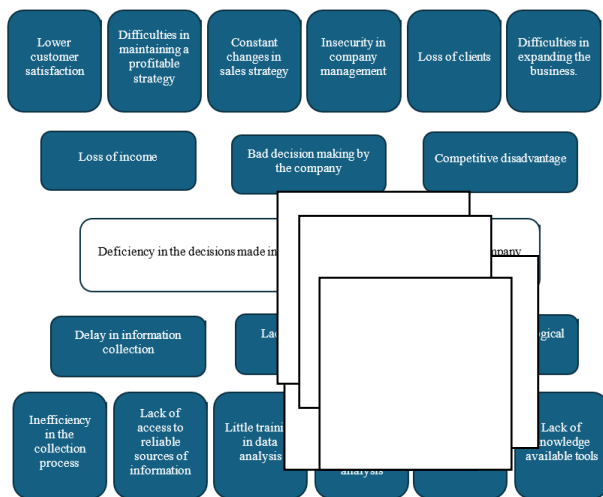


Fig. 4 Deficiency in the decision made in the sales department at the Galargarden company.

Note: Indicates a failure or error in the decision-making process related to the company's sales activities. This situation could have resulted in negative consequences, such as loss of business opportunities, decreased income or impact on the company's reputation in the market.

### B. Requirement analysis

The requirements were identified based on questions that would be asked to the users where the objectives as a company must be met and at the same time satisfy the client and/or user. The following table below shows the list of questions.

TABLE I  
QUESTION LIST TABLE

Identify the questions
How much is the number of appointments per Department?
How much is the number of events per type of client in a certain period?
How many are the top Clients by Departments in a certain period?
How much is the average number of events per manager and districts in a given period?
How much is the total sales per seller?
What is the percentage of events according to Type of Events?
How much is the event rate per manager, district, department in a certain period?

How much is the Number of clients by Departments in a certain period?
How much is the average Closing of events per manager and District in a certain period?
How much is the number of appointments per Province at a certain time?

According to Table 1, the requirements identified are shown based on questions that would be asked of the user where both the company's objectives and at the same time satisfy the client and/or user.

TABLE II  
INDICATORS AND PERSPECTIVES

Indicators	Perspectives
Number of Appointments	Department
Number of Events	Customer, Time
Top Clients	Department, Time
Average Events	Districts, Time, Manager
Event Volume	Events, Weather
Total sales by seller	In charge
Number of Clients	Department, District, Time
Number of Appointments	Province, Time

### C. Preparation of the proposal

Considering the current pressing need to incorporate information into the decision-making process of small and medium-sized businesses (SMEs) in Peru, whether through the implementation of Business Intelligence (BI) or other options, the following evaluation is proposed:

#### D. Problem Recognition

Small and medium-sized business (SME) owners take on a great deal of responsibility in the daily management of their businesses, which limits the time they can dedicate to recognizing the need to modify their decision-making processes. Additionally, any change proposal requires the direct support of owners and senior partners to achieve success.

Consequently, it is essential that the owner or entrepreneur is in charge of first examining his or her decision-making method and carrying out a SWOT analysis. This will identify areas for improvement and highlight the importance of incorporating data as an essential component for formulating successful strategies.

#### E. Identification of metrics

Any company, regardless of its sector, must establish measures that make it possible to evaluate its performance. When identifying these indicators, questions arise such as: which of the essential metrics are being produced and which are not? How are they being obtained?

#### *F. Current situation*

After reflecting on the decision-making process and identifying key metrics, it is essential to examine the current situation in terms of availability of data tools. To carry out this analysis, it is useful to list the various tools, data sources, social networks and human resources in information technology and marketing departments available today.

#### *G. Evaluation of tools not available in the company*

It is essential to consider hiring specialized resources in Business Intelligence (BI), if the company does not have them. These professionals can provide suggestions, perform demonstrations, and present quotes along with their respective ROI analyses. Assessing the cost justification of this implementation falls to executives. At this stage, it would be beneficial to have, if possible, diverse approaches and address iterative processes to observe short-term results. Additionally, as part of the plan, training of company personnel in the generation of operational reports must be included, in order to avoid future costs.

#### *H. Contributions for future research*

After examining the situation of small and medium-sized enterprises (SMEs) in Peru with respect to the use of data and Business Intelligence (BI) tools as an essential component in the strategic decision-making process, additional areas of research are proposed that could be explored in the future. The most notable of them consists of deepening the specific analysis of particular segments of SMEs in Peru, given that the classification is very broad and the conditions between small and medium-sized companies vary significantly, especially in terms of interests, industries, geographic locations and economic results.

Additionally, the following suggestions can be considered for future research:

- Carry out a more detailed analysis by industrial sectors to determine which of them use Business Intelligence most intensively as a decision-making tool.
- Understand what metrics are measured in different industrial sectors and evaluate the possibility of standardizing the measurement of these metrics through the use of BI tools.
- Investigate the purposes behind the use of social networks by Peruvian SMEs and examine how data obtained through these platforms is used.

- Evaluate in more detail the impact of the results derived from the implementation of BI in medium-sized companies.
- Investigate the historical and psychosocial factors that influence the adoption of experiences by SMEs.

#### *I. Discussion*

Mahoto's study highlights the relevance of product prices in relation to market share and commercial profits. They propose an intelligent business model that uses machine learning to optimize pricing based on factors such as competitor behavior and customer preferences. On the other hand, Božič and Dimovski emphasize the need for innovation in a dynamic business environment. They argue that although business intelligence can support innovation, its impact on the balance of different innovation activities and on overall performance is limited. Finally, Herrera Salazar, Encalada Sarmiento and Sanchez Crisostomo (2019) present the results of a research that evaluated the impact of the use of business intelligence on managerial decision making in the sales area of Indurama in Lima. Their findings indicate significant improvements in efficiency, information access, and data loading time, supporting the conclusion that information becomes available in real time, immediately, and permanently.

Together, these studies highlight the importance of analytical tools, machine learning, and business intelligence in various business areas, from pricing and innovation to rate management and managerial decision making. Each perspective provides valuable insights to understand how these technologies can drive performance and effectiveness in the business environment.

## IV. CONCLUSIONS

The study revealed that, despite the technical feasibility and decreased costs, small and medium-sized enterprises (SMEs) in Peru face significant challenges in the implementation of Business Intelligence (BI). It was concluded that there are several factors that contribute to the limited adoption of data for decision making in these SMEs. These factors include the deep-rooted tradition of basing decisions on past experiences, the limited use of relational databases, the presence of poorly processed data that does not add value to the process, the limited use of social networks, especially in interaction with customers, and the inability of IT departments to provide reports in a timely manner. Despite technological advances and cost reductions, it is evident that there is a considerable way to go to improve the adoption of BI in this current business context.

The short-term results sought by SMEs - given the changing panorama of the Peruvian economy - mean that investments

in other aspects of the organization, including BI, were little considered.

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