



An-Najah National University
Faculty of Graduate Studies

**ENHANCING STRATEGIC DECISION-MAKING IN
INDUSTRIAL COMPANIES: A POWER BI-BASED
SALES ANALYTICS DASHBOARD IMPLEMENTATION
USING ACTION RESEARCH METHODOLOGY**

By

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Dedication

I dedicate this thesis, first and foremost, to my beloved parents, whose unconditional love, guidance, and sacrifices have been the foundation of every step I have taken in my life. Without their prayers, support, and wisdom, this achievement would not have been possible.

To my dear wife, whose patience, encouragement, and unwavering faith in me have been my greatest strength throughout this journey, and to my precious daughter, who fills my life with joy and inspiration.

I also dedicate this work to my brothers, sisters, and relatives, who have always surrounded me with care and encouragement, and to my dear friends, whose companionship and support have given me motivation during both challenging and successful times.

Finally, this thesis is dedicated to all those who believed in me and stood beside me, reminding me that perseverance, dedication, and the love of family and friends are the true keys to success.

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This thesis would not have been possible without the valuable support of the institution and the collective efforts of everyone who contributed, directly or indirectly, to its successful completion.

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

Enhancing Strategic Decision-Making in Industrial Companies: A Power BI-Based Sales Analytics Dashboard Implementation Using Action Research Methodology.

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

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A handwritten signature in blue ink, consisting of a horizontal line followed by a stylized 'A' and 'S'.

Date: 22/01/2026

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**ENHANCING STRATEGIC DECISION-MAKING IN INDUSTRIAL
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Abstract

In today's highly competitive business environment, data has become a critical asset for supporting strategic decision-making in industrial companies. The complexity of sales operations and the massive amount of data generated from diverse sources make it challenging for managers to extract actionable insights using traditional methods. Business Intelligence tools, particularly Microsoft Power BI, provide advanced capabilities to integrate, analyze, and visualize sales data in an interactive and user-friendly manner.

This study aims to design and implement a Power BI-based sales analytics dashboard within an industrial company to support strategic decision-making and improve overall business performance. The research adopts an action research methodology, which follows iterative cycles of planning, acting, observing, and reflecting. Through this approach, the study seeks to identify key performance indicators relevant to sales analysis, build an effective data model, develop an interactive dashboard, and evaluate its impact on decision-making quality and operational efficiency.

The expected results of this study include a practical dashboard that integrates diverse sales data sources, provides accurate and timely insights into sales performance, and enhances managers' ability to identify trends, forecast demand, optimize pricing strategies, and strengthen customer segmentation through methods such as ABC and RFM analysis. By applying Power BI in this context, the research contributes to bridging the gap between theoretical frameworks of BI and practical applications in industrial environments.

In conclusion, the study emphasizes the transformative role of business intelligence tools in fostering a culture of data-driven decision-making, supporting sustainable competitiveness, and enhancing operational performance in industrial companies.

The importance of the study lies in presenting an applied model that integrates Power BI as an analytical platform with the ABC and RFM models as strategic tools for classifying customers and understanding their purchasing behavior

Keywords: Business Intelligence, Power BI, Sales Analytics, Industrial Companies, Strategic Decision-Making

Chapter One

Introduction and Theoretical Background

1.1 Introduction

The last two decades began a fundamental change from the institutional point of view in terms of management and decision-making owing to the rapid digital transformation of systems coupled with the emergence of analytical intelligence and Business Intelligence (BI) technologies. Across different sectors, with a bias towards the industrial sector, institutions have started treating data as the most cherished resource for its improvement, be it in the form of performance or of competitiveness in local and international marketplaces. From experience-based management, the other conspicuous manifestation of such transition is towards Data-Driven Management. It has been shown in innumerable studies that organizations using up-to-the-minute BI tools perform at greater efficiency in operation and have more advanced capabilities for demand forecasting and resource allocation than those who choose manual methods or very simple descriptive reports.(Phillips-Wren et al., 2021; Tirupati et al., 2024).

To an increase in data processing speed and accuracy in the decision-making process, institutions have increased their business intelligence systems. Modern research has confirmed that advancements in interactive analysis tools have increased their abilities in managing voluminous box data and converting it to information valuable in helping management understand the performance of operations and making evidence-based decisions, as shown by (Phillips-Wren et al., 2021). It is asserted by some other research that the reliance of institutions on advanced analysis platforms would enhance their capacity to improve operation efficiencies as well as utilize resources more optimally, as stated by (Mbima & Tetteh, 2023) when discussing the role of data in the decision-support process. In the same context, (Božič & Dimovski, 2019) proving that the success of institutions in competitive environments is fundamentally established by the capacity to invest in data and subsequently change it into applicable knowledge, while. Zanke & Sontakke, 2024 Integrating advanced analytics into decision-supporting systems increases the operational capacity of institutions. The above findings conform with the

objectives of this study, whose goal is to create a Power BI dashboard for assisting in sales analysis and decision-making in the industrial setting.

Business intelligence tools nearly today constitute pillars of digital transformation in industrial institutions- some of the data management techniques which it integrates with statistical analysis and predictive modeling provide an integrated analytical environment that allows decision-makers to extract knowledge from the vast amount of operational data. Business intelligence systems are defined as "a set of tools and technologies that allow for the collection, analysis, and transformation of data into useful information which supports strategic and operational decision-making." Such tools have evolved to include big-data analysis applications, interactive dashboards, and Data Visualization systems that contribute toward facilitating an understanding of patterns and trends within the data. (Božič & Dimovski, 2019; Burnay et al., 2024).

Of the many different advanced business intelligence tools, Microsoft Power BI emerges as an integrated solution par excellence-an easy-to-use tool, combining statistical analysis capabilities and giving users the capability to present results in highly interactive visual format simultaneously. Power BI is a strategic tool that enables compilation of multiple data sources into a single all-inclusive dashboard, where management can analyze performance in real-time. In addition to being perceived as a practical tool employed across various industrial, educational and service organizations, Power BI demonstrates its usability in reporting systems development, down the transformation process from static reports to dynamic dashboards that reflect actual performance indicators instantaneously. In fact, the introduction of Power BI into the industrial setting has opened up possibilities of linking operating data with financial and marketing analysis so that a whole institution performance picture can be viewed across the levels (Burnay et al., 2024; Tirupati et al., 2024).

In this regard, sales analysis concerns one of the most important areas of application for business intelligence tools in industrial organizations. Revenue is driven primarily by sales, and an analysis of sales allows for an understanding of customer behavior, purchasing patterns, seasonality, and performance-affecting situations. Owing to industrial organizations handling usually many customers and products, the urgent need arises for an integrated analytical system that can classify customers and products based on their revenue value. Amidst the several analytical approaches that could provide this,

ABC analysis and the RFM model are significant in their application for customer segmentation and classification. (Mbima & Tetteh, 2023; Zanke & Sontakke, 2024).

The ABC analysis is based on the Pareto Principle, wherein 20% of customers or products are presumed to generate around 80% of revenue. Hence customers can be divided into three main categories:

- **Category A:** Represents the most important segment and the highest contributor to revenue.
- **Category B:** Represents a segment of medium importance.
- **Category C:** Includes the largest number of customers but with the least impact on profits.

Spoor, 2023 utilized this analysis in his study published in the *Journal of Marketing Analytics* to develop an advanced classification model based on combining ABC analysis with statistical clustering algorithms. Considering high revenue customers as an entirely separate set of "outliers" from the other part of the base improves segmentation quality and accuracy in understanding customer behaviour; it showed that separating Key Accounts from other customers provides a more balanced analysis and prevents skewness in the results by differences in transaction volume.

In the case of the RFM model, Recency-Frequency-Monetary, it refers to the behavior of customers in three dimensions: The recency of the purchase, how frequently a purchase is made, and the value of that purchase. Anitha & Patil, 2022 So, in the study published in the *Journal of King Saud University Computer and Information Sciences*, they elaborate this model clearly which facilitates measuring customer loyalty and its importance based on past sales, and by using it along with cluster techniques to group similar customers with K-Means to know the most profitable sectors. Therefore, utilizing both ABC and RFM in the Power BI environment will create an interactive analytical dashboard for industrial management to control overall performance and provide perfect sales strategies.

The industrial institutions have become all the more in need of such integrated analytical models due to the data management problems they are facing. Mainly, reports are worked on manually on traditional spreadsheet software with slow access to information and poor

accuracy, raising the probabilities of errors. Hence comes the importance of developing a Power BI dashboard that integrates the analysis with quantitative and qualitative inputs and presents indicators of sales performance in real-time, thereby ensuring better quality of marketing and production decisions. (Khare et al., 2023; Sudiantini et al., 2024).

Not only the technical aspect but also the methodology determines the success of such projects. An effective dashboard within an industrial institution comes with continuous interaction between researchers and practitioners and regular evaluation of the impact with which the application is versed. Accordingly, this research is justified by the use of Action Research methodology as a methodological framework. (Erro-Garcés & Alfaro-Tanco, 2020; Farhan, 2017).

Action Research is a process of conducting research-iterative and participatory-with actual changes to be used on the real workplace, following an entire cycle through stages of diagnosis, planning, doing, and evaluating. Erro-Garcés & Alfaro-Tanco, 2020 The Action Research is considered a "meta-methodology" because it integrates quantitative and qualitative methods and blends theory with practice. The scientific utility of Action Research, according to researchers, rests in its power not only to analyze reality but also to change it by applying interventions studied through the research with constant evaluation of the impact of the interventions. They also clarified that this kind of inquiry thrives in organizations with direct engagement between the researcher and stakeholders for continuous improvement.

Having established their position along these lines, (Farhan, 2017) described Action Research methodology as a useful administrative machinery in dealing with organization change and improving institutional performance. In this regard, researcher stated, managers and researchers could work together to understand and solve problems in a participatory environment that allows for joint learning. Therefore, from this standpoint, Action Research is more relevant for those applied studies that seek to develop concrete systems within institutions because it provides for modifications to the model during implementation according to user feedback, thereby augmenting the credibility and realism of the results.

In addition, (Nagle et al., 2023) introduced a modern version of action design research (ADR), which is an evolution of action research that integrates the dual processes of

building technical systems and evaluating them. The authors confirmed that ADR provides an ideal framework for developing technical tools such as analytical dashboards in which solutions are built, prototyped, and modified iteratively in the actual working environment. This is perfectly in line with the nature of this study, which involves developing a Power BI dashboard, implementing it in the industrial company, and assessing its influence on performance.

Action Research was selected to provide a basis for implementing Power BI for sales analysis due to the following major justifications: One, it secures great collaboration between the researcher and the sales management, guaranteeing any necessary modification of the analytical model based on the institution's needs. Two, it favors the continuous evaluation of results, allowing the user to modify and enhance the dashboard application in response to field observations. Third, it links the academic and applied aspects of the research, as it seeks to achieve actual improvement in performance in addition to the theoretical contribution to the field of industrial business intelligence.

The literature reviewed in this research addressed the use of the Action Research methodology in multiple fields, including the development of performance systems, quality management, and technical systems in institutions. For example, the study "Action Research as a Meta-Methodology: Insights from an Operations Development Project" applied the methodology in a real industrial environment and showed that involving employees in the research process contributed to raising operational efficiency and adopting a culture of continuous improvement within the institution. These results are consistent with the objectives of this thesis, which seeks to improve sales performance by involving end-users (the sales team and management) in the design and testing of the analytical dashboard (Erro-Garcés & Alfaro-Tanco, 2020).

In light of the above, the research gap targeted by this study can be identified in the scarcity of applied research that employs the Action Research methodology to develop Power BI dashboards in Arab industrial environments. Most available studies have addressed either the technical aspects of analytical systems or the methodological aspects separately, while the literature lacks applied models that link the Action Research approach with practical data analysis of sales in industrial companies. Hence, this study gains its importance from combining both frameworks into an integrated model that seeks

to build a business intelligence system capable of actual application in Palestinian industrial institutions.

The importance of this research is manifested in two integrated dimensions: The first is scientific, represented by enriching the literature on the integration of the Action Research methodology with business intelligence systems and providing an applied model that enhances the academic understanding of how to employ Power BI in sales analysis and customer classification.

Practicality is the second dimension: creating tangible improvements to the industrial company's working environment with an analytical dashboard focused on improving reporting efficiency, accelerating decision-making, and enhancing accuracy of performance indicators.

It follows that, thus, the core problem of study is articulated as, to what extent can the implementation of a Power BI dashboard contribute to the improvement of sales performance within the industrial firm through analyzing and classifying customers according to the Action Research methodology?

To answer this question, the study aims to:

- Analyze the reality of traditional reporting systems in the company and identify deficiencies in information accuracy and access speed.
- Design and develop a Power BI dashboard based on ABC and RFM models for customer classification and sales analysis.
- Apply the Action Research approach to develop the dashboard through the stages of diagnosis, planning, implementation, evaluation, and reflection.
- Measure the impact of implementing the dashboard on sales performance and the quality of administrative decisions.

The ultimate aim of the study attempts to achieve practical results that would subsequently be generalized to other similar industrial institutions and suggest a framework where business intelligence tools could find their way into local work environments. Thus, this study is a bridge between academic research and administrative practice extending culture of analysis based on data and continuous improvement in industrial institutions.

Based on this premise, the introduction sets the stage for the subsequent chapters of the thesis regarding the business intelligence literature review, and Power BI analysis alongside ABC and RFM models discussed in chapter two; the third chapter elaborates the design of the Action Research methodology and how it applies in the organization under study. Thereafter, the results of the analysis and discussions following the application appear in succeeding chapters. In this way, the research seeks to provide a scientific and practical contribution aimed at improving sales analysis schemes and decision-making within modern-day industrial entities.

1.2 Problem Statement

Over the last few years, the industrial landscape has certainly undergone changes at an unprecedented pace due to the increasing rate of digital transformation and the exponentially increasing volumes of data generated by everyday operational and sales activities. However, many industrials are still suffering from this increase in data and have certain weaknesses in the effective utilization of the potential of this data. Numerous institutions cling to such traditional ways of reporting and sales analysis using static spreadsheets or non-integrated systems, which leads to tardy analysis, difficulty in extracting accurate performance indicators, and weak support to strategic decision making.

This is a global challenge because previous studies report that the absence of an integrated analytical infrastructure in industrial organizations creates a gaping hole between available data and actionable knowledge, diminishing the credibility of strategic decisions based on evidence (Khare et al., 2023; Sudiantini et al., 2024).

To address this concern, business intelligence (BI) systems are considered crucial for forging a link between raw data and actionable insight that serves to support managerial decision-making. Studies have highlighted that integrating BI tools into industrial operations significantly elevates operational efficiency and the quality of decisions (Tirupati et al., 2024). Furthermore, the BI system's effectiveness highly depends upon designing interactive dashboards that convert complex numerical data into a format understood by the human brain as a visual representation (Burnay et al., 2024). Despite these developments, very few studies in the literature have attempted the applied use of Power BI for sales analysis in real industrial cases in an Arab setting.

From field observations and the assessment of the status quo at one industrial firm, it has been ascertained that the current mechanism for sales management relies on manual periodic reports incapable of generating an overview of sales performance in an interactive mode. Management lacks a reliable means of identifying which of the customers are most responsible for annual sales, or to what extent they are achieving sales targets by city, representative, or item. Furthermore, there is no mechanism to cluster customers according to their purchasing habits or market worth. The void created by this inhibition weakens institutional capacity for prudent sales planning and equitable distribution of marketing resources, as well as for formulating targeting policies endorsed by facts.

Previous studies confirm that interactive BI dashboards and analytical models such as ABC and RFM are effective in identifying high-value customers and improving sales performance transparency, in line with the Pareto principle (Bagheri & Zwering, 2023; Chen & Zhang, 2025).

Consequently, the study problem is defined by the absence of an integrated applied framework demonstrating how a business intelligence system—specifically Power BI—can transform sales data in industrial companies into analytical knowledge usable in decision-making, through the integration of ABC and RFM models within an interactive dashboard developed according to the Action Research methodology.

In this way, the study attempts to address the problem through the application of the Power BI tool to build for the analytical dashboard addressing sales analysis efficiency and customer classification under the framework of Action Research, thus enabling these decision-making processes to move from the qualitative intuitions and personal estimations into more quantitative data-driven decisions. This study hopes to help fill the void in the knowledge necessary to apply business intelligence to the industrial sector and to emphasize the interactive analysis impact on the industrial management towards more effective and efficient planning.

1.3 Objectives / Aims of the Study

The objectives of the study are meant to enhance the theoretical underpinnings of Business Intelligence (BI) tools within an effective implementation of the Power BI

application among industrial companies in light of the increasingly global trend to Data-Driven Decisions. Recent studies (Alqhatani et al., 2022; Burnay et al., 2024; Tirupati et al., 2024) reveal that the success of industrial institutions in the march toward digital transformation lies in their ability to invest in business intelligence tools to analyze their operation data and develop interactive dashboards that assist in making accurate and rapid decisions.

Therefore, on those bases, the proposed objectives of this study would address the dimensions of analysis, technology, and administration for developing an applied business intelligence system based on Power BI, within a framework of Action Research aimed at diagnosis, implementation, and continuous evaluation of results.

This research is aimed at developing a significant integrated applied model on the analysis of sales and the classification of customers in an industrial company using the Power BI tool for the purpose of strategic decision-making and enhancing the effectiveness of sales and overall operational performance. This major objective stems from the needs of converting raw operation data into usable analytic knowledge as part of the change towards data-driven decisions instead of relying on intuition or manual non-integrated reports.

Accordingly, the study intends to realize a set of detailed objectives which will be integrated with the stages of implementing action research, including:

1. Analyzing the current status of sales systems in the industrial company

The objective is to achieve a clear understanding of the company's sales data landscape. This includes recognizing gaps and weaknesses in how sales data is collected, analyzed, and reported. The expected result is a comprehensive view that highlights areas needing improvement, enabling informed decision-making.

2. Designing and building an interactive dashboard using Power BI

The goal is to provide management with actionable insights into sales performance across cities, customers, products, and time periods. The expected outcome is improved decision-making, more effective performance tracking, and higher operational efficiency.

3. Implementing customer classification models (ABC & RFM Analysis)

The objective is to identify distinct customer groups and understand their contribution to revenue and loyalty. The expected result is the ability to target customers more effectively, enhance marketing and sales strategies, and improve overall business performance.

4. Analyzing Sales Key Performance Indicators (Sales KPIs) and monitoring targets

This is aimed at assessing and analyzing essential sales performance indicators (KPIs) such as total sales, monthly growth rate, percentage attainment of annual target, sales distribution by city and by sales representative, and such assessments of reaching the strategic and operational objectives of the industrial company based on hard quantitative metrics so that these metrics may enhance the employee incentive and accountability systems and inform future planning on actual performance results.

This will build the knowledge base for the continued assessment of the continuous evaluation process in the Evaluation phase of Action Research.

5. Enhancing strategic decision-making through business intelligence

An objective of this approach is to bring together quantitative and scenic data on the one hand, and sound strategic insights on the other, for improving the insightfulness of managerial decisions and future planning. In the process, it looks into the changed speed and accuracy of decision-making, inter-departmental communication, and information transparency in the industrial company due to the adoption of Power BI. If this objective is attained, it will also ensure better resource management, lesser decision-making mistakes, and consequently, sustain a competitive advantage based on data and analytical prowess.

6. Evaluating the impact of implementing the Power BI dashboard on institutional performance

The present objective deals with measuring the impact of implementing the interactive Power BI sales dashboard on actual sales and managerial performance, comparing the performance before and after implementation, assessing user satisfaction, and evaluating how far within the institution the system is accepted. Thus, it becomes directly related to the evaluation and reflection phases of the Action Research methodology and aims to assess how effective the intervention was toward improving work efficiency and assisting to achieve the organization's goals.

Measurement tools and implementation success indicators:

The implementation of the proposed business intelligence model will be judged on a set of quantitative and qualitative indicators that show how effective the system is and the extent of its impact on institutional performance. Such indicators as:

- Reducing sales reporting time from several hours to a few minutes through automation and real-time analysis.
- Increasing the accuracy of sales performance indicators and tangibly improving the target achievement rate.

These metrics aim to ensure a comprehensive evaluation of the implementation quality in terms of efficiency, speed, accuracy, and the extent of user adoption of the new system.

1.4 Importance / Significance of the Study

Accordingly, this study derives its academic and practical significance from its attempt to bridge the gap between available sales data and strategic decision making via employing an applied Business Intelligence model through Power BI use.

The importance of this study is demonstrated through the following:

1. Scientific and academic importance

This study constitutes a scientific contribution to the area of business intelligence and data analysis in particular with respect to the Arab industrial environment, where applied research in the usage of BI tools such as Power BI is still limited. The study aims at integrating the ABC and the RFM analytical models with Power BI techniques in developing an applied scientific framework linking performance analysis and customer classification on one hand, and support for administrative decisions on the other

It also adds to contemporary literature on the Action Research methodology within the context of management information systems by documenting an applied experience illustrating how technical interventions can improve realistic management practices within industrial companies

2. Practical and professional importance

In a practical and professional sense, this study is important in that it provides an applied model to implement business intelligence in this vital but often poorly integrated and

manually data-incremented sector. The application of Power BI allows for interactive dashboards with which management can track real-time sales performance, identify their most profitable customers through ABC analysis, and fathom their purchasing behavior and patterns using the RFM model.

Thus, this study in a big way enhances the efficiency of sales management and increases customization of marketing and sales strategies with the help of real-time data that augment operational efficiency and profitability of the business.

3. Technical and analytical importance

The fact that this investigation is conducted in a real industrial environment and involves lining Power BI tools to various operational data sources for the unification, cleansing, and analysis of data in one integrated system indicates the technical significance of this particular work. Besides contributing to the delivery of more sophisticated multi-dimensional analysis for examining products, customers, geographies, and time periods, it also gives a demonstration of the great possibility that business intelligence tools can offer regarding trend analysis and future performance predictions. This would make way for the next development of intelligent decision-support systems.

4. Administrative and strategic importance

This study will, from an overall administrative perspective, accelerate performance management decision making and improve decision-making accuracy by providing decision makers with the Real-Time KPIs, thus creating an environment for continuous performance monitoring and evaluation supported by interactive Power Bi dashboards. From a strategic angle, the implementation of the proposed system ultimately empowers the senior management to carry out long-range planning and analyze market dynamics and customer behavior, which translates into increased competitiveness and sustaining growth within the local and regional industrial market.

5. Research and methodological importance

The study is considered one of the rare applications that utilize the Action Research methodology in developing and evaluating business intelligence systems. It combines the scientific aspect (design and analysis) with the practical aspect (implementation and evaluation) within the framework of solving a real problem within an industrial work environment. Thus, it provides a research model that can be utilized in future Master's

and PhD research seeking to integrate analytical intelligence techniques with continuous improvement methodologies in institutions.

The study also derives its methodological importance from its adoption of the cycle: Diagnosis → Action → Evaluation/Reflection within the action research framework, where sales performance indicators (KPIs) are measured before and after the dashboard implementation to measure the actual impact of the application on decision efficiency.

Summary of importance

The importance of this study can be summarized in its contribution to building an integrated model for sales analysis and customer classification using Power BI in an industrial company.

This furthers the drive toward data-oriented decisions and shows how business intelligence methodologies can actually be converted into improved performance, improved institutional effectiveness, and enhanced strategic competitiveness.

This research committed to established ethical standards in scientific inquiry by ensuring that the company under study was fully anonymized and that no personal or sensitive information of either employees or customers was mentioned. All data processed were for research and academic purposes alone, ensuring information confidentiality and respect for the privacy of the participating entity.

Moreover, all data collection, analysis, and storage practices have been carried out following the principles of equitable and ethical use of data, guaranteeing transparency and integrity at every stage of the research.

1.5 Research Questions

Research questions emanate from the principal objectives that incorporate the development of an integrated model for analyzing sales performance and classifying customers by using the Power BI tool in the context of Action Research methodology.

These were built upon the theoretical framework and recent studies which have underscored the relevance of Business Intelligence systems as enablers of strategic decision-making and analysis of customers' behaviors (Alqhatani et al., 2022; Burnay et

al., 2024; Tirupati et al., 2024). The study holds also on recent research results that showed the application of tools like Power BI improves the quality of administrative decisions, accuracy of performance indicators, and effectiveness of the analytical models (Chen & Zhang, 2025; Hjelle et al., 2024). Hence, the study questions are as follows:

To what extent does the implementation of a Business Intelligence system through Power BI-integration contribute to improving sales performance analysis, customer classification through ABC and RFM models, and support data-driven decision-making in industrial companies?

Several sub-questions are formulated in order to give response to this main question within the dimensions of theoretical and applied issues that address as follows:

1. What are the shortcomings of the current sales reporting system in the industrial company?

This question aims to identify the practical problems in the mechanism of collecting and analyzing sales data prior to the implementation of the business intelligence system, such as delays in issuing reports or the absence of a holistic view of sales performance.

2. How can the application of the Power BI tool contribute to building an interactive dashboard that helps management analyze sales performance indicators (KPIs) in real time?

This question addresses the applied aspect of developing the analytical system and its ability to transform data into measurable and analyzable indicators.

3. To what extent does the application of the customer classification model (ABC) contribute to identifying the most important customers and their contribution to total sales revenue?

This question aims to test the effectiveness of the model in highlighting the customer segment that represents the largest percentage of sales according to the Pareto principle (80/20).

4. How can the use of the (RFM: Recency, Frequency, Monetary) model help in analyzing customer behavior and understanding their purchasing patterns?

This question aims to study how Power BI can be utilized to analyze the recency, frequency, and monetary value of purchases in order to support marketing decisions and customer retention.

5. What is the impact of implementing an interactive dashboard (Power BI Dashboard) on the speed and accuracy of decision-making within the sales management of the industrial company?

This question tests the relationship between the adoption of the new system and the improvement of the efficiency and quality of administrative decisions in terms of speed, accuracy, and reliance on reliable data.

6. What change occurs in sales performance and operational indicators after the implementation of the business intelligence system compared to the period prior to implementation?

This question aims to evaluate the actual impact of the implementation through a quantitative and qualitative comparison between performance before and after the system execution.

7. How can the Action Research methodology contribute to improving the adoption of business intelligence systems within industrial companies and fostering a culture of data-driven decision-making?

This question deals primarily with the methodological and practical aspects of the study, with a focus on the contribution of the action research approach to the achievement of continuous improvements within the working environment.

1.6 Concepts and Operational Definitions

The key elements underpinning this study are among the most important pillars that elaborately clarify the theoretical and practical framework of the research, such that they constitute the very basis of the analysis and application process within the industrial company environment. The following are the most important concepts that the study addresses, thus operationally defined in the applied context:

1. Business Intelligence - BI

Conceptually:

Business Intelligence means a set of systems, tools, and methodologies to collect and analyze data that transforms into information and insights to make more accurate and effective strategic and operational decisions for management. (Alsaad et al., 2022).

Operationally:

Business Intelligence in the current study includes the use of the Microsoft Power BI tool to analyze sales data in the industrial company through bringing together data from multiple sources-including sales, customers, products, geographical regions-and converting it into visual performance indicators for enhancing the decision-making process.

2. Dashboard

Conceptually:

An interactive interface that makes it possible to consolidate and visualize data from diverse sources in a graphic format that aids users in performance monitoring, trend analyses, and decision-making. (Burnay et al., 2024).

Operationally:

In this study, the term dashboard refers to the interactive panel created in Power BI for sales performances indicators, customer class analysis, and real-time integrated monitoring of industrial company operational results.

3. Sales Performance Analysis

Conceptually:

The act of measuring and evaluating sales performance through the application of a set of quantitative and qualitative indicators is meant to ascertain the extent of the company selling and achieving its strategic goals (Khare et al., 2023).

Operationally:

This refers to the study of historical and current sales data analyzed by Power BI using indicators such as total sales, growth rate, percentage target achievement, representative performance, and sales distribution according to regions, products, and customers.

4. Customer Classification

Conceptually:

It refers to the assigning of customers to various segments according to certain characteristics deemed relevant, such as volume of purchases, frequencies of purchases, and monetary value, to ascertain the most significant and profitable segments (Bagheri & Zwering, 2023).

Operationally:

In this study, customer classification refers to the use of two analytical models, the ABC model and the RFM model, within Power BI to identify high-value customers and major contributors to revenue, and to guide marketing strategies accordingly.

5. ABC Analysis

Conceptually:

It is a classification method based on the Pareto Principle, which assumes that 20% of customers or products contribute to 80% of sales or revenue (Alqhatani et al., 2022).

Operationally:

In this study, customers are segmented into three major categories. Category A: The customers contributing the maximum percentage to the total revenue (80% of cumulative revenue). Category B: Customers contributing medium amounts (approximately 15% - 20% of revenue). Category C: Remaining customers generally low impact within total sales. Analysis is conducted in Power BI, using the annual sales data.

6. RFM (Recency, Frequency, Monetary)

Conceptually:

RFM stands for Recency, Frequency, and Monetary value-a marketing model to study customer behavior (Sudiantini et al., 2024).

Operationally:

In this research, the RFM model was adopted to categorize the customers into groups using Power BI. Recency: Number of days since last purchase. Frequency: Number of times the customer has purchased during a certain specified period. Monetary: Total amount spent by the customer during the analysis period. The classification was then followed by the analysis of loyalty and identification of opportunities to retain the most valued customers.

In this study, the RFM model metrics were determined on the basis of well-defined operational measurable timeframes, namely:

- Recency: The number of days from the last purchase until the measurement date. A customer is considered more recent if they have made a purchase within the last 90 days.
- Frequency: The number of purchase invoices issued by the customer during
- Monetary: The total overall spending of the customer during.

These operational windows allow for the objective and comparable measurement of customer behavior across different time periods.

7. Action Research Methodology

Conceptually:

It is an applied research methodology aimed at improving practical practices within the work environment through a continuous cycle of Diagnosis, Action, and Reflection (Nabil et al., 2023).

Operationally:

This study relies on applying the action research approach in developing a business intelligence system within the industrial company, starting from analyzing the current situation, passing through designing the dashboard and applying analytical models, up to evaluating the impact of the intervention on sales performance and administrative decision quality.

8. Power BI

Conceptually:

It is a business intelligence system developed by Microsoft that allows the integration of data from various sources and its transformation into interactive reports and dashboards.

Operationally:

In this study, Power BI is used as the primary platform for the analysis process, visual display, and customer classification, with the aim of enabling management to make decisions based on accurate and real-time updated data.

Summary of these definitions: The study defines the practical framework for implementing business intelligence systems in a real industrial environment, such that the

previous concepts form the theoretical and practical foundation that guides the action research stages and ensures the consistency of the analysis with the study objectives.

1.7 Theoretical Background and Previous Studies

The theoretical framework of this study constitutes the scientific foundation upon which the applied analysis is based, as it clarifies the key concepts associated with Business Intelligence (BI) and its analytical tools such as Power BI, as well as the quantitative models used in sales analysis and customer classification, such as ABC analysis and the RFM model. This framework aims to highlight the role that business intelligence systems play in transforming operational data into strategic knowledge that supports decision-making within industrial organizations.

This section also includes a review of the most prominent recent studies (2022–2025) that examined the relationship between the application of business intelligence tools and the improvement of institutional and sales performance, with a focus on interactive analytical models that assist in making data-driven decisions. Through this presentation, the theoretical foundations upon which this study was built are clarified, along with the research gap it seeks to fill through practical application in a real industrial environment using Power BI.

Microsoft, (2024) indicates that Business Intelligence is an integrated process aimed at uncovering insights that help organizations make strategic data-driven decisions. BI tools rely on analyzing historical and current data and then presenting the results in clear and easy-to-understand visual representations. The process begins with collecting data from multiple sources, then transforming, processing, and analyzing it to discover patterns and anomalies, to be subsequently displayed using dashboards, graphs, maps, and other visual tools that enable the user to understand the business status quickly and accurately. At its core, business intelligence technologies help organizations move from merely displaying data to transforming it into actionable knowledge used in making more effective operational and strategic decisions.

Dashboards are viewed as perhaps the most valuable outputs of present-day business intelligence systems, transforming raw data into knowledge for decision-making and institutional performance. According to the study by (Burnay et al., 2024), the success of

business intelligence systems is extremely contingent upon the graphic design of the dashboards and their ability to diminish the cognitive load on the user . The researchers presented a new analytical model, Dashboard Adoption Model (DAM), which discusses the relationship between the characteristics of dashboard design: the overall informational, representational, and non-informational load; and the user's intention to adopt it in the decision-making process. Findings indicated that a balance in information presentation and simplifying interaction with data contribute to the effectiveness of the dashboard and user satisfaction. These findings also lend support to contemporary research trends in business intelligence which show that tools like Power BI are best employed when designed to alleviate visual and informational clutter while providing lucid performance indicators that facilitate sales analysis and strategic decision-making within industrial organizations.

This study done by (Sudiantini et al., 2024) addressed the growing Business Intelligence aspect in supporting decision making up for organizations in light of the transition toward a data-driven economy and reliance on data as strategic assets. This study has shown that new forms of business intelligence differ from older models in their capacity to handle enormous amounts of data (Big Data) using state-of-the-art analysis and mining techniques, thus enabling a better understanding of the behavior of the customers, market trends, and the internal performance of the organization.

It is further stated by researchers that implementing BI systems enhances the efficiency of the operational systems and minimizes risks by establishing organized access to data and interactive reporting, which assist management in the discovery of growth opportunities and more rapid and accurate decisions. According to this study, the successful implementation of business intelligence systems is reliant on reviewing the business requirements and integrating appropriate tool sets, such as Data Mining and Predictive Analytics. This is directed to the subject of the current research, which will apply business intelligence tools, specifically Power BI, to the analysis of sales data in an industrial company; both studies find true business intelligence to be when operational data becomes transformed into strategic insight in the support of sales and production decisions. Thus, the findings of (Sudiantini et al., 2024) provide a significant theoretical foundation for clarifying how BI techniques enhance decision accuracy and improve institutional performance through intelligent data analysis.

One of the new studies that happened earlier is that by (Khare et al., 2023) on the effects of Business Intelligence (BI) implementation on industrial companies' performance using System Dynamics simulation methodology. The study presented an analysis of the nexus between financial and operational performance components such as net profit, revenue, production costs, and production volume established in a case of a Japanese company working within the Printed Circuit Board (PCB) industry. Findings indicated that an installation of business intelligence systems has a significant influence on improvement in financial performance, operational performance, revenue increases, and efficiency rate improvements in data processing. Simulation results also indicate how timely data processing saves production costs and accelerates and improves accuracy in decision-making, which is a great indicator of overall industrial performance.

These results confirm the fundamental position taken by business intelligence in transforming operational data to measurable and analyzable performance indicators on their own. This intersects with the current research designed to improve sales performance in an industrial company using Power BI to develop interactive dashboards. Theoretically, this study confirms the hypothesis that a shift to data-driven decision-making endows organizations with the flexibility to compete; it also cites the criticality of analytical modeling and simulation to represent the real impacts of BI technologies on operational processes. However, the study did not discuss organizational and human factors (corporate culture, end-user efficiency, etc.) that might affect the success or failure of BI implementation. This gap indicates a need to focus further investigations that address financial aspects in conjunction with human factors, especially in using BI tools such as Power BI, for better understanding of sales performance and customer behavior.

Therefore, (Khare et al., 2023) set a rock-solid scientific basis for supporting the role of business intelligence within the industrial setting and therefore strengthens the importance of linking practical performance analysis with administrative decision-making through interactive dashboards connecting financial performance with market behavior. Literature also depicts that business intelligence systems have become centerpiece tools for decision support in industrial organizations, especially considering the rising demands of sales analysis and performance monitoring based on accurate and easy-to-understand data. Studies suggest that data quality, the effectiveness of visual presentation, and efficient management of a business intelligence system are among the

top-ranking factors that determine the management's ability to make strategic decisions of higher accuracy and speed.

Abu-ALSondos, (2023) demonstrated that data quality, visual perception quality, and business intelligence (BI) system management are directly and positively correlated with enhanced strategic decision quality, and that greater use of BI within the organization amplifies this positive effect. Literature further supports the argument that interactivity embedded within dashboard tools such as Power BI ensures raw data morphing into performance indicators, allowing management to swiftly analyze sales patterns, track customer behavior, and detect operational deviations—thus providing the industrial firms with a tool for focusing on continuous improvement. Therefore, building sales dashboards based on reliable data and effective visual presentation is certainly one of the prime stages in improving decision-making, the purpose of this study within an industrial firm of the same context is related to it.

Recent literature recognizes the emerging significance that tools and dashboards of business intelligence have in fostering decision-making in industrial organizations and service companies. Sorapure, (2023) suggests that the value of a dashboard does not depend solely on the quality of the data, but rather on the level of actionability—interpreted as the ability of the dashboard to facilitate non-expert users in determining what decision can be made based on the presented data. On this study, users expect to see dashboards that relate to audience needs, provide localized and simplified information, and lay everything out in a clear visual narrative that makes detecting trends easy, thus lowering cognitive load when interpreting indicator results. These results underscore the findings of the literature in the field of Business Intelligence, whereby other studies showed that dashboard design must find a balance among information volume and ease of navigation and visual clarity of indicators, to be effective within the context of decision-making under quick reaction to data. Special studies in the industry have shown how dashboards made in applications like Power BI help in operations monitoring, improving sales analysis efficiency, and outlook demand prediction, hence making them operational for the strategic performance development of industrial corporations. With this in mind, literature emphasizes a necessity for user-centered design processes, linking data with daily operational decision-making, and performance metrics based on reliable data

sources, which forms the theoretical framework on which this study is based for building a sales analysis dashboard in the industrial company under study.

Business Intelligence capabilities represent one of the major factors impacting an institution's performance; mainly new product and service development, according to (Alsaad et al., 2022). Under the Dynamic Capabilities Theory, the authors argue that business intelligence is not just a technical system for the analysis of data but instead a dynamic organizational capability that enables organizations to forecast future customer value, enhance innovation capability, and reduce the time-to-market of product launches. The findings indicate that the positive effect of business intelligence on performance is largely indirect, operating rather through the enhancement of three key capabilities: customer value prediction capabilities, product innovation capabilities, and speed of market entry. The mediation effect of the three capabilities on the relationship between business intelligence tool use and companies' innovative performance has been empirically confirmed based on a survey of 583 sales and marketing managers in Arab service companies. These findings complement the focus of this study, which endeavors to highlight how Power BI tools facilitate predictive analysis and support strategic decision-making aimed at enhancing sales performance in industrial organizations.

Bagheri & Zwering, (2023) asserts that implementing Business Intelligence and analytics (BI&A) is fundamentally determined by a number of organizational and technical factors such as data quality, management support, clarity of vision, and user participation, as well as having an 'active project champion' within the organization supporting the project. The research showed that data quality is the most critical factor in assuring BI&A success, as correct and integrated data means better and faster decision-making. In addition, management support and active user participation assist in realizing the expected benefits of a data analysis system. These findings show that industrial companies seeking to better their sales analysis through Power BI can increase decision-making performance by emphasizing such factors, thus making BI&A an effective strategic tool toward enhancing operational efficiency and obtaining a sustainable competitive edge.

Recent research into business intelligence has also stressed that the quality of visual design of charts and dashboards will directly affect the speed and correctness of the decision-making process. Chen & Zhang, (2025) showed that default PowerPoint-type designs in tools such as Power BI and Tableau are, by way of associating them with multi-

color rainbow palettes, making it increasingly difficult for users to integrate information and spot patterns. The study then introduced a new model based on visual grouping to unclutter graphics, thereby enhancing perceptual accuracy and promptness of comprehension, ultimately leading to improved quality of administrative decision making. This aspect leads toward developing an industrial sales dashboard that is perceptually distinguished in favor of highlighting sales patterns and trends. Optimization of the Power BI dashboard design for industrial firms necessitates the reduction of distractions and impediments, thereby improving decision-supporting clarity and effectiveness.

Research by (Sinarasri et al., 2023) investigating the association of Management Control Systems (MCS) , BI, and the performance of startups in Indonesia highlights BI's role in enhancing decision-making performance. While this research focused on startups, its findings offer an interesting perspective on BI implementation in industrial companies, especially concerning sales analysis with tools like Power BI. The most important finding of this research is that the success of Business Intelligence depends on a number of fundamental dimensions: management support and active employee participation (in which support from top management aids in provisioning resources and ensuring the integration of BI systems into daily decision-making processes); data quality and technical infrastructure (i.e., accurate, integrated, and reliable data forms the basis for generating effective analytical findings to support sales decisions); and the team's analytical and technical capabilities that determine how much a company is able to benefit from BI tools in improving operations and strategic decision-making . The research also indicated that BI, by itself, does not guarantee the improved performance of the company unless it is tied to Management Control Systems (MCS), creating the need for analytical systems to fit along with company policies and operational procedures. For industrial companies, this sets into motion the integration of Power BI with sales, inventory, and distribution processes for all-consuming insight into monitoring sales performance in real-time, analyzing patterns and trends, improving demand forecasts, and supporting faster and more accurate strategic decisions.

Similar recent studies also utilized the Action Research methodology as a basis for the development and evaluation of business intelligence systems in actual working environments. In their study that applied the Action Design Research (ADR)

methodology, (Nabil et al., 2023) addressed performance management in supply chains through a real-time dashboard that was developed through Microsoft Power BI, thereby proposing to enhance operational against financial performance indicators at an industrial company. Findings showed that actual improvements were achieved in speed and accuracy of decision-making, enhanced communication between departments, and more efficient use of data due to integration of applied scientific analysis and field participation with decision-makers. It was also confirmed, according to the researchers, that under the ADR methodology, an opportunity exists for an iterative development cycle (Diagnosis → Action → Reflection) in which the practical model is, based on user feedback, improved. Other studies such as (Burnay et al., 2024; Sudiantini et al., 2024) have also supported such an assertion by observing how the action approach features as one of the most effective vehicle methods for merging technical analysis with continual managerial adjustments in that it could allow for interactive evaluation during implementation and revealing the extent of user acceptance of new systems and the quality of the practical impact of the application. These results underline the centrality of action research as an appropriate methodology for developing and evaluating business intelligence systems in industrial organizations, which this study will leverage to construct the dashboard and analyze its application effects on enhancement of sales performance and decision-making.

Thus, analyzing and reviewing previous studies makes it clear that Business Intelligence systems have developed into one among the most important strategic tools which support industrial organizations in using Data-Driven Decisions. It is indicated by (Erro-Garcés & Alfaro-Tanco, 2020) that action research would stand for a "meta-methodology" under management because it combines quantitative and qualitative methods within one, integrating the scientific-empirical practice dimensions. The study explains that such methodology will offer a collaborative environment which would contribute resolving practical problems in organizations through direct interaction between the researchers and the practitioners. The integration of science and application makes action approach suitable with performance improvement projects using business intelligence tools such as Power BI since it will provide understanding of practical troubles in sales systems and hence produce experimental solutions measurable and continuously improvable within the company environment.

Olhager, (2025) indicates that when action research methodology is applied in projects for developing industrial processes, it would enhance operational performance over time through iterative processes of planning, execution, evaluation, and reflection. The study results validate the fact that when a research team collaborates with employees, production problems are revealed and valid data are used to develop effective solutions. This method resembles that of Power BI dashboard development in industrial organizations, where models are validated against results, further analysis and improvement are performed continuously on the basis of feedback received from managers and sales teams, which qualifies action research to be the most appropriate methodology for implementing analysis and forecasting systems into the industrial sector.

Action Design Research (ADRs) integrates and combines action research and design research, marking a truly modern development path for an organization when putting technical solutions into practice where the design and evaluating processes are held iterative within a realistic environment. As indicated by (Nagle et al., 2023), that embodiment rests on learning by doing, which enables the researcher to acquire a solid systematic understanding while undertaking its construction and testing . The thesis captures this philosophically because it aims at constructing an analytical Power BI dashboard for monitoring sales to support better decisions; the action-design approach will contribute to creating a practicable model that can also be built and improved with conjoined efforts from the company management and sales teams.

Power BI is an integrated business analysis system that allows organizations to develop insights from data that are linked to a series of tools and services for business decision-making, as stated (Microsoft Learn, 2024) in the official Power BI documentation. Power BI offers extensive features for connecting data from multiple sources and brings that data relatively clean and transformed into a visual presentation and interactive dashboards that are beneficial in understanding trends as well as monitoring performance in real-time. For all categories of users, including analysts, report creators, and executive management, the platform is based on a framework that enhances report-sharing and improved collaboration within the organization. This is strengthened further by published literature on the site, which also portrays the strength of Power BI as being able to unify all data into one model and transform that into analyzable indicators, making it the most important tool for developing business intelligence systems and improving efficiencies in

operational and strategic decisions, especially in the ranges that require continuous data monitoring-large monitoring of data such as analysis in sales.

Microsoft Fabric, (2025) In the document titled "Power BI Service- Basic Concepts," the Power BI cloud service, known as Microsoft Fabric, forms part of the Power BI ecosystem that allows a user to easily create and share through interactive dashboards reports within the organization. The service provides a unified environment through which data can efficiently be uploaded organized, and dynamic reports created without using local infrastructure. It also features key elements including Reports, Dashboards, Workspaces, and Apps, thus establishing a healthy symbiosis among these components to promote collaborative efforts among work teams and sustain data-driven decision-making. The developers note that the service allows users access to reports from virtually any connected device and can update data automatically, improving real-time performance monitoring and making previously raw data insights actionable within the business landscape.

According to (Farhan, 2017), action research method is said to be successful in management by helping the leaders and researchers comprehend organization-specific issues so that decisions made will consider the participation of stakeholders at all the stages of the research. According to him, the methodological cycle consists of observation, reflection, planning, and action, which then leads to understanding the present context, instituting interventions, followed by a second evaluation of results under a continuous improvement scheme. According to (Farhan, 2017), the iterative nature of action research makes it a suitable vehicle for organizational change and institutional performance improvement, more especially in environments that require data-driven decisions and collaboration between researchers and practitioners. Therefore, using this approach in developing a Power BI dashboard within an industrial company is the methodological step consistent with action research philosophy, where continuous learning and updating of analytical indicators happen through direct interaction with sales reality and management needs.

Gultom et al., (2024) addressed a study on the application of a Business Intelligence dashboard based on Power BI to analyze employee performance data in an organizational environment. The researchers applied design methodology embedded with ETL (Extract, Transform and Load) in the collection, cleansing, and visual representation of the data,

which was interactive and easy to understand. Results indicated that dashboards using Power BI helped the administrative decision-making process significantly by enhancing the performance monitoring and early detection of declines in employee efficiency, whilst also improving the communication between human resources management and top management. Although the focus of their study was on job performance data as opposed to sales data, it does present practical evidence regarding the usefulness of some of these business intelligence tools in translating raw data into information of analytical worth. This intersects the present research goals which seek to use a similar model with Power BI in analyzing sales data for Data-Driven decision-making.

The study by (Tirupati et al., 2024) focused on the role of Power BI in enhancing companies' capabilities to visualize data and transform it into information usable for strategic decision-making. The faculty verified that Power BI had interactive dashboards empowering management to have a holistic view regarding issues of operational and commercial performance, comprehension of key performance indicators, and make faster-and-accurate decisions. According to the study, Power BI has improved work with data as compared with traditional platforms like Excel and Tableau by presenting data with real-time view while providing artificial intelligence supported analytics. This enables management teams to monitor sales performance, identify customer behavior trends, discover any potential decline in sales, and quickly take corrective measures. In addition, the researchers noticed that Power BI has brought collaboration across departments, through its cloud sharing features and interactive style of reports, and it has also increased user satisfaction by being simple and straightforward in its graphical presentation. Such features make Power BI advantageous in industrial and commercial firms willing to create interactive dashboards that will enhance the sales performance and foster data-driven decisions. However, the study also suggested that due consideration should be given to challenges related to the implementation of Power BI in large entities, such as data governance and training of users, which will ensure the maximum benefit is realized from the system. Generally, (Tirupati et al., 2024) affirm that Power BI stands as a key strategic tool in the conversion of data to actionable insight; thereby sharpening the competitiveness of firms and augmenting the quality of the administrative decision-making process.

Digital transformation had suddenly occurred. Organizations began generating vast extents of data as a result of the growth of infrastructures such as Enterprise Resource Planning (ERP) systems, the Internet of Things (IoT), and other modern technologies; the changes will even extend much farther with the ongoing shifts from the Fourth Industrial Revolution to the Fifth (Trieu, 2017). This research, using Microsoft Power BI, as one of the business intelligence systems in converting this data to knowledge actionable for decision-making and supply chain performance improvement, emphasized the significance of using business intelligence systems in organizations by (Nabil et al., 2023).

The goal of the research was to demonstrate, using a case study by the Action Design Research (ADR) methodology in a food company (Ly Foods Ltd.), how an interactive dashboard design using Power BI can measure SC Key Performance Indicators (KPIs) like delivery rate, inventory level, and supplier performance. This dashboard enables managers to track operations day by day in real time by making data-driven decisions. In terms of operational efficiency improvement and cost reduction by operation cost, customers became happier as a result of the overall impacts.

Research results also indicated that Power BI is strong in integrating data from many sources, such as ERP, transportation systems, or inventory management, and providing interactive display interfaces that lead to the ability to share information across departments. It has been recommended that the deployment of business intelligence tools like Power BI be extended to include even better dashboards integrated with machine learning algorithms for predictive analysis of data in the future. Among these important studies evaluating the very important role of business intelligence tools in improving operational efficiency and transforming data into added value in small and medium enterprises, especially those manufacturing-oriented and supply-chain relevant.

Recent references also confirm the significant role of dashboards in enhancing the quality of decisions through a more interactive representation of data for users to better track performance and detect problems more quickly. Studies show that a well-founded design of effective dashboards must indeed rely on monitoring the entire business cycle and not just isolated indicators. In this scenario, the (Hekman et al., 2024) study explains how dashboards based on a contextual-analysis methodology allow organizations to assess how performance varies across several points of time and early identification of

deviations from the expected course of operations by using flowcharts and statistical control charts that improve accuracy in the monitoring process of decision making. Literature on business intelligence argues that such continuous monitoring contributes to improving industrial processes in companies, boosting the efficiency of sales teams, and driving decisions based on real-time data visible on platforms such as Power BI. In addition, it increases sales management effectiveness while enhancing a company's forecasting and continuous improvement capacity towards creating an ideal dashboard to support decision-making within the industrial company in this research.

Modern literature depicts a steadily growing dependence of industry ventures on business intelligence systems at updating performance analysis and decision-making through interactive dashboards like Power BI. Recent studies indicate a positive increase in forecasting accuracy as well as in monitoring the behavior around sales and customer's behavior by employing advanced techniques. For example, through the aforementioned study by (Chebrolu, 2025), the impacts of Artificial Intelligence within a business intelligence environment can account for a 70% deduction of manual work in data processing while increasing forecast accuracy by an average rate of 35% - 50%, therefore improving the speed and quality of operational and strategic decisions within organizations. It was further noted in the literature that these tailored dashboards, after their creation, provide these organizations with very useful metrics such as identification of profitable products, sales representatives performance analysis, and monitoring of inventory levels, in addition to facilitating continuous improvement through action research methodologies linking diagnosis, intervention, and evaluation. Therefore, it may be concluded that the move towards these interactive dashboards will increase the possibility that these companies might have the opportunity to track their performance indicators in real-time, the ability to base an organization's actions on accurate data, and reliable data, which supports this study's business objective of developing an analytical system that enables management to better understand sales patterns and improve overall performance.

The study by (Gonçalves et al., 2023) is one such recent applied study aimed at improving the decision-making process through the use of business intelligence (BI) tools with a case study on the use of Power BI as the primary medium to integrate data into designing analytical dashboards. The impact of BI on the decision-making process in organizations,

especially on sales and marketing, was the focus of this study. The researchers relied on Vercellis methodology to design an integrated business intelligence system based on Extraction, Transformation, Loading (ETL) stages within a Data Warehouse, and then analyzing and displaying it through interactive dynamic dashboards. The dataset consisted of those available from the SuperDataScience website, and key performance indicators (KPIs) were developed representing the vital aspects of the sales decision-making process.

Research findings confirmed that business intelligence tools in this case Power BI allow data to be pulled and transformed from many sources within a single analytical environment for near real-time access to interpretative analytics accessible to managers in making faster and more accurate decisions. Results also support the idea that joined dashboards result in departments being able to identify strategic performance indicators, pinpoint operational problems well ahead of time, and correct deviations of processes within the business. Theoretically, the study confirmed the fact that BI tools are essential means of converting unstructured data into usable practical knowledge while enhancing the culture of Data-Driven Decisions within organizations. The experiment, in practice, displayed designing interactive dashboards based on Power BI which able creates visual environments to help sales departments understand trends and improve marketing performance. The study further indicates low adoption of Power BI in small and medium enterprises with a representation of below 22% thus revealing research gaps related to increasing awareness about strategic benefits associated with using such tools. The researchers recommend future studies to broaden scope by using primary data obtained from existing companies to quantify the impacts that accrue from applying BI in real work environments. Hence, the study brings out the significance of linking data analysis and interactive dashboards in assisting sales decisions which greatly overlap with the current research objective of developing a Power BI dashboard to analyze sales performance thereby improving decision-making efficiency within industrial companies.

The research article published by (Sanabia-Lizarraga et al., 2024) in the Q1 ranked journal of Sustainability examined how to develop a Business Intelligence system based on the use of Microsoft Power BI for the analysis of international agricultural trade in Mexico. It sought to develop an interactive dashboard for decision-makers to analyze agricultural product imports and exports, monitor trade indicators, and logistics performance

indicators in an interactive and real-time manner. The study adopted the Cross-Industry Standard Process for Data Mining (CRISP-DM) as the guiding methodology to build the analysis model; this adequately reflects the orientation of the study toward integrating data analysis and practical modeling for better strategic decision-making. The dashboard included indicators like agricultural trade balance, evolution of exports and imports in a time frame, transport and logistics analysis, and an interactive map showing export distribution on a state-wise basis.

Power BI was seen by the results to have, in effect, enabled a process whereby stakeholders would be able to transform raw data coming in from various sources into actionable executive insights, contributing to support decisions relating to investments, trade, and logistical infrastructure development. Decision-making and operational transparency improved as those without technical backgrounds could obtain the correct information provided over the web via Power BI in real-time. The study had precise documentation of the technical orientation, the methodology involving DAX expressions in Power BI to convert raw data into meaningful indicators, making it a useful applied reference that will be useful in the creation of similar dashboards for other areas such as industry or sales. This research is an important reference that backs an ongoing discussion on the application of business intelligence tools in enhancing analysis-and-decision-making processes among organizations, for it shows how Power BI practically supports much needed decision-making activities through integrated visual analysis and connecting operational data to performance indicators, which intersects with this study's objective aimed at analyzing and improving sales performance in an industrial company using Power BI.

The study by (Picozzi et al., 2024) is among the recent researches that illustrate the importance of using Business Intelligence (BI) software in tracking performance indicators. The study showed that integrating BI tools such as Power BI enables organizations to monitor and analyze operational and financial data in an interactive and real-time manner, which supports accurate strategic decision-making. The researchers focused on developing interactive dashboards to track and analyze key performance indicators over time, enhancing the ability to identify improvement opportunities and increase process efficiency. The study indicates that using BI allows for linking different data, measuring results accurately, and providing a comprehensive visual representation

that makes it easier for decision-makers to understand complex information quickly and effectively, which can also be utilized in the context of sales analysis to improve performance and increase profitability.

The research conducted by (Alqhatani et al., 2022) concern recent studies conducted in the field of Business Intelligence (BI) concerning the applications of sales analysis and data support systems for decision-making processes within a digital business environment. In their analysis, they also applied a blend of Artificial Intelligence (AI) and Business Intelligence (BI) techniques to develop an integrated analytical model that would improve sales performance in the retail space by creating interactive dashboards using Power BI. The cloud-aligned BI system relies on historical and current data analysis, utilizing machine learning algorithms such as ARIMA for forecasting future sales, complemented by RFM methods, to analyze and classify customers according to their purchasing behavior. The results revealed that the integration of Power BI with forecasting algorithms could improve forecasting accuracy concerning sales forecasting, further understanding customer behavior, and directing marketing and administrative decisions toward the most profitable segments.

Management could analyze the sales overtime performance across the global geography and product category and thus follow the Key Performance Indicators (KPIs) in real-time through dashboards created using Power BI. The study also shows how adopting big data, the analysis through BI provides an events view of the performance of sales and balances the strategic and operational planning. These findings conform to the current research objective of developing an analytical model using Power BI to better understand the sale's performance among industrial companies and back the data-driven strategic decision in sale and customer management.

According to (Wong et al., 2024), merging RFM analysis with clustering algorithms has a significant effect on enhancing the comprehension of the customer behavior and specifying in a more precise manner the most valuable groups. This can support organizations with data-driven marketing decisions, which is precisely in line with this study's goal of analyzing customer segments using a dashboard in Power BI. In addition, (Londhe & Palwe, 2022) provide an advanced predictive model on the basis of RFM analysis integrated with the ARIMA model to achieve more accurate sales forecasts since the results obtained revealed that excluding inactive customers prior to forecasting adds

reliability to the predictive models. This method is in line with the present thesis as it explores the application of predictive analytics within a Power BI dashboard in order to enhance decision-making.

According to (Hjelle et al., 2024), one of the most important outcomes of Big Data Analytics applications is the Analytics Dashboards, which improves decision-making by transforming complex data into easily visual representations for decision-makers to understand and analyze. The study explains that dashboard design and quality components of the displayed information like Format, Currency, Completeness, and Accuracy in a great way can improve user satisfaction with the information and reduce their perception of task complexity, leading towards more accurate and efficient decisions. Experimental results were derived from an exposure of over 500 participants, and it showed that the Format, Currency, and Completeness of information on a dashboard raise the level of Information Satisfaction, which in turn reduces Perceived Task Complexity and enhances decision quality. Though the accuracy variable did not strong direct impact, it encourages trust indirectly in both information and decision making. The study suggested that an understanding of how to design analytical dashboards in terms of perceived information quality contributes to improving the quality of strategic decisions taken in organizations, particularly in such complex areas as marketing, sales, and operations management.

This study by (Rungruang et al., 2024) analyzed customer behavior in the digital environment of business through the RFM (Recency, Frequency, Monetary) quantitative modeling method, whereby such purchasing patterns, frequencies, and the financial value of the purchases are understood and clustered using the K-Means clustering algorithm to group customers into homogeneous ones. Using the real transaction data of a retail company, the Silhouette Coefficient analysis determined the optimum number of clusters for such transactions; the analysis concluded that three-category models ($K=3$) can be the most representative for customer behavior. The findings suggest that merging RFM and K means can aid companies in identifying their most important and most profitable customers, facilitate formulation of market strategies, and improve the efficiency of retention efforts concerning marketing ROI. These findings are consistent with the current thesis goal, which analyzes and classifies customer behavior within a Power BI dashboard using similar quantitative models (RFM and ABC) to differentiate segments of industrial

customers by financial value and frequency in support of the strategic decision-making process within the corporate environment.

This research presents an applied model through which business intelligence techniques will be implemented in analysis of customer behavior through the RFM model, Recency, Frequency, Monetary, and uses the K-Means clustering algorithm (Anitha & Patil, 2022). The aim of this research is to help organizations to find the most valuable and most profitable customers acquired from a scientific and systematic analysis of historical sales data. Suffice to say that combining the RFM model with clustering techniques provides much more precise knowledge of purchasing patterns, hence supporting even better marketing strategy developments. Business intelligence tools taken up for decision support and improving business performance are the essence of this thesis objective, which is building a Power BI dashboard for sales analysis in the industrial company. Just as the researchers relied on real data to classify customers according to their purchasing behavior, so too does this research aim to employ Power BI in designing a dynamic dashboard that enables management to monitor RFM indicators and identify accurately customer and sales segments for improvements in marketing and production decisions.

Spoor, (2023) offers an improved model that serves to enhance customer segmentation by the integration of ABC analysis and Anomaly Detection concepts in a cluster analysis methodology. Real data from a wholesale company operating in the food and household supplies sector in Portugal allowed the researcher to demonstrate differentiation between Key Accounts and regular customers. Findings showed that the two-stage process that initially identifies key accounts that have behavior dissimilar to the rest, followed by clustering algorithms like Gaussian Mixture Model being applied to remaining customers, improves segmentation quality and increases the interpretive powers with regards to purchasing behavior. Such a model fits within the concepts defined under ABC analysis in sales management, where the high revenue customers and strategic actors making up Category A stand out as outliers in the data, and as advice of Spoor, they ought to be isolated prior to general analysis before forming other groups of customers. The results in this respect are congruent with the objective of this thesis in designing a Power BI dashboard that uses ABC and RFM indicators for further categorization of customers, improving sales decisions in the industrial environment, as the very same approach can

be applied within Power BI to distinguish between various customer categories and analyze their purchasing behavior in a dynamic and practical way.

Recent study results demonstrate effectiveness of tools such as Microsoft power BI in transforming complex operational data into interactive dashboards that enable decision-making regarding performance indicators tracking and real-time analysis of customer behavior. Effects of analytical models such as ABC analysis and RFM analysis in classifying customers according to value and relative importance in sales have also been shown to emphasize improving marketing and sales strategies with increased accuracy. However, most studies have focused on applying these models within commercial and service sectors, while practical applications in the industrial sector remain severely limited, particularly within an applied methodological framework based on Action Research.

This research gap thus requires studies that actually implement business intelligence in real conditions of an industrial environment to measure its direct effect on improving sales performance and accuracy of administrative decisions. Therefore, the point of contribution this study makes for filling this gap is the design and construction of an interactive dashboard using Power BI to analyze sales data and segment customers through ABC and RFM models, while addressing impact in strategic and operational decisions support in an industrial company.

Accordingly, the theoretical framework of this study combines the scientific concepts of business intelligence and analytical models for customer classification on one hand, and the applied methodology of action research on the other, to provide an integrated model that contributes to developing industrial performance and enhancing the effectiveness of decision-making in contemporary organizations.

Chapter Two

Methods

2.1 Study Design

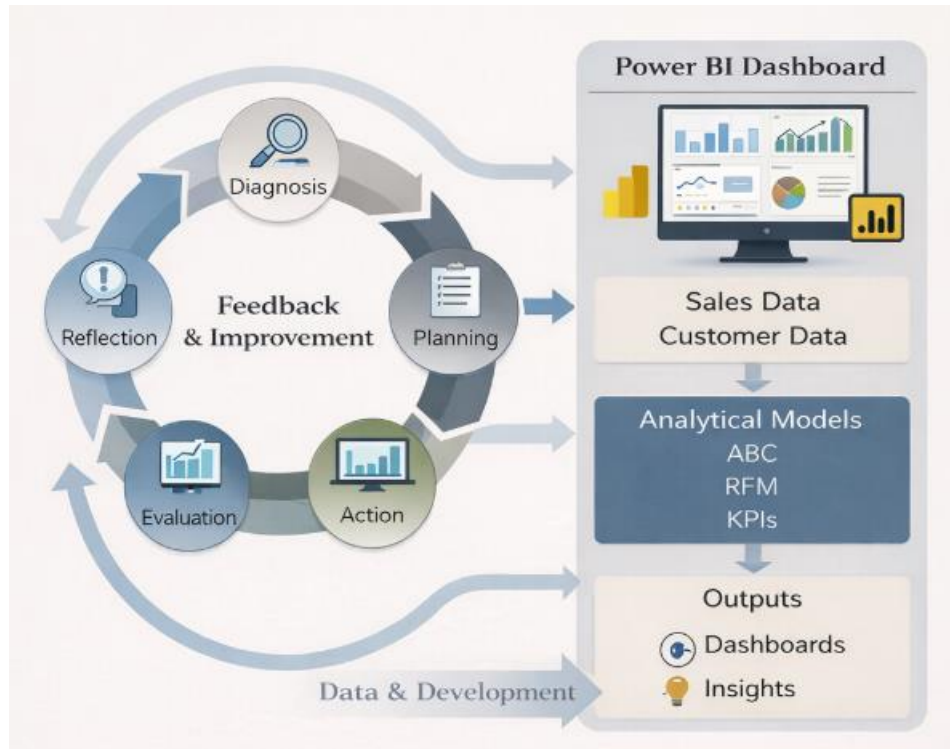
This study is designed according to the Action Research Methodology due to its suitability for the nature of the research problem, which combines scientific analysis with practical application within an actual work environment. This approach is considered one of the most compatible methodologies for applied studies in the field of Business Intelligence (BI), as it allows for the development of technical solutions in the field through direct collaboration between the researcher and stakeholders within the organization, aiming to bring about real improvement in administrative and analytical practices.

The study design aims to develop and analyze a practical application of a business intelligence system using the Microsoft Power BI tool in an industrial company, in order to address the deficiencies in traditional reporting based on manual Excel files that require significant effort and time to prepare monthly and annual sales performance reports. Action research has been adopted as a dynamic methodological framework that integrates Diagnosis, Action, Evaluation, and Reflection, allowing for cumulative and continuous process improvement.

The study design is based on an integrated cycle involving four main interconnected stages as shown in the illustration below:

Figure 2-1

Illustrates the integrated action research framework combined with Power BI and its role in supporting analysis and decision-making within the industrial company.



These stages were implemented in the field at the industrial company during the period spanning from March to July 2025, through more than ten consecutive work sessions and applied consultative meetings with the General Manager, Sales Manager, Financial Manager, and Operations Manager, in addition to periodic presentations to the Board of Directors to review the results and analytical outputs.

In the first stage, Diagnosis, the traditional sales reporting mechanism relying on multiple Excel spreadsheets was analyzed, and challenges such as the length of the preparation period, the probability of calculation errors, and the lack of a comprehensive analytical vision were identified. In the second stage, Planning and Intervention, a Power BI dashboard was designed containing Key Performance Indicators (KPIs) such as the percentage of sales target achievement, sales analysis by cities and representatives, customer classification according to ABC and RFM analysis, and a temporal comparison of monthly sales between years.

In the Evaluation stage, the actual improvement after implementation was measured by comparing performance before and after using the new system; the monthly report preparation

time decreased from several days to a few minutes, and the accuracy of indicators and the transparency of real-time monitoring of sales targets increased. Furthermore, participants expressed high satisfaction with the clarity of the indicators and their ease of use in administrative meetings.

In the stage of Reflection and Continuous Improvement, a closing session was held to discuss development recommendations resulting from the experience, such as expanding the application scope to include procurement and inventory analysis and its future integration with ERP systems. It was also agreed to updates to the system monthly, and to carry out quarterly reviews on the continued rightness of the analysis and improve the quality of the administrative decisions.

The design relied on integrating quantitative and qualitative methods (Mixed-Method Design) since sales performance indicators were quantitatively analyzed for measuring the efficiency improvements and interviews and field observations were used for interpreting the changes in management behavior towards data-driven decisions.

A result of this design showed an application of Power BI not just as a technical tool, but an administrative and cultural advancement towards a Data-Driven Decision Culture, which afforded an unprecedented level of transparency and analysis in real-time sales performances across the various administrative levels. Therefore, the design represents an integrated applied model that combines systematic academic analysis with practical analytical transformation and can be generalized to other industrial organizations seeking the adoption of business intelligence systems for continuous improvement in their operational environment.

2.1.1 Rationale for Choosing Action Research Methodology

The Action Research methodology was selected as the methodological framework for the study based on several scientific and methodological considerations that align with the nature of the research problem and the specific characteristics of the applied study environment in the industrial company, as follows:

1. Suitability for the nature of the applied study:

This study looks at developing and analyzing an interactive dashboard to help improve the sales decision-making process. This process needs direct involvement in the real work

environment and ongoing follow-up of the stages of change and improvement step by step. Action research is suitable for this type of study because it combines academic research with practical application at the same time and aims to create real change within the organization being studied.

2. Focusing on participation and interaction with decision-makers:

Action research is based on the principle of participatory interaction between the researcher and the members of the studied organization. In this study, the general manager, sales manager, finance manager, and operations manager were all participants throughout every stage of research including diagnosis, implementation, evaluation, and reflection, resulting in a much deeper understanding of practical challenges and more realistic and managerially acceptable solutions.

3. The ability to achieve continuous improvement:

It is given the naming iterative because every research cycle is finished with feedback thereby enabling continuous development and improvement of the system. This feature was applied in the study through holding more than ten consecutive working sessions to modify the Power BI dashboard based on management feedback, which enhanced the quality and practicality of the applied results.

4. Focusing on solving real-world problems:

Action research aims to solve real organizational and managerial problems, not only to build a theoretical model. In this study, a specific problem was identified, which is the slow preparation of reports and weak sales analysis, and a practical solution was developed using business intelligence tools to address it and achieve real and measurable improvement.

5. Integrating quantitative and qualitative approaches:

Action research allows the integration of quantitative and qualitative approaches in a complementary way. This was applied in this study through using quantitative analysis of performance indicators before and after applying Power BI, and qualitative analysis of observations and interviews that reflected the managerial and behavioral changes resulting from adopting the new system.

6. Enhancing the reliability of applied results:

Because this approach is carried out within a real work environment, it produces results with direct practical value that can be used to improve systems and processes within the company, and it contributes to building professional knowledge that can be generalized to similar industrial organizations.

Based on the above, adopting the action research approach in this study was not just a methodological choice, but a scientific and practical necessity that fits the research objectives, its practical context, and the nature of the problem, which requires direct interaction and gradual improvement within the industrial work environment.

2.1.2 Illustrative Figure of the Relationship Between the Stages of Action Research and the Steps of Developing the Power BI Dashboard

To clarify how the research methodology interacts with the applied aspect of this study, Table (2.1) shows the integrative relationship between the four stages of action research and the steps of developing the Power BI dashboard within the industrial company environment.

Each research stage corresponded to a technical and analytical step within the system development cycle, making the research and applied processes move in parallel and in an interactive way, as follows:

Table 2-1

Illustrates the integration between the action research stages and the Power BI dashboard development steps within the industrial company environment.

ACTION RESEARCH STAGE	POWER BI DEVELOPMENT STEP
1. DIAGNOSIS	Analyzing the current state of manual sales reports and identifying deficiencies in sales analysis.
2. ACTION PLANNING & INTERVENTION	Designing the database and connecting it to Power BI, selecting analytical indicators and classification models (ABC, RFM).
3. EVALUATION	Testing the dashboards developed with the management in measuring pre- and post-implementation performance and analysing speed, accuracy, and satisfaction indicators.
4. REFLECTION & CONTINUOUS IMPROVEMENT	Discussing results with top management and documenting feedback can also be done while working on proposals to take the Power BI usage throughout all departments.

More appropriately, this integration indicates that the research process was not confined to theoretical observation and data collection alone but formed an integral component in a continuous participatory development process between the functions of the researcher and the management team within the company. Each cycle of action research represented a discrete functional development and improvement project on the Power BI dashboard in terms of analyzing the present situation, designing interactive indicators, and reporting on results and their impacts on managerial decisions.

Because of the interplay between the research and its applied aspects, a comprehensive understanding was gained of how sales data is converted into usable strategic knowledge, which in turn enhances quality and swiftness in decision-making in the industrial organization.

2.1.3 Study Design Summary

The study set up may be succinctly defined as a pragmatic operationalization of the action research paradigm, integrating the academic analytical aspect with practical application within the real working environment of a medium-sized industrial company.

The iterative approach adopted by the study proceeded in an ordered succession of stages: diagnosis, intervention, evaluation, and reflection. Each of these stages allowed for some tangible development and improvement in the newly built analytical system using Microsoft Power BI.

During this stage of action research, traditionally weak reporting structures were identified, and an interactive dashboard was designed for real-time sales performance analyses using the ABC and RFM models, feeding into target achievement indicators for each sales representative, by city, item, ton, and product.

The Power BI implementation also allowed management to progress from slow descriptive reporting to the use of an interactive business intelligence system powered with real-time data and advanced visual analytics by which decision-makers could quickly grasp sales trends and make decisions based on facts.

This design is an example of academic research integrated into managerial practice in which the system was developed in direct collaboration with the highest levels of management within the company, while its effects were measured in terms of quantitative indicators (e.g., report

preparation time, target achievement rates, accuracy of indicators) and qualitative indicators (e.g., user satisfaction, decision effectiveness, and data-driven culture).

Thus, this model can be seen as a pragmatic way to leverage the theory and practice of business intelligence in the industrial setting, using action research as a framework to develop solutions that will allow a systematic and empirical shift to data-driven decisions.

2.1.4 Integrative Perspective of the Applied Methodology

This research is premised on an integrated approach (Mix Applied approach), which employs quantitative and qualitative analyses within the realm of action research. Semi-structured interviews and field observations yielded qualitative data that provided rich descriptions, allowing the researcher to grasp the real picture of managerial and organizational problems in sales analysis. For its part, the analysis of KPIs through Power BI offered precise quantitative data to show actual improvements in the efficiency of analysis, speed of reporting, and accuracy of results.

The integration of these different research tools with the technical platform gave rise to a holistic perspective combining managerial insight with digital measurement, empowering the dashboard to serve not only as a presentation tool but also as a research and analytical tool at the heart of the relationship between data, decisions, and organizational development.

Considered in this way, the study does not merely describe the phenomenon but takes further steps to initiate real positive change within the work environment via its applied scientific ventures that permit continuous evaluation and constant improvement of organizational performance.

2.2 Study Population

The study population consists of the top management of the industrial company under study, as this group plays a central role in shaping strategic decisions and overseeing sales and operational performance.

In its entirety, the study population encompasses:

The Chairman of the Board, General Manager, Operations Manager, Sales Manager, and Finance Manager.

These members are considered as the key players of the management team who accompany the commercial, financial, and operational activities of the company in question. The decisions that these members take are very crucial in steering the overall strategies and attaining the organizational objectives.

The significance of this population deals with the quality and accuracy of the analytical data and sales reports, upon which the success of their decisions depends. Having adopted traditional systems for sales management and data collection using Excel worksheets and manual reports, the management faced recurrent setbacks concerning delays in generating reports, poor integration of information between departments, and challenges in analyzing sales performance indicators in a comprehensive and interactive way.

Hence, this management population constituted a perfect environment for implementing a Business Intelligence system on Power BI, which offers real-time visual reports for assisting management to interpret sales trends, key customers, and analyze profitability across various products and geographical areas.

The choice of this population equally corresponds with the tenor of the action research methodology, which relies on active participation and close interaction with decision-makers in the real work environment. Members of this population were involved in all research phases, beginning with the diagnosis phase, in which the current state of systems and reports was analyzed, through the action phase, which included the design and implementation of the interactive dashboard, and at the evaluation and reflection stage, where the effects of the application on managerial and sales performance were analyzed.

The interaction with these subjects allowed the researcher to receive specific practical feedback regarding enhancements made in reporting efficiency, speed of data access, accuracy of selected performance indicators, and user involvement with the new system.

It also gave the chance to understand the decision-making culture of the industrial company before and after the business intelligence system implementation, which allows for measuring the actual move toward making decisions from the data.

Thus the study population appears to be an appropriate representation-a rich environment for applying the business intelligence model-which straddle the strategic managerial side with the

practical operational side. It thus gives a unique opportunity for evaluating the extent to which Power BI has contributed toward improving decision quality, performance effectiveness, and information transparency at the top management level of the industrial company.

2.3 Study Sample

This study adopted a purposive sampling approach, which is the most appropriate method in action research and applied studies, as participants are deliberately selected based on their direct relevance to the study topic and their ability to provide rich and detailed information about the phenomenon under investigation.

The sample participants were selected from among the members of top management in the industrial company, as they are the main parties concerned with sales operations, financial analysis, and strategic decision-making.

The study sample consisted of five individuals representing the main managerial levels in the industrial company, namely:

1. Chairman of the Board: who represents the company's operational level, oversees its overall strategy, and assesses its long-term prospects.
2. The General Manager: who is responsible for overall supervision of all administrative and operational activities and ensures performance integration across different departments.
3. The Operations Manager: responsible for monitoring production and logistics performance and ensuring alignment with the company's sales objectives.
4. The Sales Manager: who is responsible for supervising sales performance, monitoring target achievement, and analyzing customer relationships.
5. The Financial Manager: responsible for analyzing financial trends, revenues, and profitability, and supporting management in making data-driven decisions.

This sample was selected based on three main criteria:

1. Direct involvement in sales operations and financial performance, so that participants are actual users of the data and decision-makers who rely on it.
2. Active participation in all stages of the action research (diagnosis, action, evaluation, and reflection), which allows continuous feedback that contributes to improving the application.

3. The ability to provide objective and well-informed evaluations of the Power BI dashboard implementation and its impact on the quality and speed of decision-making.

Survey or survey participants participated in a series of consultative meetings, semi-structured interviews, and conducted applied workshops on the analysis of current states of sales reports, the design of key performance indicators (KPIs), and the checking of dashboards after opening up their use.

Participants assumed roles exceeding that of research subjects, stepping up to the level of partners in the research process (co-researchers), contributing to the diagnosis of the problem, implementation of the technical solution, and evaluation of practical effects of the improvement.

This is in keeping with action-research approaches that focus on active participant involvement and co-construction of knowledge in collaboration with the participants in the change process. Data saturation was reached after noticing repetition in responses from participants and consensus in their views regarding the improvements that will be achieved on the speed of report preparation, accuracy of sales indicators and decision quality as a result of the new system.

Therefore, this purposive sample represents the most suitable group for fulfilling the objectives of this study as it interlinks strategic knowledge with its application, ensuring reliable results and a valid assessment of the actual impact of the implementation of a business intelligence system Power BI in a real industrial setup.

2.4 Instruments of Study and Validation Indicators

Interviews, semi-structured in nature, became crucial to their qualitative data collection, allowing for depth and flexibility in communication. This approach fits the action research mode of inquiry established on participation, interaction, and continuous evaluation within the working environment.

The interview guide was developed in line with the several objectives of the study in a more applied perspective, covering phenomena around sales analyses, the role of business intelligence tools for decision-making, and the effectiveness of the interactive Power BI

dashboard. The guide has a set of main questions divided into four stages that correspond to the action research cycle, namely:-

1. **Diagnosis stage:** This stage included questions aimed at identifying the main challenges faced by management in analyzing sales data using traditional tools such as Excel, and evaluating the efficiency of current reports in terms of speed and accuracy.
2. **Action stage:** The questions addressed the effectiveness of implementing the Power BI dashboard in improving data access and interpretation, and how it facilitated the sales decision-making process.
3. **Evaluation stage:** The questions focused on participants' level of satisfaction with the results achieved after implementing the dashboard, and its impact on improving performance efficiency and monitoring key performance indicators (KPIs).
4. **Reflection stage:** The questions aimed to collect participants' views on opportunities to further develop the current system and the possibility of applying the model to other departments within the industrial company.

There were interviews with a group of managerial leaders in the industrial company comprising the Chairman of the Board, General Manager, Operations Manager, Sales Manager, and Financial Manager, lasting 20 to 30 minutes each. The researcher maintained field notes during system implementation and then discussed initial findings with participants for the sake of real engagement with the daily work environment surrounding the dashboard.

Validation Indicators:

Get this given that the applied nature of the study and the fact that it relies on direct interaction with a set of methodological procedures, the following are also considered in relation to the credibility and reliability of findings:

- **Content validity:** The interview questions were reviewed by specialists in business intelligence and data analysis to ensure that they covered all dimensions related to the study objectives.

- Expert validation: The study instruments and interview themes were reviewed by academics with expertise in management information systems to ensure their consistency with the action research approach and the industrial context.
- Field credibility: The researcher relied on direct observations during system implementation and monitoring participants' interaction with the dashboard, which allowed documentation of real situations without the need to record the interviews.
- Feedback validation: Preliminary results and Power BI dashboard visualizations were presented to participants during consultative meetings to confirm the accuracy of the analysis and its alignment with the actual work environment.
- Dependability: Data obtained from interviews and observations were analyzed using thematic analysis to extract key patterns in participants' responses and enhance internal consistency across the study themes.

In the course of the assessment of the application impact, the study depended on perceptual evaluation as described by the participants through their statements and impressions during and after the dashboard implementation.

The participants appreciated the interactivity and clarity of the Power BI dashboard concerning tracking sales against performance indicators and revenue analysis, confirming that it reduced report preparation time and increased the quality of performance indicators. It also allowed the management to monitor results in real time in an interactive, visually pleasing manner.

The sales manager and the finance manager indicated that the dashboard had facilitated creating a common vision across the departments, thus expediting decisions related to pricing and distribution while the CEO confirmed that this experience represented a real landmark shift toward data-based management as opposed to paper reporting or subjective estimations.

The participants also agreed that the analytical model used in this study is generalizable to other departments such as procurement and inventory, and that it can be applied to other companies within the industrial group to unify analysis systems and enhance integration of performance indicators across different departments.

These perceptual observations reflect the practical and functional acceptance of the new system and confirm the success of the experience in achieving one of the main objectives of action research, which is improving the decision-making environment and developing managerial analysis mechanisms using business intelligence tools (Power BI).

Accordingly, semi-structured interviews, supported by field observations and perceptual analysis, represented an effective tool for collecting accurate and reliable data, and contributed to evaluating the impact of applying business intelligence in a real industrial environment within an integrated applied research framework.

2.5 Analysis Plan

The data analysis plan in this study is based on integrating quantitative and qualitative descriptive analysis within the framework of the action research methodology, which relies on diagnosis, intervention, and continuous evaluation with the aim of achieving real improvement within the work environment.

This plan was developed to assess the impact of implementing a business intelligence system (Power BI) on the efficiency of sales analysis and the speed and accuracy of decision-making in the industrial company, through comparing performance before and after implementation.

First: Diagnostic Analysis of the Existing Situation Before Intervention

Before implementing the interactive dashboard, the sales manager relied on multiple Excel files with several worksheets to prepare monthly and annual sales reports.

These files included a large number of detailed worksheets containing data related to:

- Sales of sales representatives by months and years.
- Rates of achieving monthly and annual sales targets.
- Sales of cities and different geographic regions.
- Performance of items and products in terms of quantity and value.
- Cumulative indicators of growth and decline rates.

The writing of the final report spanned several consecutive working days, including the collation of data from various sources, a manual review, and formatting data into tables and charts to be presented for approval by board-affiliated executives in periodic evaluation meetings.

These reports served as the basis for discussions among management; however, due to several limitations, they faced several major limitations:

- Long preparation time that could exceed one week in some months.
- Possibility of human error resulting from manual formulas or data entry.
- Lack of interactivity and difficulty in comparing performance across cities, sales representatives, and time periods.
- Weak analytical ability to identify patterns and relationships between products and customers.
- Personal reliance on the sales manager's experience without the support of a decision-support analytical system.

This initial diagnosis represented the first phase of action research (Diagnosis Phase), which aimed to identify the core problems in the traditional reporting system and determine the need to develop an intelligent and integrated dashboard.

Second: Post-Implementation Analysis

After implementing the Microsoft Power BI business intelligence system, the reporting process was transformed from a static manual model into an intelligent interactive system that displays performance indicators in real time.

The dashboard provided management with a comprehensive and dynamic view of sales performance through a set of modern analyses, most notably:

1. Customer classification using ABC analysis

Customers who generate the largest share of revenue were identified as Category A, representing the most important segment in sales, followed by medium-contribution customers in Category B, and then the least impactful customers in Category C.

This analysis contributed to redirecting marketing efforts toward high-value customers.

2. Customer behavior analysis using the RFM model (Recency, Frequency, Monetary)

The recency, frequency, and monetary value of purchases for each customer were analyzed to identify active, potential, and declining customers, which enabled management to develop accurate retention and targeting plans.

3. Customer classification by industrial sectors

This allowed management to identify the sectors that contribute the most to revenues and compare their sales performance across different time periods.

4. Time-based comparison between periods

The dashboard displayed a direct comparison of each month's sales with the corresponding month from the previous year, highlighting the percentage of change (increase or decrease) in a clear visual way.

5. Analysis of sales target achievement

The dashboard displayed real-time indicators of the level of target achievement for each sales representative, city, and item, in an interactive way that shows current performance and supports accountability and motivation.

6. Annual and cumulative sales monitoring

The board of directors was able to instantly review overall performance and growth indicators without the need to prepare separate manual reports.

As a result, the time required to prepare reports decreased from several days to just a few minutes. Now the sales manager could instantly present sales performance before top management and the board of directors, increasing operational efficiency and accelerating the decision-making process.

Third: Performance Measurement Indicators and Validation

To ensure the credibility of the analysis results, a set of key performance indicators (KPIs) was adopted to measure the impact of the implementation, including the following:

- Report preparation time: Before implementation, it ranged between 2–5 days, and after implementation, it was reduced to only minutes.
- Sales target achievement rate: The achieved rate was compared monthly before and after implementation.
- Monthly sales growth rate: Used as an indicator of performance stability and improved forecasting.
- Number of active customers per month: Used as an indicator of the effectiveness of customer classification and behavior analysis.

- User satisfaction level: Measured through evaluative interviews with department managers, using thematic analysis of the collected feedback.

Data validity was also verified by reviewing the figures within Power BI and comparing them with the official financial reports approved by the financial management to ensure their accuracy and consistency.

Fourth: Qualitative Analysis of Participants' Feedback

Conducting more than more than 10 working sessions with the general manager, sales manager, financial manager, and operations manager at different times within March-July 2025 while carrying out system implementation.

Prototypes of the Power BI dashboard were showcased at these meetings, with discussions on the feedback for any improvement required.

All the participants were extremely happy with the system and remarked on the lucidity of the indicators combined with their ease of presentation before the board of directors. They suggested widening the scope of the application of this system to other departments like inventory management and other units of the organization.

Fifth: Integrating the Results within the Action Research Cycle

The quantitative and qualitative analysis processes were integrated within the full action research cycle, during which the following stages were carried out:

1. Diagnosis: Identifying weaknesses in the old system.
2. Action: Designing and implementing the Power BI dashboard and analyzing sales performance.
3. Evaluation and Reflection: Analyzing the results and reviewing them with management to assess the effectiveness of the implementation.

The results showed that using Power BI not only improved the efficiency of sales analysis, but also contributed to strengthening a data-driven decision culture within the company.

Sixth: Comparative Analysis and Practical Reflection

A analysis comparison study was done on the performance of the system before and after implementation in order to see the actual improvement in analytical efficiency and time efficiency.

Sensitivity analyses were also carried out to study how stable the customer classification results would be under changes in the ABC model classification thresholds; for instance, switching from 70-80% to 80-20% provides a better insight into the robustness of the analytical models employed.

These improvements were reflected in organizational performance through the institution of a permanent smart reporting system within the monthly management meetings and adherence to the Power BI dashboard as the primary reference for sales performance monitoring, thereby making the implementation experience a model to be generalized to other industrial companies pursuing a shift into business intelligence systems.

Summary of the Analysis Plan

With this analytic framework, the study integrated a quantitative analysis based on performance indicators and qualitative analysis based on observations and interviews within an applied action research framework.

The results indicated that the implementation of Power BI constituted a qualitative shift in the conduct of sales analysis, customer segmentation, and target tracking and significantly contributed to achieving real transformation toward data-driven decision-making within the industrial company.

2.6 Study Procedures

This study adopts the action research methodology, which focuses on achieving continuous improvement through integrating practical application with scientific research within a real work environment.

Based on the nature of the problem faced by the industrial company in analyzing sales data and making strategic decisions, the study was carried out through a series of sequential procedures spanning several overlapping time phases that cover the full action research cycle:

Diagnosis → Planning → Implementation → Evaluation → Reflection

These procedures form the archetype of the study, through which gaps were identified, the solution was designed, the new system was implemented, and its actual impact on managerial and sales performance was evaluated.

Below is a detailed presentation of these stages:

First: The initial diagnosis and analysis phase

The study started with collecting field data on the existing sales management system in the industrial company to ascertain the nature of the current procedures, as well as the challenges facing management in performance analysis and decision making.

This phase was carried out during February and March 2025 through a series of semi-structured interviews with the Sales Manager, the General Manager, the Operations Manager, and the Financial Manager.

The interviews included key questions about:

- The way periodic sales reports are prepared.
- The type of data available in the current system.
- The difficulties they face in reporting and analysis.
- The management's needs regarding sales and financial performance indicators.

This data was analyzed descriptively to extract the following key points:

- Full reliance on manual Excel files with many sheets.
- No unified central system for the data.
- Frequent calculation errors and difficulty checking data accuracy.
- Long time needed to prepare monthly and yearly reports (sometimes more than a week).
- Weak ability to analyze sales trends over time and compare cities and sales representatives.
- Limited visual and analytical presentation of results for the Board of Directors.

This phase ended with a clear understanding of the problem, and a list of requirements was prepared for the new analytical system that would be built using Power BI. These requirements included: easy data connection, interactivity, customer classification, time comparison, and indicator integration.

Second: Planning and Analytical Design Phase

1. In light of the previous diagnosis, an initial design plan was prepared for the targeted business intelligence system using Microsoft Power BI, in a way that integrates with the company's current accounting system and the existing Excel files. This phase included the following steps:

2. Data Structure Analysis

The structure of the historical data (2023–2025) was analyzed to identify the important fields such as invoice number, customer, sales representative, city, product, quantity, price, revenue, and sales date.

3. ETL Process

The data was unified into a single database and cleaned from errors and duplicates, with logical relationships created between the tables to ensure the correct connection between products, customers, and regions.

4. Designing the analytical models:

A preliminary prototype was designed for an interactive dashboard that includes the following pages:

- General sales KPIs dashboard.
- Sales analysis by city, sales representative, and product.
- Customer classification using the ABC model.
- Customer behavior analysis using the RFM model.
- A page for comparing performance across different time periods.

5. Pre-Testing

The first trial version was presented to the Sales Manager, who provided his feedback about the arrangement of the indicators and the way the data was displayed.

Third: Action Phase (Practical Implementation Phase)

This phase is considered the core of the action process, as the new analytical system was actually implemented inside the industrial company.

This phase lasted from March to July 2025 and included a set of detailed steps and procedures:

1. Feeding the system with actual data for the period from 2023 to 2025.
2. Applying interactive analysis using DAX measures and visual components to display performance indicators in real time.
3. Testing data accuracy (Data Validation) by matching the Power BI outputs with the financial reports issued by the Finance Department.
4. Holding more than ten working sessions with the General Manager, the Sales Manager, the Financial Manager, and the Operations Manager to review the updates and provide improvement feedback.
5. Training the main users on how to use the dashboard, read the indicators, and analyze performance using filtering and comparison tools.

The active participation of the management team helped ensure the easy adoption of the new system and created alignment between the technical, analytical, and administrative aspects.

Fourth: Evaluation Phase

A detailed evaluation was conducted at the end of implementation to assess the effectiveness of the new system by comparing sales performance before and after introducing the Power BI dashboard.

The assessment was based on the evaluation of three key aspects:

1. Quantitative KPIs
 - The time needed to prepare the monthly report decreased from 4–5 days to less than 10 minutes.
 - The accuracy of performance indicators increased, and human errors decreased noticeably.
 - The level of achieving monthly sales targets improved due to real-time performance monitoring.
2. Qualitative Indicators
 - User satisfaction with the ease of using the system and the speed of accessing information.
 - Introducing a new culture inside the management that relies on data-based decisions.
 - Positive feedback from the Board of Directors about the clarity of the reports and the ease of presenting them.

3. Feedback Analysis

Appendices (1 and 2) have constituted an analysis of the feedback offered by the participants. They documented participants' opinions as to the efficiency of the system and whether this could be adopted and applied in other companies within the industrial group.

In the monthly management meetings, Power BI has been officially sanctioned as the main source of analytical data, thereby reflecting the successful implementation and sustainability of the improvement.

Fifth: Reflection & Continuous Improvement

The last meeting in July 2025 with the General Manager, Sales Manager, and Financial Manager was conducted to discuss the achieved results and suggestions for future developments after the extensive application of the system and measurement of its impact.

This meeting resulted in a set of recommendations, the most important of which are:

- Expanding the use of the system to include inventory and purchasing analysis.
- Developing an additional dashboard to monitor daily financial performance.
- Integrating the system with future ERP applications to achieve wider integration.
- It was also agreed that Power BI data would be updated monthly and that a periodic review every three months would be carried out to ensure the continued accuracy of the system and the development of performance indicators.

Sixth: Organizational and ethical aspects in the implementation

To ensure research integrity and scientific credibility, the following organizational and ethical rules were considered during the study implementation:

- Data confidentiality: All customer and sales representative names were hidden and replaced with codes.
- Approval from top management: Official verbal and written approval was obtained from the general management before collecting and analyzing the data.
- Academic use of the data only: All results were limited to academic research purposes with no external publishing or sharing.
- Documentation of procedures: A complete timeline record was kept to show the work stages, meeting dates, and evaluation notes.

Summary of the procedures

Through these integrated procedures, the study combined practical application with academic analysis within an ongoing interactive research framework.

The results of the implementation showed that adopting the Business Intelligence system (Power BI) did not only improve the speed and accuracy of reports, but also created a real administrative transformation in the decision-making culture inside the industrial company.

This makes the experience a model that can be followed in applying analytical transformation in industrial institutions

2.7 Challenges Encountered During the Study

During the implementation of this study, several challenges were encountered. These included the long time required to collect, prepare, and clean sales data before analysis, as well as limitations related to data quality and completeness. Additionally, the development of the interactive Power BI dashboard required additional effort in data modeling and visualization design, which posed time and technical challenges during the research process.

2.8 Ethical Approval

Ethical considerations are one of the main pillars in applied research that deals with real data and people working in a real environment.

This study followed all ethical principles approved in academic research, especially those related to information confidentiality, respect for the privacy of individuals and institutions, and the responsible use of data.

The research was carried out with explicit approval from the top management of the industrial company where the study was applied, after explaining the research objectives, its academic nature, and the fact that there were no risks to the participants or the institution.

This approval came as part of an initial agreement that allowed collecting and analyzing operational sales data for research purposes only, with confirmation that all results and reports would be used for academic purposes and would not be published or shared outside the research unless official permission was given.

During all stages of the research, the following points were taken into consideration:

1. Maintaining the confidentiality of institutional data:

The company's name, branch offices, or customers were not stated anywhere in the thesis; rather, it was referred to in generic terms as "industrial company." Any information that would reveal the identity of the organization or damage its commercial interests was omitted.

2. Protecting the identity of the participants:

The interview names are not indicated (the Chairman, the General Manager, the Operations Manager, the Financial Manager, and the Sales Manager), and instead, identification codes were used. Their job titles are only presented in tables and appendices (see appendices 1 and 2).

After explaining the purpose of research and how the information would be used, prior verbal consent was obtained from every participant in the interviews.

3. Fair & Ethical Use of Data:

The analysis was restricted to historical sales data, void of any sensitive financial data or individual customer information, and was confined to an internal secure environment to which there was no online access or external server access.

4. Respecting the principles of participatory action research:

The study maintained the partnership principle in development, allowing no distortion in power and institutional interests, due to direct interaction with company's management and active participation of team members.

The emphasis was laid on working together for the betterment of the organization rather than a personal evaluation, in line with the concepts of professional and ethical action research values.

5. Commitment to the university's policies and the academic author:

The study was carried out in accordance with the scientific research policies and academic ethics applied at the university, which require maintaining data confidentiality and respecting the privacy of the participants and the cooperating institutions

Summary of the ethical approval

The research follows applied and action research ethical principles, including prior approval, confidentiality, privacy, and responsible use of data.

The researcher made sure to document all procedures and approvals and to apply the principles of transparency and integrity in all stages of the study, which ensures the academic and professional credibility of the research

Chapter Three

Results

3.1 Introduction

This chapter gives results obtained from the implementation of the dashboard model through Power BI on data extracted from the sales department of the studied company. The data underwent descriptive and interactive analysis for the interpretation towards an absolute view of the company's sales performance, customer trends, customer classification, purchasing patterns, and key performance indicators to support the act of decision-making. This chapter adds up to the action research methodology, demonstrating the changes and improvements adopted from the previous situation into the condition after developing the analytical dashboard.

The chapter addresses the reporting of the results based on major themes: namely, analysis of total sales, sales representatives' performance, customer classification by RFM and ABC models, product analysis, tracking customer activity, and identification of periods of declining purchases. This chapter presents specific indicators that define customers who made a first purchase during the study period and customers who did not make any purchases even though they are in the customer database; contributing into demand volume explanation, monitoring of declining purchase patterns, and deeper understanding of customer behavior for management to direct follow-up efforts thereby taking appropriate action.

This chapter is important in that it gives quantitative and visual evidence of the effectiveness of the developed system against the problems identified earlier in the diagnosis phase, such as slow report generation, not having sales updated in real time, and the difficulty experienced in analyzing the declining activity of customers. This is done in a more objective and coherent presentation of the results, reflecting the added value of the developed analytical system with Power BI.

3.2 Results of Interview Analysis Using MAXQDA

The study employed semi-structured interviewing techniques to retrieve data from managers and staff in the company being investigated. MAXQDA was used as the software for qualitative data analysis. The software made it possible to classify and code the interview text

and thus identify relevant themes that reflect the perceptions of the participants regarding the work situation before the application of the Power BI dashboard, the effect that implementing it had, the challenges faced in implementing it, and the value added at both operational and strategic levels.

The final analysis garnered a set of major themes to include work reality and challenges prior to applying the Power BI dashboard, the impact of implementation on sales analysis and customer behavior, dashboard support for decision-making and managerial performance, the challenges of employing organizational learning during the implementation phase, justified strategic value, future scalability, as well as suggestions for development and improvement.

The study's findings indicated that prior to implementing the Power BI dashboard, much of the work involved traditional techniques such as Excel and PowerPoint. These tools permitted slow report preparation, frequent manual repetition, difficulty in linking and analyzing data integrally with no current performance indicators for faster and more accurate decision-making. Thus the monitoring efficiency was adversely influenced and correctness of decisions made by managers deteriorated.

The differences were stark in the interview results after the implementation of the Power BI dashboard. Sales analysis and performance tracking were if one thus puts it better, even enhanced. The dashboard was helpful in an organized and clear manner mentioning data; quick access to key performance indicators; and deeper exploration of customer and sales representative performance. Participants further confirmed the statement that the introduced dashboard led to more accuracy in data and the creation of greater confidence in figures as the sources of data are unified and manual data entry diminished.

Analysis revealed that the Power BI dashboard formidably contributed to decision-making by presenting timely and near-real-time data while lessening dependence upon individual estimates and nurturing a culture centered on data-driven decision-making. Additionally, the dashboard fostered greater coordination and integration between disparate departments through a single-point source of dependable information, decreasing discrepancies in figures and assisting with communication and collaborative activities across departments.

Interviews revealed that there were some challenges during the initial phases of dashboard implementation, mostly regarding the need for the time for learning and adapting to this new way of working, and for users to become trained in the interpretation of some analytical

indicators. However, these challenges were reported to be transient and tended to diminish with increased exposure to the dashboard since the interactions with the system became more straightforward and self-explanatory.

By applying business intelligence into its operations, as pointed out by the participants, the Power BI dashboard thus played a role in the augmentation of monitoring efficiency, the acceleration of information flow, and the facilitation of planning and decision-making into the medium and long terms. Additionally, there are indications from the findings that there is a great potential for further dashboard development and for utilizing it in other sections of the company, increasing the sustainability of business intelligence systems and thereby enhancing their effectiveness in organizational performance improvement.

3.3 Comparison of Sales Reporting Before and After Implementing the Power BI Dashboard

Comparison of the earlier scenario of sales reports with the present one after the implementation of the Power BI dashboard yielded definite improvement observable in a series of quantitative markers. Previous comprehensive monthly reporting would take the course of several continuous working days to generate data from a multitude of Excel files before it could even be manually reviewed. All key indicators, however, can now be refreshed through just one data refresh process that takes barely minutes, reporting the results directly into management meetings. In addition, all deficiencies associated with prior manual reports were highly diminished by unifying the data source and linking tables, thus adding to the indicators' reliability in evaluating performance. Finally, management was able even further to monitor in real time how sales targets were being achieved as the achievement rate for every sales representative, city, and item became available directly and not through periodic reporting. This factor had a direct relationship with enhancing the efficiency of corrective actions whenever deviations from the planned targets were recognized. Altogether, these indicators reveal what is the real effect of introducing business intelligence system in the aspects of analysis efficiency, decision speed, and quality in decision-making within the industrial company.

Results from this project indicated a groundbreaking shift in the preparation of sales reports across the company. The manual preparation relied solely on Excel files and PowerPoint presentations for preparing tables and charts. This involved a lot of manual work, including

entering and merging data from several separate tables, reorganizing and formatting it in comparison tables and charts in PowerPoint, as shown in Figures 3.1 and 3.2. This age-old way of preparing reports took a long time and was labor-intensive in terms of copying, pasting, and formatting, with high chances of human errors and repetitive work every time data were updated or new periods were added. Changes in any figures or updates to them necessitated data rebuilds from scratch concerning tables and charts, which resulted in delays in the preparation of reports, thereby limiting the ability to meet management's information needs in time. The data were static and non-interactive, further restricting users' ability to analyze the information or drill down details, such as sales distribution by regions, sectors, or product.

The results reveal several shortcomings in the existing sales reporting system, including limited analytical capabilities, lack of interactivity, and delays in accessing accurate information.

In moving to Power BI, reporting definitely changed for the better in terms of having direct connections to data sources and having automatic processing features without manual intervention. Today, tables and charts are dynamic, automatically refreshed upon every data upload, eliminating manual recreations of reports. It also allowed users to travel easily across different levels of analysis and compare performance across periods, cities, and sectors, so that one needs only the interactive filters and selections, which was not available before. These features of the new reporting system boosted information quality and speed of access and created a more accurate and reliable analytical environment, which enhances management's ability to make decisions based on fresh and clear data.

As a result, performance tracking and sales review became more effective and flexible than ever before.

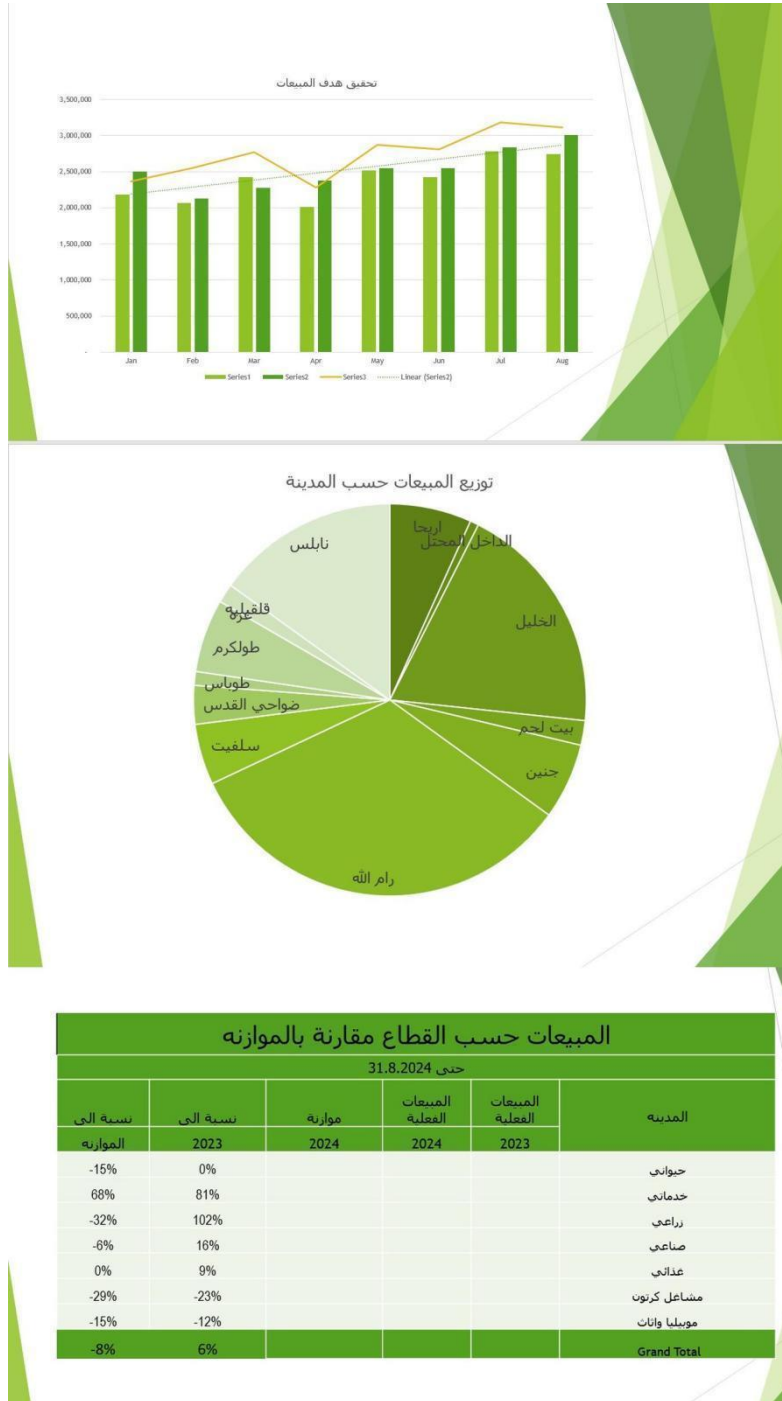
Figure 3.1

Sales Comparison Tables in Excel

مقارنة المبيعات (طن) من تاريخ 1/12/2024 وحتى تاريخ 31/12/2024 بنفس الفترة من العام 2023						
الموازنة	نسبة الى 2023	نسبة الى الموازنه	موازنة	المبيعات الفعلية	المبيعات الفعلية	البند
الموازنة	2023		12.2024	12.2024	12.2023	
	55%	60%	260	403	253	علب
	13%	46%	6	6	4	تلبيس
	-32%	-13%	124	84	98	الواح
	33%	435%	14	19	4	رولات
	27%	43%	405	513	358	
مقارنة المبيعات (شيكل) من تاريخ 1/12/2024 وحتى تاريخ 31/12/2024 بنفس الفترة من العام 2023						
الموازنة	نسبة الى 2023	نسبة الى الموازنه	موازنة	المبيعات الفعلية	المبيعات الفعلية	البند
الموازنة	2023		12.2024	12.2024	12.2023	
	58%	60%	1,264,190	1,991,965	1,248,516	علب
	58%	67%	28,113	44,439	26,605	تلبيس
	-44%	-16%	604,228	339,301	403,711	الواح
	-2%	412%	64,712	63,393	12,389	رولات
	24%	44%	1,961,243	2,439,099	1,691,221	
مقارنة مبيعات 2024 مع 2023 ومع الموازنة (بالشيكال)						
الموازنة	نسبة الى 2023	نسبة الى الموازنه	موازنة	المبيعات الفعلية	المبيعات الفعلية	البند
الموازنة	2023		2024	2024	2023	
	1%	12%	2,038,215	2,052,025	1,834,495	Jan
	-21%	4%	2,199,988	1,745,035	1,682,323	Feb
	-22%	-6%	2,386,545	1,864,181	1,986,926	Mar
	-1%	18%	1,959,536	1,949,245	1,650,045	Apr
	-15%	1%	2,469,582	2,093,403	2,066,794	May
	-13%	5%	2,415,415	2,094,692	1,988,024	Jun
	-15%	2%	2,738,039	2,327,363	2,278,791	Jul
	-8%	10%	2,683,253	2,468,905	2,248,503	Aug
	-15%	5%	2,694,561	2,292,512	2,174,019	sep
	-10%	7%	2,709,256	2,436,798	2,275,305	Oct
	2%	15%	2,157,368	2,199,485	1,909,780	Nov

Note. A sample of the manual tables previously used in sales analysis using Excel.

Figure 3.2
PowerPoint Charts



Note. Examples of charts that were manually created using PowerPoint to present sales performance.

After developing the reporting system using Power BI, the data within the Excel file were restructured in a way that allows automatic linking between tables. In addition, a comprehensive data model was built to enable the integration and analysis of information in a dynamic manner. This part of the chapter presents the new outputs of the developed system, which include multiple interactive pages that display sales performance from different perspectives and provide management with the ability to explore data and make decisions based on up-to-date and reliable indicators.

The new Excel file is expressly rebuilt to create a consolidated source of data by organizing information in different tables based on the requirement of the data model in Power BI as part of the system development stage. There was a table for daily sales, another table for cities and sales representatives for monthly sales targets, and yet one more table for basic customer data like sector, city, and name of the responsible sales representative. This new format is a bit more stable and linkable compared to the previous raw files that contained overlapping and disorganized data.

Now with the direct linking of Power Bi, these tabulations would have an even more dynamic and interactive capability of analyzing data and generating error-free indicators tracking sales performance against the different cities, sales representatives, products and customers. Also, it was possible to establish clear relationships between tables- a fundamental step in developing a dashboard capable of rendering real-time performance with a high level of reliability.

Figure 3.3

The new structure of the Excel file after reorganization

رقم الزبون	الإسم التجاري	المدينة	القطاع	اسم المتدرب
C0000208	رام الله	رام الله	غذائي	مكعب
C0000207	مشارف كرتون	رام الله	مشارف كرتون	مكعب
C0001664	اريجا	اريجا	غذائي	مكعب
C0000741	اريجا	اريجا	زراعي	مكعب
C0001752	الخليل	الخليل	غذائي	مكعب
C0000333	الخليل	الخليل	صناعي	مكعب
C0000572	الخليل	الخليل	غذائي	مكعب
C0002080	مشارف كرتون	جنين	مشارف كرتون	مكعب
C0001630	نابلس	نابلس	صناعي	مكعب
C0001212	الخليل	الخليل	صناعي	كارم رضوان
C0000388	طولكرم	طولكرم	حيواني	مكعب
C0002173	نابلس	نابلس	غذائي	خالد حمد
C0002072	الخليل	الخليل	صناعي	كارم رضوان
C0000883	الخليل	الخليل	غذائي	كارم رضوان
C0001245	الخليل	الخليل	صناعي	كارم رضوان
C0002095	اريجا	اريجا	زراعي	عبدالرحمن تايه
C0000182	نابلس	نابلس	غذائي	مكعب
C0000172	نابلس	نابلس	غذائي	مكعب
C0001776	نابلس	نابلس	غذائي	خالد حمد
C0001325	رام الله	رام الله	غذائي	وسيم ابو راس
C0000829	رام الله	رام الله	غذائي	مكعب
C0001924	رام الله	رام الله	غذائي	وسيم ابو راس
C0002181	نابلس	نابلس	غذائي	مكعب
C0001750	نابلس	نابلس	مشارف كرتون	مكعب
C0001845	نابلس	نابلس	غذائي	خالد حمد
C0001590	نابلس	نابلس	صناعي	خالد حمد

Note. The new structure of the Excel file after reorganizing sales tables, city and sales representative targets, product classifications, and customer data to link them with the Power BI data model

This new file represents the foundation upon which we built the dashboard; the existence of separate tables, organized well to facilitate continuity in data updates, certainly did ameliorate the quality of analysis and diminish the errors that arise with the manual merging of data. Likewise, this structure has allowed for the implementation of advanced-level analytical

Another set of measures was then built using the DAX language to compute various performance indicators.

With the building out of the data model and the establishment of relationships between various tables, a set of analytical pages was developed within the dashboard using Power BI, these pages present a panoramic view of sales performance interactively through sets of charts and indicators to help management track patterns, identify deviations, and arrive at timely decisions. This section presents the main pages designed within the dashboard, explaining the role of each page and the analytical outputs it provides. The calculated measures built using DAX were included in the appendix of the thesis.

Figure 3.5 shows the main page of the interactive sales dashboard developed using Power BI, which represents the main starting point for using the analytical system within the company. This page was designed to function as a central interface that combines the display of overall sales performance indicators with structured navigation to detailed analysis pages, reflecting the real role of business intelligence in organizing the analysis process and guiding users to explore data in a systematic way rather than merely viewing raw numbers.

Figure 3.5

The main dashboard page



Note. The main dashboard page, which includes general indicators and navigation buttons between the different sales reports

As shown in Figure 3.5, the main page enabled the display of a set of general performance indicators, such as total sales amount, average monthly sales, and number of customers, in a real-time and updated manner. This provided management with a quick and comprehensive overview of the overall sales situation before moving to deeper levels of analysis. At the same

time, the interactive navigation buttons allowed users to move directly to specialized analysis pages, such as sales representative’s analysis, product analysis, customer classification using ABC and RFM models, and sales target achievement.

The results of using this page indicate a clear improvement in the speed of access to information and a reduction in the time required to understand overall sales performance compared to the traditional approach previously based on Excel reports and PowerPoint presentations. The design also fostered a certain unity of analytic entry into the company while further enhancing the dependence on the dashboard as a central and reliable data repository-a move that underpins support for the emergent perspective of data-driven decision-making and validates the work of the dashboard as an instrument for decision support rather than merely a display of sales results.

Figure 3.6 illustrates the page for analyzing the distribution of customers and sales by cities and time periods, which represents one of the most important levels of interactive analysis in the Power BI dashboard. This page aims to highlight the capability of the analytical system to link geographic and temporal data with customer and sales data, allowing management to understand the spatial and temporal distribution of sales activity rather than relying only on total sales figures.

Figure 3.6

Sales Representatives Analysis and Distribution of Customers and Sales



Note. The sales representative’s analysis page showing the distribution of customers and sales across cities within the dashboard

As shown in Figure 3.6, the dashboard enabled the analysis of the distribution of the number of customers across cities alongside the distribution of sales amounts, which made it possible to compare customer density in each city with the level of sales achieved. This analytical linkage helped reveal important differences, such as cities with a high number of customers but lower sales contribution, or the opposite, which cannot be easily observed through traditional reports.

The results also demonstrated the system's ability to analyze sales trends over time through an interactive time line, either across the full data period or when filtering the analysis by a specific year. This enabled tracking of monthly sales development, identification of periods of growth or decline, and linking of those trends back to city, sector, or sales representative at user discretion.

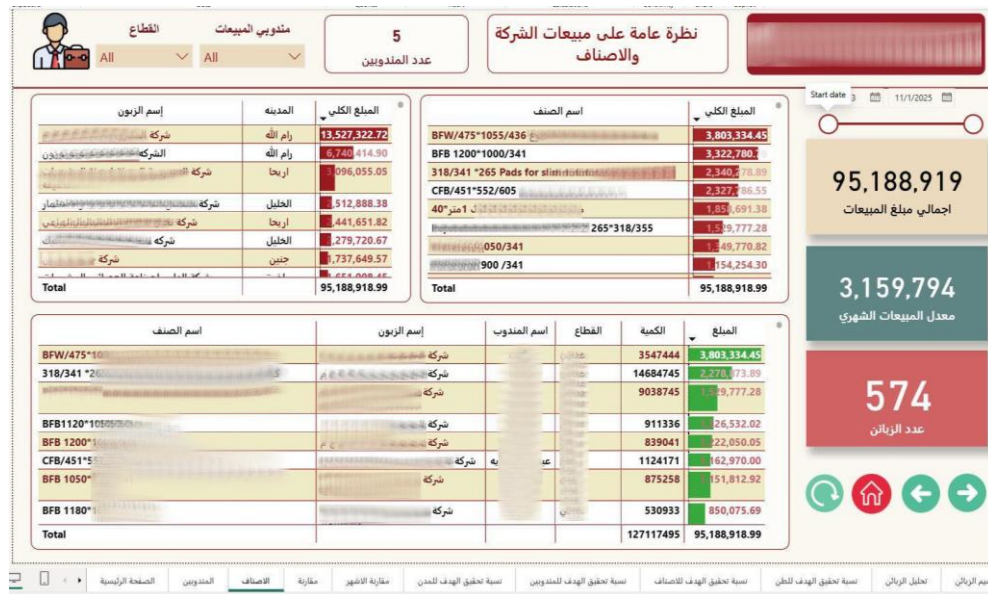
Besides, through such interactivity, the users could run their own analyses, like selecting a specific sales representative and analyzing the geographic distribution of his or her customers and the sales volume accomplished in each city or selecting a specific sector and analyzing its sales behavior through time. This very interactivity represents the real essence of business intelligence, allowing users to explore data from multiple angles without the burden of creating new reports or re-processing data manually.

These results indicate that the dashboard did not just present sales figures but also helped in transforming data into a dynamic analytical tool that would help develop a deeper insight into market dynamics and demand distribution. Such information would assist management in making more precise decisions in relation to allocating sales efforts, identifying priority markets, and enhancing geographic and temporal sales planning.

Figure 3.7 Product Analysis page of the Power BI dashboard, designed to emphasize the role of multidimensional analysis in linking product data with customers, sales representatives, sectors, and periods. This page aims to enable management to move from overall sales analysis to detailed analysis that shows which products generate the highest demand volume and which achieve the highest financial contribution, with the ability to track the parties responsible for achieving these results.

Figure 3.7

Product Analysis Page



Note. The product analysis page that shows the top-selling products and the concentration of customers in purchasing them within the dashboard.

As shown in Figure 3.7, the dashboard enabled the display of demand quantity for products alongside the financial value achieved for each product, which made it possible to distinguish between high-volume products and those with higher profitability. This would be another analysis intended to conform with product management decision-making, for example, identifying those products that need better marketing to those that need to be re-evaluated concerning pricing or distribution.

The findings also confirmed the capability of the system, linking every product uniquely to customers who purchased it, accountable sales representatives, and the sector it pertains to, thus offering a view into the sales chain direction analytically. Linking all these allowed product performance not only to be tracked in sales amount but through whom these results have been arrived at, thereby enhancing transparency and accountability in the sales system.

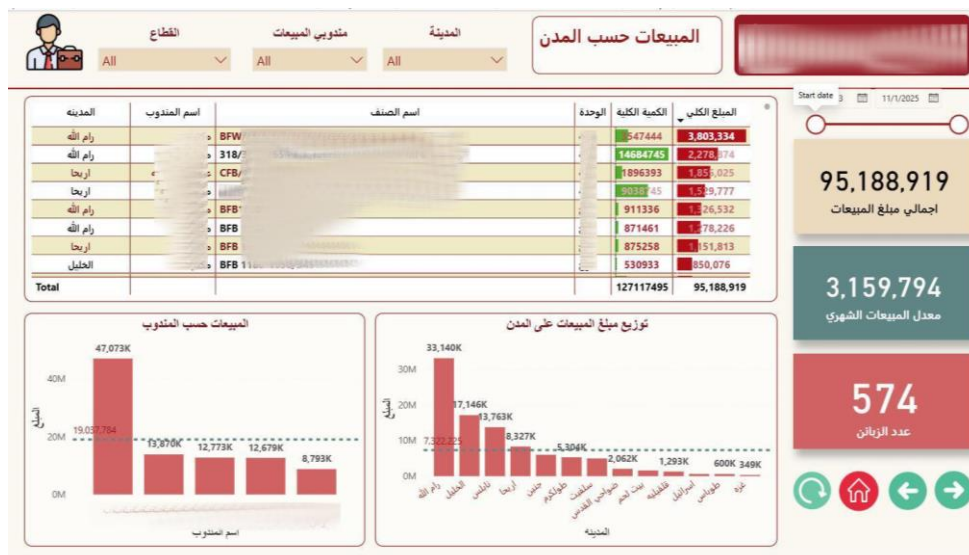
Furthermore, the interactive filtering facilities allowed users to do advanced analyses, such as filtering data based on a particular sales representative to find out which products produce the best performance, filtering data through a specific time period to see different demand behavior over time, or filtering sector by sector to appreciate the difference in demand across various sectors. This is the kind of interactivity expected of business intelligence and enables users to 'play' with data while not requiring alternate report production or manual intervention.

These results show that the display goes beyond that of product data to be integrated into an analytical system that supports decision making regarding product management, directing sales efforts to more valuable products, and aligning what gets planned and produced with what is being sold based on accurate and integrated data.

Figure 3.8 indicates the sales analysis by city page in the Power BI dashboard, which endeavors to show the analytical system's capacity to segment sales geographically and correlate them to products and responsible sales representatives. This page is meant to inform management on how sales are distributed spatially, the cities that account for more revenues, and the performance networked to the sales entities accountable for it through a unified interactive analytical interface.

Figure 3.8

Sales Representatives Performance Comparison and Sales Distribution Page



Note. The page for comparing sales representatives' performance and the distribution of sales by cities and top-selling products.

As illustrated in Figure 3.8, the dashboard gave a view of sales by city, allowing for tracking of top-selling products in every city and linking them to the sales representatives who made this happen. Such analysis gradually leads away from a bird's-eye view of performance towards a deeper appreciation of the geographic market dynamics, in order to define cities as major demand hubs versus less active areas.

The results also demonstrated how sales amounts across cities were effectively presented clear to management for comparison of performance by cities and the identification of geographic

voids within sales. Furthermore, the chart corresponding to sales representatives' sales allowed for analysis of each representative's contribution toward total sales, and linking this to his/her sales in the cities where they operate, thus promoting a fairer and more accurate evaluation of the sales performance.

Interactive filtering options also allowed for the analysis from various angles, such as clicking on a particular city to identify its most sought-after products, clicking on a particular sales representative to see where they have sold geographically, or filtering by industry sector or time period. Such a degree of interactivity embodies the true role of business intelligence in supporting data exploration without the generation of further reports.

Thus, the dashboard is far more than just a city sales display; it aided in the construction of an analytical tool for sales planning, potential supervision of sales representatives by management, marketing effort allocation, and decision-making with sound spatial insight on demand behavior. This makes the company's sales management and strategic planning more effective.

In Power BI, the comparative analysis page of monthly sales is presented in Figure 3.9, where management may compare sales from the current year against the previous or any selected year versus the year right before it. It aims to emphasize the usefulness of time series analysis in monitoring the growth or decline trend of sales and determining the accuracy of monthly performance on the basis of the accumulated historical data.

Figure 3.9

Monthly Sales Comparison Page



Note. A page comparing monthly sales between the current year and the previous year, with the ability to analyze individual customer performance.

Figure 3.9 shows how the dashboard has allowed a direct comparison of monthly sales for any year with those of earlier months in previous years through its line chart mapping differences over time, or through an analytical table showing sales values, absolute change, and growth or drop percentages against those of the previous year. The analysis, therefore, allows the management to determine the month that registered significant positive growth, on the one hand, and understand periods that experienced declines requiring managerial intervention, on the other.

The results highlight the system’s capability in rendering a time-based comparison from an arduous manual computation into an interactive real-time analysis that can be immediately updated whenever the selected year changes. The dashboard allows for the transition of such analysis from an overall company view to a more detailed view such as examining the sales of an individual customer, a particular sales representative, or a specific sector or city, through dynamic filtering tools without needing to prepare separate reports for these cases.

his level of flexibility reflects the real role of business intelligence supporting exploratory analysis and decision-making: management can now compare customer or sales representative performance over time to assess the continuity of growth and early detection of changes in purchasing behavior. Such analysis is also useful for future planning and seasonal trends'

assessment, establishing more realistic sales targets according to actual performance for prior years.

These results show that the dashboard is no longer only a platform for presenting numbers from differing years but it was meant to furnish a strategic analytical tool for decision-makers to grasp the historical development of sales performance and facilitate replacement of static descriptive reports into more-interactive analyses which foster data-driven decisions on decisions at a later time.

Within the Power BI dashboard, from figures 3.10 through 3.13, we have developed the sale target achievements analysis pages to assist management in monitoring actual performance against what was planned at the year's start. These pages further highlight the analytical dimension of the dashboard, linking annual targets to cumulative ones for the months gone by and analyzing target achievement rates across various organizational levels. This provides a clear quantitative and visual performance evaluation with a real-time identification of positive and negative deviations.

The pages were designed to equip the user with the ability to carry out analyses of the achievement of targets on a monthly basis, with filtering by time period. With this, the requirements of a continuous evaluation process as set out in the action research methodology are fulfilled and management is enabled to undertake data-based corrective actions.

Figure 3.10

Target Achievement by Cities



Note. Sales target achievement rate by cities within the dashboard.

As evidenced by the results shown in Figure 3.10, the dashboard is able to showcase the performance differences among cities, either in terms of exceeding sales targets or in identifying areas where intervention may be needed. Visual indicators, such as performance gauges and achievement percentages, provide a quick understanding of what is going on in each city. This would help management direct sales efforts, reallocation of resources, and corrective decisions that are made based on actual data rather than general estimates.

Figure 3.11

Achievement of sales targets by sales representatives

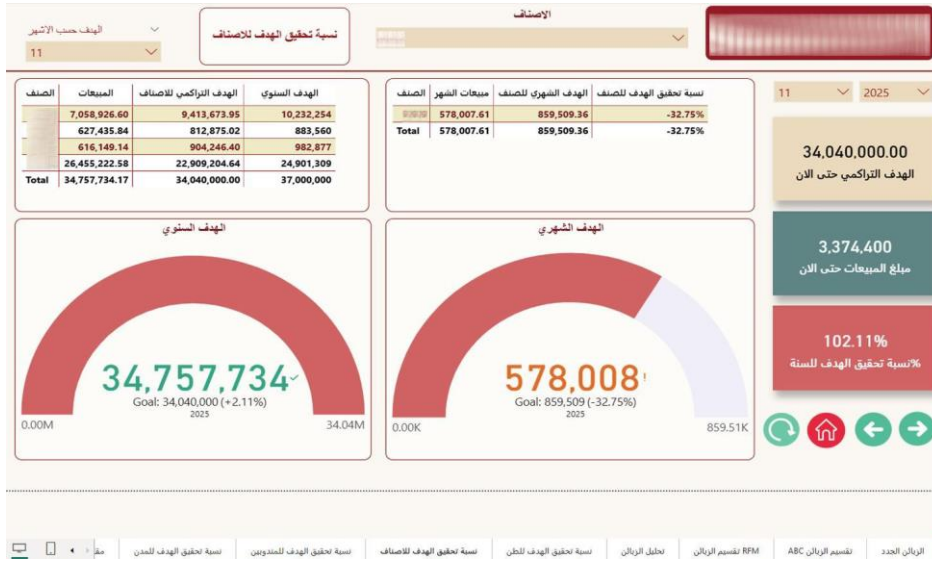


Note. The percentage of sales target achievement by sales representatives compared to monthly and annual targets

This page highlights the analytical role of the dashboard in supporting individual performance management by clearly showing the level of target achievement for each sales representative, as illustrated in Figure 3.11. This analysis helps management evaluate the effectiveness of sales representatives, strengthen monitoring and incentive systems, and identify cases that require additional support or a redirection of sales plans. It also enhances fairness and transparency in performance evaluation and reduces reliance on personal judgments when assessing sales representatives' performance.

Figure 3.12

Product target achievement

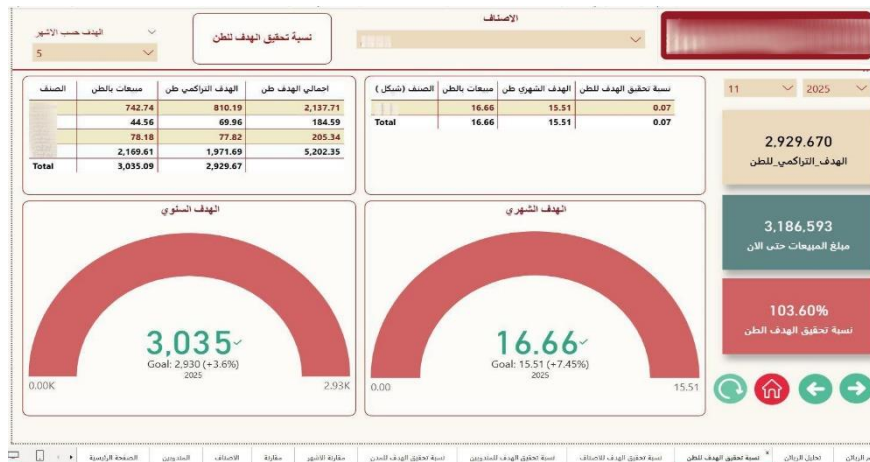


Note. The percentage of target achievement for products by comparing actual sales with planned targets

The actual sales of each product are compared against annual and cumulative targets, and the mechanism is presented for monitoring target achievement by products on this page, as shown in Figure 3.12. This analysis shows where the products are performing well against target and where the opposite is true. It further provides a quantitative basis for product management decisions such as repricing some products, altering promotional strategies, or reassessing production or distribution volumes backed by adequate quantitative data.

Figure 3.13

Tonnage target achievement



Note. The percentage of target achievement for products by comparing actual sales with planned targets

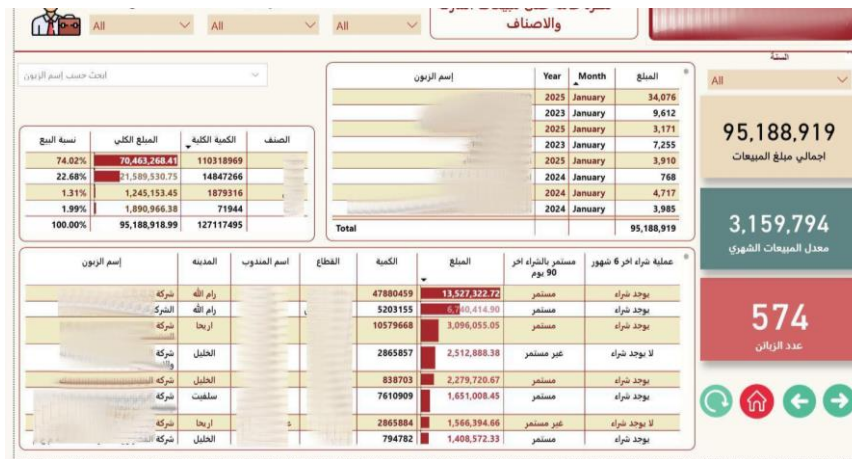
The page captures the monitoring of tons of sales target achievement by comparing actual sales quantities with those planned, as shown in Figure 3.13. This analysis is very important for industrial companies that measure performance in quantities besides financial values because it allows management to monitor the production and distribution efficiency and relate sales performance to operational targets. The page also provides for competitive analysis on a monthly basis and identifies deviations in sales volume measured in tons for more accurate operational reporting linked to production and logistics.

The Customer Purchase Continuity Analysis page within the Power BI dashboard Figure 3.14 aims to enable management to study customer behavior over time, distinguishing between customers who continue to purchase and those whose activity has declined or ceased entirely.

This page aims to highlight the importance of analyzing customer behavior in driving decisions to shift from analyzing sales value to analyzing demand sustainability and purchase regularity.

Figure 3.14

Customer Performance Analysis Page



Note. A page for analyzing customer purchase continuity and their temporal behavior

The dashboard, as seen in Figure 3.14, facilitated an analysis of customer movements linking sales data with a time dimension in which customers were classified by whether purchases were made in the last 90 days. The page also informs the months in which purchases were made and corresponding sales values for each period. With this type of analysis, management would be able to identify active customers and detect cases of decline or discontinuation in purchases chronologically instead of depending on general impressions or late reporting.

The results highlight the system's ability to transform transactional sales data into actionable analytical indicators for decision making. Management can analyze purchase continuity according to criteria like customer, product, salesperson, city, or sector, using interactive filtering tools instead of having to prepare separate reports for each case. This is helping in sales follow-up, targeting marketing campaigns, and decision-making about reactivating customers who have not repurchased regularly.

This analysis reflects the real role of business intelligence in supporting a deeper understanding of customer behavior. The dashboard presented more than time series data; it also constituted a strategic analytical tool which enabled management to connect the sales performance with the time dimension, evaluate customer relationships sustainability, and reinforce the change to data-driven decisions in modern sales management and further future planning.

In the Power BI dashboard, Figure 3.15 shows the page for analysis and classification of customers through the RFM model (Recency, Frequency, Monetary). The purpose of this page is to allow the management to analyze the behavior of customers in a systematic manner based on recency of purchase, frequency of purchase, and monetary value. It aims to highlight the advanced analytical role of the dashboard in moving from descriptive sales analysis to behavioral analysis that focuses on customer value and strategic importance to the company.

Figure 15-3

A page for customer segmentation using the RFM model



Note. A page for customer segmentation using the RFM model and distributing them across purchasing categories and different sectors.

As illustrated in Figure 3.15, the dashboard enabled the classification of all customers into clear segments such as premium customers, new customers, and customers who require attention, based on the aggregated values of the RFM indicators. The analytical table displays the Recency, Frequency, and Monetary scores for each customer, along with the segment to which they belong. This provides management with a precise view of customer loyalty, the regularity of their transactions with the company, and the level of their contribution to revenues.

The page also highlights advanced interactive analysis capabilities, where the analysis can be shifted from the level of all customers to a specific sector, or customers can be filtered based on purchase value ranges (such as less than half a million, from half a million to one million, and more than one million), without the need to prepare additional reports. It benefits the management in designing flexible marketing policies for individual customers, selective sales efforts on more valuable customers, and reactivation plans for smaller activity customers.

In this analysis, actually, business intelligence serves very well for customer relationship management (CRM) purposes. Not only did the dashboard classify customers on a purely technical basis, it served strategic analytics in linking purchasing behavior with the customer's economic value, allowing better targeting and pricing decisions, and better sales forecasting. Similarly, results show how incorporating the RFM model into the Power BI dashboard

improved revenue-related sales data by turning raw sales data into actionable intelligence supporting data-driven decisions within the industrial company.

RFM analysis provides a clear answer to the fourth research question by enabling customer segmentation based on purchasing behavior and transaction patterns.

The customer classification page illustrated in Figure 3.16, based on ABC Pareto analysis, in the Power BI dashboard looks to identify customers that contribute maximum sales to a company's total, in accordance with the Pareto principle (80/20), which assumes that a limited number of customers bring in maximum revenues. The page above demonstrates the analytical role of the dashboard in aiding management in sales prioritization decisions and in channeling resources toward the highest-value customers.

Figure 3.16

A page for customer segmentation according to the ABC methodology



Note. A page for analyzing and segmenting customers according to the ABC methodology based on their contribution to total sales.

Figure 3.16, customers were divided into three major categories (A, B, and C) based on each customer's contribution toward total cumulative sales. Category A represents customers with the highest contribution to revenues, with Category B giving a moderate contribution followed by Category C, which includes many customers making limited contributions. The analytical table thus provides information such as the ranking of customers, the total sales for each customer, the customer percentage of total sales, and cumulative percentage, thereby painting a clear quantitative picture of the distribution of revenues across the customer base.

The accompanying charts clearly illustrate the variation between the number of customers in one specific category and the amount of contribution made by these customers in sales. It is evident that Category A customers are fewer in number as compared to the customers in other categories, but they contribute to a greater share of total revenues for the company, thereby substantiating the applicability of the Pareto principle in this industrial context. This analysis provides management information so that they can focus their sales effort and follow-up plans on high-impact customers and re-evaluate policies in relation to lower contribution customers.

As more additional customer attributes are pinned on the dashboard, for example, city, purchase continuity, and number of orders, the analysis became further enriched-transforming itself from having mere static numerical classifications into a strategic decision-support tool. An exclamation of Power BI's capability in providing that salted interactive analysis where the relationship of sales volume with the degree of risk of dependence on a small number of customers could be made, thus enabling management to better achieve a balanced customer portfolio.

The application of ABC analysis on the interactive dashboard results created a broader understanding of the revenue structure by management and thereby facilitated a transition from monthly sales monitoring to strategic management by placing more emphasis on customers classified according to their economic value. This, in turn, improves the efficacy of sales planning and sustains the financial sustainability.

These results directly address the third research question by identifying the most valuable products and customers based on their contribution to total sales.

Figure 3.17 shows the analysis page of customer continuity and new customer retention on the Power BI dashboard, which was designed to help management track long-term customer purchasing behavior over a multi-year study period. The page highlights the analytical function of the dashboard in differentiating between active customers, new customers, and inactive customers who did not record any purchases for a given time period, thereby aiding more accurate and objective customer relationship management.

Figure 3.17

New Customers Page



Note. A page for new and inactive customers and their distribution by first purchase year and purchasing activity status.

The dashboard, as seen in Figure 3.17, allows for an in-depth view of the customers over years. Customers are shown to have purchased or not each year in the study, the total sales amount, the year of first purchase, and their classification into new or inactive customers. This analysis helps management to pinpoint the newly acquired customers and follow their progress against those that have stopped transacting as a sign of possible loss of loyalty or changes in purchasing behavior.

The page further supports filtering by year, customer type, and sector, complete with analytical tables indicating the purchasing status of each customer by year. Thus, from a highly complex manual task, tracking customer continuity is turned into a real-time interactive analysis. The dashboard allows for the search of individual customer details, including their entire purchase history: first purchase, total sales, and consistency over time.

An analysis of this nature reveals the real importance of business intelligence systems in supporting customer retention decisions. It allows the organization to track customers who are at risk of stopping purchases and take proactive measures to re-engage them. This ensures that strategies used for attracting new customers are subsequently evaluated. It also steers future marketing planning in the direction of those customer groups with greater potential for growth and long-term engagement.

The interactive Power BI dashboard supports answering the research questions by presenting the results in a dynamic and user-friendly manner that facilitates data-driven decision-making

3.4 Summary of the Impact of the Power BI Dashboard on Sales Performance Analysis

The interactive dashboard pages' displaying and analyzing results revealed that the Power BI system was used not only to communicate sales figures but also as an integrated analytical system that aided conversion of raw sales data into intelligible insights for decision-making at operational and strategic levels. It allowed the management to analyze sales performance along various dimensions such as time, regions, sales representatives, products, and customers. The system facilitated comparisons, cumulative tracking, and real-time tracking of the target achievements.

Moreover, the findings have spotlighted the dashboard's role in customer behavior analysis using scientific classification models such as RFM and ABC and customer continuity analysis-involving new and inactive customers-and in deeper understanding of the demand dynamics and customer relationship management. It has interactive filter and flexible analysis functionality that minimize the need for manual reports, reduces time in accessing information, and improves the accuracy and reliability of analysis.

Overall, these results showed that the Power BI dashboards proved to be an effective tool in transitioning toward data-driven management. They helped improve the quality of analysis, increased efficiency of follow-up, and aided management with better planning and decision-making based on accurate and updated data. This is clearly in line with the objectives of the study and an action research methodology adopted.

Chapter Four

Discussions and Conclusions

4.1 Introduction

In this chapter, we aim to provide a comprehensive analysis of the study questions based on the findings obtained from developing and implementing the sales dashboard using Power BI over a period of three years, ranging from 2023 to 2025.

Here, it will be scientifically demonstrated how the adoption of business intelligence systems has enhanced the quality of sales analyses and customer classifications in conjunction with recent literature and action research methodology adopted in this study.

The long time period gave a better database making it possible for the analysis of sales trends across the range of years, stability versus change in customer behavior, and much more accurate comparisons of the performances of the different time periods.

4.2 Discussion of the Results

With the implementation of the interactive dashboard designed by Power BI, images were evidently raised to a level of operation from which industrially oriented companies ought to be able to analyze sales performance and understand its variations over time. Monthly and yearly views of sales performance related to the years 2023-2025 were made using an elaborate and integrated view of the sales performance. The unified data sources and the connected integrated data model allowed management to evolve from using separate and delayed reports to an interactive analytical system enabling continuous monitoring of the key-performance-indicator. This directly addressed one of the major weaknesses identified during the pre-implementation stage.

In accordance with the above stipulations, analysis of the literature on Business Intelligence has shown that the real value of the BI systems is not so much in numbers, but rather in their ability to intertwine the data generated across sources and transform it into knowledge that is useful in the support of decisions. Sales analysis for this study was broadened from the total numbers all the way down to time analysis, geography analysis, and behavior analysis, thus leading to better management insights and improved accuracy in evaluations.

By integrating customer classification models, such as RFM and ABC analysis, into the dashboard, the study provided management with better understanding of customer behavior in terms of sales value. It was possible for the company to advance from general descriptive analysis towards strategic analysis relating to the identification of most important customers, distinguishing active from inactive customers, and tracking changes in purchasing behavior over extended periods. These findings correlate with studies that highlight the significance of customer-behavior analysis as an important foundation for data-driven marketing and sales decisions.

From an operational perspective, the findings showed that utilizing Power BI reduced the time and effort required for sales report preparation. Updating indicators and analyses now became automatic with the simple refreshing of data, rather than through manual processing and rebuilding reports each time. This had a positive impact on the speed at which management responds to changes in performance, detects deviations from targets, and takes corrective action on time- all things that would not have been possible under the old traditional system.

These findings are corroborated by the semi-structured interviews. Participants commented on the improvement of data clarity, accuracy of indicators, and ease of obtaining information since the implementation of the Power BI dashboard. They also confirmed that the new system increased confidence in the numbers while reducing reliance on personal judgment. This indicates that there is a gradual shift toward data-driven decision-making culture within the company.

At the methodological level, the results stress the importance of action research methodology in the successful implementation of the dashboard. This approach facilitated gradual and interactive development of the system through the stages of diagnosis, planning, implementation, and evaluation. The dashboard was improved and expanded based on user feedback and real management needs that effectively built an analytical tool suitable for the working environment that supports continuous performance improvement.

From all these discussions, one can conclude that the findings of the study are not just a technical success in utilizing Power BI but also a change in the way sales analysis and information management is handled by an industrial company. The results confirm the very important role of the Business Intelligence systems in supporting administrative decisions and increasing operational efficiency given the adequate methodological and practical conditions.

4.2.1 Discussion of the Main and Sub-Research Questions

The study is mainly guided by one question: To what extent does applying the Power BI Business Intelligence system help in analyzing sales performance and classifying customers using the ABC and RFM models to support decision-making in industrial companies?

Results proved that under the new system, there were major improvements in analysis accuracy and clarity of the sales picture. The three-year database enabled one to analyze monthly and cumulative sales trends and also to follow customer activity which was impossible with the traditional system. These results corroborate what recent studies such as (Burnay et al., 2024; Chen & Zhang, 2025) reported, namely, that Business Intelligence systems are capable of transforming raw data into strategic knowledge for decision-making.

Moreover, it shows that the dashboard was not only used for presenting purposes but was also an analytical decision-support system that enabled management to move from the level of descriptive reporting to that of interactive data analysis.

1- What are the shortcomings of the current sales reporting system?

Gaps were clearly demonstrated between the old reporting system and the Power BI system. It became evident that the old system hinged on several different Excel worksheets from varying sources, without any one data model bringing together customer, sale, and sales representative information. Also, the entire process of preparing reports used to take an enormous amount of time, introducing a scope for human errors since data was entered manually. The old system was also incapable of analyzing data across the years, making actual evaluation of growth or decline difficult and inaccurate.

Three years' worth of data suggested that the traditional methodology was not good enough to give a full-time view of performance. It could not also inform which reports were failing to follow customers whose behavior changed over time or whose purchases ceased for one year or more or whose purchasing rate increased. These findings are consistent with what (Alqhatani et al., 2022) mentioned as limitations of manual systems in understanding long-term sales behavior.

2- How can the implementation of Power BI contribute to building an interactive dashboard that helps management analyze sales performance indicators in real time?

The results with regard to the interactive dashboard support the management in monitoring performance indicators on an accurate and real-time basis so as to make immediate decisions based on reliable data. Interactive display of sales throughout three years in Power BI enabled comparisons to be made on a month-to-month basis to either highlight different months with growth or months with decline in sales performances. These also interactively present report analyses showing the percentage of target achievement for each year, growth rate per year, total sales for each sales representative during the study period, and the contributions made by each sector to achieving total revenue.

The results also indicated that the speed with which information could be accessed was significantly greater when compared to the system that had been in use before, with mere preparation of a single monthly report previously extending over many days. This corroborates the assertion made by (Hjelle et al., 2024), which states that BI tools cut down the analysis time by as much as 70%.

3- To what extent does the ABC model contribute to identifying the most important customers?

The ABC model turned out to be successful in the practical application in identifying the most valuable customers over the three-year period. The analysis showed that category A was a small percentage of customers while shouldering the largest burden of revenues every year. The model also provided tracking over the years as to where customers moved from one category to another based on changing buying patterns. The analysis aids management in better allocating sales resources to focus efforts towards higher return customers.

These results are consistent with Pareto principle with modern customers' marketing, which emphasizes the importance of classifying clients to ensure effective sales management.

4- How does the RFM model help in analyzing customer behavior?

The study demonstrated that the RFM model was one of the most influential models in customer analysis over the three-year period, as it enabled management to identify:

- Customers who made recent purchases
- Customers whose purchasing frequency has declined
- Customers who stopped purchasing several years ago
- The highest-spending customers over the study period

Behavioral analysis helped in the classification of historical sales data into actionable indicators to help management understand customer relationships' dynamics and make data-driven decisions for targeting and retention.

Clear distinguishing mechanisms arose in the behavior of customers during 2023 compared to 2024 and 2025, as significant changes in recency and frequency of purchases became apparent, allowing marketing strategies to rely on data-based conclusions rather than gut feelings. These results are in accordance with (Tirupati et al., 2024) regarding the effectiveness of the RFM model for understanding long-term customer value.

5- What is the impact of implementing the dashboard on the speed and accuracy of decision-making?

The data apparently indicated that management would gain access to accurate and real-time reporting without cumbersome manual processes. It also allowed managers to compare results of different periods across the three years, to identify deviations from target, and to analyze the rules in place for decline or growth. This brought about faster and more accurate decision-making and consequently supported the findings of this study on the effectiveness of business intelligence in improving the quality of managerial decisions. This also confirms the idea that the true value of the dashboard is to enable timely management based decision making rather than merely showing the performance indicators retrospectively.

6- What changes occur in performance after implementing business intelligence compared to the previous period?

Through the analysis of data over the three years, it was found that the implementation of Power BI led to:

- Improved ability to identify low-performing products and reassess them
- Directing sales efforts toward more profitable products
- Accurately tracking sales representatives' performance across the years
- Identifying inactive customers who stopped purchasing since 2023
- Providing a foundation for annual performance analysis that the previous system could not produce

This reflects a clear and tangible impact of the new system in improving sales and operational performance.

7- How did the action research methodology contribute to the success of the system implementation?

Adopting the action research methodology enabled a continuous improvement cycle through the stages of diagnosis, planning, implementation, and evaluation, which made it possible to:

- Accurately identify problems prior to development.
- Design a model that aligns with the company's needs.
- Implement the system in collaboration with stakeholders.
- Evaluate the results by comparing the three years.
- Introduce continuous improvements to the dashboard based on feedback

These results are consistent with the literature that highlights the effectiveness of action research in applied projects within industrial organizations .Integrating action research with the dashboard demonstrates that business intelligence systems are continuously developed through organizational learning and not as a series of one-off technical projects.

Going by this, one can neatly conclude that all study questions have been addressed holistically. The findings from Chapter Three tend to affirm the correctness of this research Study's findings regarding its research questions and the vantage position of business intelligence systems in facilitating and improving decision-making processes within industrial companies.

Supporting this finding are operational improvements that crystallized while comparing the existent scenario with the developed one: exhibited in Table (4-1) was the salient difference between the age-long traditional way of preparing reports and the newly found outputs made available through Power BI post-implementation.

Table 4-1*Comparative Analysis of Reporting Processes Before and After Power BI Integration*

INDICATOR	BEFORE IMPLEMENTATION	AFTER IMPLEMENTING POWER BI
MONTHLY REPORT PREPARATION TIME	Required 4–5 working days due to collecting data from multiple files and manual review	Less than 10 minutes through updating the unified data model
NUMBER OF FILES USED	Several separate and unlinked Excel files	A unified data model with relational tables inside Power BI
DATA ACCURACY	Higher probability of errors due to manual processing	Higher accuracy as a result of automated data linking and cleaning
LEVEL OF INTERACTIVITY	Static reports with no multi-dimensional analysis capabilities	Interactive dashboard with filtering by period, salesperson, city, product, and customer
CUSTOMER ANALYSIS	Not available or performed manually with limited depth	Automated customer segmentation using ABC and RFM methods within the dashboard
TARGET ACHIEVEMENT TRACKING	Conducted only at the end of the month with no real-time visibility	Real-time indicators showing target achievement by salesperson and region
DETECTION OF DEVIATIONS	Required a long time and was usually identified after reports were finalized	Deviations can be detected immediately as they occur
MANAGERIAL DECISION SUPPORT	Dependent on delayed compiled reports	Instant and accurate decision support based on refreshed and up-to-date data

Note. This comparison confirms that the Power BI dashboard did not only contribute to improving the efficiency of report preparation, but also served as a strategic analytical tool that supported management in monitoring performance, detecting deviations, and making decisions based on accurate and up-to-date data.

4.3 Linking the Results with Previous Studies

The findings of this study corroborate trends raised in recent literature regarding business intelligence systems as enablers of improved quality of analysis and decision-making within industrial organizations. Burnay et al., 2024 showed that the ability to use interactive dashboards augments management tracking of performance indicators in real time , a clear reflection of which was seen in this study in terms of reduced reporting and cumulative analysis time across the 3-year duration.

Findings from customer segmentations using the RFM model are also aligned with the results from (Tirupati et al., 2024), indicating that the analysis of recency, frequency, and monetary value allows organizations to identify high-value customers and detect those in decline. In a study that contrasted data across 2023-2025, these findings correspond with those of the present study and therefore validate the robustness of the model, along with the need for it to be integrated into decision-support dashboards.

As for customer analyses via the ABC model, findings of this study supported recent analytical marketing research like (Chen & Zhang, 2025), which actually argued that classifying customers based on revenues allows more efficient resource allocations within organizations and gives a higher level of management efficacy in generating effective retention strategies for the most valuable segments. It was quite evident by focusing on category A customer, which contributed the largest share of sales during the study period.

Such outcomes have been validated by research from (Hjelle et al., 2024) and demonstrate the beneficial impact of business intelligence tools on analysis speed and accuracy of reporting. According to findings reported herein, the self-contained Power BI has decreased the human errors associated with manual data entry processes while improving data accuracy through a unified data model and automated processes.

Apart from this, this research brings something new to the literature by linking ABC and RFM analyses through the action research methodology-an approach that, integrated, has not been extensively reported in previous studies. This integrated approach is thus very useful in practice for one to understand customer behavior over time, in addition to providing a model that can be used in similar industrial environments.

4.4 Conclusions

This study establishes that improved quality of sale data analysis in the industrial company is a direct result of the Power BI dashboard implementation. The newly introduced analytical model allowed for performance monitoring in real time, trend analysis across various years, and even detecting changes in demand ahead of time. Furthermore, the integration of ABC and RFM models allowed for better understanding of customer behavior by sales value, recency, and purchase frequency and enhanced the managerial decisions in targeting sales effort more accurately.

The transition from manual reports to an interactive dashboard has also resulted in saving managing errors, improving in terms of speed, and overall decision making. Action research methodology was applied very well throughout the gradual formation of an interactive dashboard according to the real conditions met by the actual users of the system. This happened through cycles of configuring and iterative diagnosis, planning, implementation, and evaluation.

Overall, these conclusions confirm that a firm relying on a business intelligence system is strategically enhancing its sales performance and analytical capabilities, making it more competitive under increasing information pressure. The application of the Power BI software within both a practical and methodological manner thus contributes to the creation of actionable knowledge from operational data for supporting strategic decision-making.

4.5 Practical Implications of the Implementation

The Power BI interactive dashboard strengthened further strategic planning of the industrial company through accurate and timely indicators related to sales, products, and customers, thus enabling management to monitor performance qualitatively based on clear quantitative grounds. The system also was instrumental in supporting data-driven managerial decision-making and reducing reliance on subjective judgments or delayed traditional reports.

The system allows for an early warning of operational troubles, such as drop in demand for a certain geographic area or below-par sales from a sales rep, so management can take imminent corrective actions instead of lying in wait for the end of the reporting period. Moreover, through advanced analytics, management were able to reach out to high-value customers, track inactive customers, and create targeted marketing interventions aimed at reactivating

them, thereby helping to accelerate growth and improve allocation of sales and marketing resources to realign with corporate strategy.

4.6 The Extent of Other Companies' Interest in Implementing Business Intelligence Systems

Indeed, these consultative discussions held by the researcher with the industrial companies revealed much greater interest among the industries concerning the business intelligence systems they seek solutions to, and especially in Power BI solutions. Similar to other companies, the consultative meetings show that many companies are experiencing challenges in report extraction, fragmented data sources, and lack of a universal view concerning sales performance. These officials agree that an interactive analytical system that will allow on the spot access to data, real-time tracking of sales, and future forecasting trends constitutes a great strategic tool for enhancing efficient monitoring and aids in making decisions.

The discussions also indicated that several companies expressed a desire to implement a similar system, especially after reviewing the dashboard model developed in this study. Participants explained that the adoption of Power BI could contribute to improving report quality, accelerating analysis processes, and providing more accurate indicators of sales performance. This external interest enhances the credibility of the study's findings in that business intelligence solutions are not only a need for the company under study, but rather are a general trend being shared among many industrial organizations facing similar analytical challenges. Emphasizing this interest should not be misconstrued as statistical generalization of the results, but rather as an indication of applicability and adaptability of the proposed model in other comparable contexts within the industry.

4.7 Study Recommendations

The following recommendations will be made for improving the efficiency of the business intelligence system and the quality of decision-making in the industry based on the results obtained in this study.

First, the recommendation made by this study is to broaden the ambit within which data is used in the Power BI dashboard by incorporating inventory, procurement, and financial information. This ensures that sales performance is tied up more completely with operational performance, thus allowing management access to a more holistic overview of the

organization. Indeed, while three years' worth of data is quite a solid basis for investigating the matter at much greater depth, it will even further add to the accuracy and analytical value of the results to include more modules from the information system.

The second recommendation in this study speaks about putting together a data quality management policy that clearly stipulates the procedures of data entry, update, and documentation and ensures the reliability of information derived from Power BI and the sustainability of the analytical system in the long term.

Power BI's advanced analytical capability can be leveraged with forecasting algorithms integrated via Python or its built-in AI tools, such as demand forecasting models and anomaly detection techniques, thus providing management with ability to undertake proactive decision-making based on predictive analytics.

The study further suggests defining precise mechanisms for monitoring inactive customers via the RFM model in order to design targeted marketing strategies to reactivate them and increase customer lifetime value. In this respect, the ABC model's outputs can be used to prioritize sales efforts and deploy resources to customers of greater value.

Moreover, the research recommends that a culture of data-driven decision-making be enhanced in the Company through continuous training and workshops aimed at improving users' competence in interpreting analytical indicators and using them effectively, because the human factor is very critical in the success of business intelligence projects.

In the end, the study recommends that action research finds continued acceptance as the methodological framework within which analytical processes can be developed within the firm due to its demonstrated capability for diagnosis, participatory development, and continued evaluation of impacts on improvements.

4.8 Study Limitations

Most importantly, regardless of the substantiation of the study, the validity of its method, and its dependence on three years of data (2023-2025), several constraints may limit the findings. The first among them is the data itself, which did not include any integrated sales and customer data with other departmental databases like those belonging to inventory, finance, and procurement, thus restricting the scope for building a fully integrated multidimensional analytical model. This limitation stems from the availability of data as opposed to the features

of Power BI, which supports a high degree of scalability and the integration of additional data sources.

In addition, quality data extraction from the traditional system was also a challenge, which required data cleaning and validation processes for accuracy, especially in respect of inactive customers or those with no recorded transactions in certain years. Although processing power is more than sufficient within Power BI, the analysis always relies on the quality and completeness of the original data.

Another limitation is that the actual implementation of the system has been limited to just one industrial company, making the results less generalizable to other industrial environments, be they different in the nature of their operations, amount of data, or even customer characteristics. However, through consultative meetings with a number of industrial companies, it constitutes a shared challenge and need for business intelligence systems, increasing the overall validity of the results and suggesting that these would be applicable in similar contexts.

Models such as ABC and RFM that use inferences for analysis depend on certain criteria and classifications, which may widely differ from one organization to the next. Therefore, the resulting analysis upon changing these criteria becomes extremely sensitive. Also, the system's user training and interpretative ability for interactive indicators largely determine its efficiency; hence there is a necessity for continuous training towards optimum use of the system.

Despite these limitations, the strength of the study lies in the inferred multi-year data analysis, providing opportunity for deeper analysis than would be allowed using one-year data. Also, the proposed system presents a scalable and extensible model, which can be further developed to cater to future needs.

4.9 Recommendations for Future Research

The findings of this research pave the way toward several strands of research that deepen business intelligence systems and offer advancements in their use within industrial firms. Future work could focus on much more advanced analytical modeling within Power BI, as well as some of its components-such as machine learning algorithms and intelligent forecasting-by entering advanced regression models, multivariate time series analysis, and

anomaly detection techniques using artificial intelligence. These models are directed toward better forecast performance and to assist organizations in proactive decision-making with all issues related to marketing, demand management, and inventory.

Future studies may also conduct comparative analyses between Power BI and other analytical tools such as Tableau and Qlik, in order to evaluate discrepancy areas in data processing ability, speed of performance, integration with industrial databases, and flexibility with dashboard development. Such comparisons can elucidate which tools are more effective under various industrial environments, particularly those dealing with big data or complex operations.

The research proposes extending studies into integrating financial and accounting data, together with sales data, in developing a comprehensive model for measuring profitability at product, customer, and geographic levels. This integration helps develop dashboards for in-depth profitability analyses, which are central to strategic decision-making.

The other area of interest for future research is the effect that adopting a business intelligence system has on the decisional-making culture within organizations and to what extent it can change the level of analytical tool employee take-up and quality speed in decision-making. It might also be interesting to study the organizational and technical factors contributing to successful or unsuccessful business intelligence projects in industrial companies.

Future research may include applying the action research methodology over a much larger sample of companies in order to assess the outcomes of improvement efforts and organizational learning in different environments, thus identifying best practices in the development of the dashboard. In addition, future studies could focus on examining the long-term impact of implementing Power BI on company performance over several years by tracking indicators of growth, profitability, and operational efficiency.

Accordingly, these research directions can contribute to building a broader knowledge base on the role of business intelligence tools in improving organizational performance and assist companies in selecting the most appropriate solutions for their operational and analytical needs.

4.10 Conclusion

This section represents the integrative conclusion of the study, as it provides a concise and comprehensive presentation of the most important results and theoretical and practical contributions achieved through the development and implementation of an integrated analytical model using Power BI and the analysis of sales data over a three-year period (2023–2025). The results of the study demonstrated that the implementation of a business intelligence system was not merely a technical update to reporting methods, but rather contributed to a fundamental transformation in data analysis mechanisms and decision-making processes within the industrial company. The system enabled management to access an accurate and comprehensive view of sales performance, analyze temporal trends, and monitor changes in customer behavior, which helped identify gaps and opportunities and enhance data-driven decision-making.

The analytical models used, such as ABC and RFM, also proved their ability to provide important strategic insights, whether by identifying high-value customers or by understanding purchasing patterns and frequency. These analyses contributed to improving the allocation of sales resources, increasing the effectiveness of targeting strategies, and enhancing the quality of customer relationship management. These models formed a fundamental pillar in developing customer follow-up policies and improving customer lifetime value within the company.

At the methodological level, the study confirmed that adopting the action research methodology was highly appropriate for the nature of this type of applied project, as it allowed the organization to move gradually from the diagnosis stage to planning, implementation, and evaluation through successive cycles. This enabled continuous system improvement based on user feedback and the practical and direct assessment of the impact of each development. This approach contributed to achieving real and sustainable change in the work environment and highlighted the importance of continuous interaction between the researcher and practitioners in enhancing the quality of the results.

The study concludes that Power BI represents a flexible and scalable analytical platform that can be relied upon to build an integrated information system that supports management in making data-driven strategic decisions. The results also open the way for future applications, including the integration of additional company units such as inventory, procurement, and

finance, or the use of artificial intelligence and machine learning algorithms to improve forecasting accuracy and enhance analytical performance. The scope of the study can also be expanded to include other industrial companies in order to compare results and enhance generalizability.

The scientific contribution of the study lies in presenting an integrated applied model that combines interactive dashboards with ABC and RFM models within the framework of action research, thereby filling an applied gap in the business intelligence literature in the industrial sector.

Accordingly, the study confirms that adopting business intelligence systems represents a pivotal step toward developing institutional performance, and that the use of Power BI and advanced analytical models directly contributes to enhancing managerial efficiency, improving decision quality, and supporting the operational sustainability of industrial companies.

While the study results confirm the effectiveness of integrating ABC and RFM analyses within a Power BI environment, they were influenced by certain limitations related to data availability and quality. Nevertheless, the findings provide valuable insights and open opportunities for future research to further enhance analytical depth and decision-making support.

List of Abbreviations

Abbreviation	Meaning
BI	Business Intelligence
DSS	Decision Support System
ETL	Extract, Transform, Load
KPI	Key Performance Indicator
RFM	Recency, Frequency, Monetary
ABC	ABC Customer Classification
ADR	Action Design Research
ERP	Enterprise Resource Planning
SQL	Structured Query Language
DAX	Data Analysis Expressions
CRM	Customer Relationship Management
API	Application Programming Interface

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Appendix A

Interview Summary Table

The following table presents a summary of the interviews and meetings conducted with members of the study population in the industrial company during the stages of the action research. These interviews aimed to assess the current state of the traditional reporting system and to evaluate the effectiveness of implementing an interactive dashboard (Power BI) in improving sales analysis and supporting managerial decision-making.

The interviews were conducted through more than ten separate working sessions over the course of the project implementation period. They included face-to-face meetings at the company's headquarters, follow-up meetings, and phone calls to discuss the stages of design, implementation, and improvement

NO.	PARTICIPANT	JOB TITLE	CUMULATIVE INTERVIEW DURATION	INTERVIEW PERIOD	KEY NOTES AND IMPRESSIONS
1	Mr. (Name withheld)	Chairman of the Board	40 minutes (one main session)	15/03/2025	Emphasized the importance of adopting modern business intelligence systems to monitor the overall performance of subsidiary companies. He expressed particular interest in the ability to compare sales performance across branches in an interactive and clear manner.
2	Mr. (Name withheld)	General Manager	4 hours across several meetings	From 17/03/2025 to 05/09/2025	Participated in several follow-up meetings during the dashboard

					development stages, where pilot versions were presented for review. He expressed satisfaction with the progress of the design and the accuracy of performance indicators, noting that Power BI improved decision-making speed and facilitated weekly performance monitoring.
3	Mr. (Name withheld)	Chief Operating Officer (COO)	2 hours	From 19/03/2025 to 22/09/2025	Contributed to discussions on data integration between production and sales units, focusing on the importance of time-based demand analysis. He observed improved interdepartmental communication after the implementation of the new system.
4	Mr. (Name withheld)	Sales Manager	More than 5 hours across several working sessions	From 21/03/2025 to 10/07/2025	Was a key participant in the practical implementation phase of the dashboard. Multiple versions of the Power BI dashboard were provided for testing and for offering

					technical feedback regarding data accuracy and readability. He expressed appreciation for the system's ability to analyze sales by customers, cities, and time periods, and suggested developing additional indicators related to sales representatives.
5	Mr. (Name withheld)	Chief Financial Officer (CFO)	2.5 hours	From 22/03/2025 to 12/06/2025	Participated in the final review meetings of sales reports and data validation. He confirmed that Power BI enhanced transparency and facilitated verification of revenue and cost figures through a unified dashboard.

Additional Notes:

- The interviews were conducted cumulatively throughout the action research implementation period, with each meeting focusing on a specific stage of development (diagnosis – design – implementation – evaluation).
- Notes were documented in written records after each session without audio recording, and thematic analysis was employed to extract key patterns and meanings from participants' responses.

- The meetings were characterized by a spirit of cooperation and active participation, and participants expressed the possibility of generalizing the Power BI experience to other departments within the company as well as to subsidiary companies of the parent group.

Appendix B

Interview Summary

Code	Summary
مقترحات التطوير والتحسين	أظهرت المقابلات وجود مجموعة من المقترحات التطويرية لتحسين لوحة معلومات Power BI مستقبلاً، من خلال إضافة تحليلات أكثر تفصيلاً، وتوسيع نطاق المؤشرات المعروضة بما يخدم احتياجات الإدارات المختلفة. كما أشار المشاركون إلى أهمية الاستمرار في تطوير اللوحة بما يتلاءم مع تغير متطلبات العمل، بما يعزز من فعاليتها في دعم الأداء واتخاذ القرار.
قابلية التعميم والتوسع	أوضحت نتائج المقابلات أن لوحة معلومات Power BI تتمتع بقابلية عالية للتعلّم والاستخدام، حيث تمكّن المستخدمون من التأقلم معها خلال فترة قصيرة نسبياً. كما أشار المشاركون إلى إمكانية تطوير اللوحة مستقبلاً وتوسيع نطاق استخدامها لتشمل مجالات أخرى داخل الشركة، مما يعزز استدامة تطبيق ذكاء الأعمال.
القيمة الاستراتيجية لذكاء الأعمال	أوضحت نتائج المقابلات أن تطبيق لوحة معلومات Power BI حقق قيمة تشغيلية واستراتيجية للشركة، من خلال تحسين كفاءة المتابعة، وتسريع تدفق المعلومات بين الأقسام، ودعم التخطيط واتخاذ القرار على المدى المتوسط والطويل. كما ساهمت اللوحة في ترسيخ ثقافة الاعتماد على البيانات داخل الشركة.
التعلم والتأقلم	بيّنت نتائج المقابلات أن المستخدمين احتاجوا إلى فترة زمنية قصيرة نسبياً للتعلّم والتأقلم مع لوحة معلومات Power BI، خاصة في المراحل الأولى من التطبيق. ومع الاستعمال المستمر، أصبحت اللوحة أكثر سهولة ووضوحاً، مما ساعد على تعزيز تقبلها والاعتماد عليها في العمل اليومي مقارنة بالأساليب التقليدية السابقة.
التحديات أثناء التطبيق	أظهرت المقابلات وجود بعض التحديات خلال المرحلة الأولى من تطبيق لوحة معلومات Power BI، تمثلت في الحاجة إلى وقت للتعلّم والتأقلم مع أسلوب العمل الجديد، إضافة إلى ضرورة تدريب المستخدمين على تفسير بعض المؤشرات التحليلية. إلا أن هذه التحديات كانت مؤقتة، وتراجعت تدريجياً مع الاستخدام المستمر للوحة.
دقة البيانات والثقة بالأرقام	أشارت آراء المشاركين إلى أن استخدام لوحة معلومات Power BI عزّز من دقة البيانات المعروضة وزاد من مستوى الثقة بالأرقام، نتيجة توحيد مصادر البيانات وتقليل الأخطاء الناتجة عن الإدخال اليدوي. وقد ساهم ذلك في تحسين مصداقية التقارير المستخدمة على المستويات الإدارية المختلفة.

التنسيق بين الأقسام	أوضحت المقابلات أن تطبيق لوحة معلومات Power BI ساهم في تحسين مستوى التنسيق والتكامل بين الأقسام المختلفة داخل الشركة، من خلال توحيد البيانات وتوفير مصدر واحد موثوق للمعلومات. وقد أدى ذلك إلى تقليل التباين في الأرقام، وتحسين التواصل بين الإدارات، ودعم العمل التشاركي في متابعة الأداء وتحقيق الأهداف.
دوافع تبني ذكاء الأعمال	أوضحت المقابلات أن الدافع الرئيسي لتبني لوحة معلومات Power BI تمثل في الحاجة إلى تحسين تحليل المبيعات وتوفير رؤية أكثر شمولية ودقة للأداء. كما سعت الإدارة إلى تقليل الاعتماد على التقارير التقليدية، وتسريع الوصول إلى البيانات، ودعم اتخاذ القرارات الإدارية من خلال مؤشرات أداء واضحة وتفاعلية تسهل متابعة النتائج وتحليلها على مختلف المستويات الإدارية.
التحديات قبل التطبيق	أشارت المقابلات إلى وجود مجموعة من التحديات قبل تطبيق لوحة معلومات Power BI، تمثلت في بطء إعداد التقارير، وتكرار العمل اليدوي عند الحاجة إلى أي تحليل جديد، إضافة إلى محدودية أدوات التحليل المتاحة. كما واجهت الإدارة صعوبات في متابعة الأداء بشكل لحظي، وعدم توفر مؤشرات دقيقة تساعد في تقييم أداء المبيعات والزبائن، مما أثر على سرعة ودقة اتخاذ القرار الإداري.
تحليل الزبائن	بيّنت المقابلات أن لوحة معلومات Power BI ساهمت في تحسين تحليل سلوك الزبائن من خلال توفير تصنيفات وتحليلات أكثر تفصيلاً، مثل متابعة الزبائن الأكثر قيمة وأنماط الشراء. وقد ساعد ذلك الإدارة على فهم احتياجات الزبائن بشكل أعمق، وتوجيه الجهود التسويقية والبيعية بطريقة أكثر فاعلية.
تحليل المبيعات	أظهرت نتائج المقابلات أن لوحة معلومات Power BI أسهمت في تحسين تحليل المبيعات من خلال توفير مؤشرات تفصيلية حول الأداء البيعي، واتجاهات المبيعات، وتحقيق الأهداف. كما ساعدت اللوحة الإدارة على مقارنة الأداء بين الفترات المختلفة، وتحليل النتائج بشكل أكثر دقة، مما انعكس إيجاباً على التخطيط البيعي واتخاذ القرارات المرتبطة بالمبيعات.
دعم اتخاذ القرار	بيّنت المقابلات أن لوحة معلومات Power BI لعبت دوراً محورياً في دعم عملية اتخاذ القرار داخل الشركة، إذ وفّرت معلومات دقيقة ومحدثة بشكل لحظي، وساعدت الإدارة على تحليل النتائج ومقارنة الأداء بسهولة. كما أسهمت اللوحة في تقليل الاعتماد على التقديرات الشخصية، وتعزيز اتخاذ القرارات المبنية على البيانات.
أثر تطبيق لوحة Power BI	أظهرت نتائج المقابلات بعد تطبيق لوحة معلومات Power BI تحسناً واضحاً في تحليل المبيعات ومتابعة الأداء، حيث أصبحت البيانات معروضة بشكل أكثر تنظيماً ووضوحاً. كما أتاحت اللوحة إمكانية الوصول السريع إلى مؤشرات الأداء الرئيسية، وتحليل أداء الزبائن والمندوبين بصورة تفصيلية، مما ساهم في تحسين كفاءة المتابعة واتخاذ القرار الإداري.
واقع العمل قبل التطبيق	أظهرت المقابلات قبل تطبيق لوحة معلومات Power BI أن تحليل المبيعات كان يعتمد بشكل رئيسي على أدوات تقليدية مثل PowerPoint و Excel، حيث كانت التقارير تُعد

يدويًا وتوفر صورة عامة عن الأداء دون التعمق في التفاصيل. كما واجهت الإدارة صعوبات في ربط البيانات بين الزبائن والمندوبين والأصناف، إضافة إلى استهلاك وقت وجهد كبيرين في إعداد التقارير، وغياب مؤشرات أداء لحظية تدعم اتخاذ القرار السريع والدقيق.



جامعة النجاح الوطنية

كلية الدراسات العليا

تعزيز اتخاذ القرارات الاستراتيجية في الشركات الصناعية: تطبيق لوحة تحليلات

المبيعات القائمة على Power BI باستخدام منهجية البحث الإجرائي

إعداد

عبد الناصر جمال عبد الفتاح سخل

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قدمت هذه الرسالة استكمالاً لمتطلبات الحصول على درجة الماجستير في ذكاء الاعمال وتحليل البيانات، من

كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس - فلسطين.

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الملخص

في بيئة الأعمال شديدة التنافسية اليوم، أصبحت البيانات ركيزة أساسية لدعم اتخاذ القرارات الاستراتيجية في الشركات الصناعية. يُصعب تعقيد عمليات المبيعات والكم الهائل من البيانات المؤلدة من مصادر متنوعة على المديرين استخلاص رؤى قابلة للتنفيذ باستخدام الأساليب التقليدية. توفر أدوات ذكاء الأعمال، ولا سيما مايكروسوفت باور بي آي، إمكانيات متقدمة لدمج بيانات المبيعات وتحليلها وعرضها بصرياً بطريقة تفاعلية وسهلة الاستخدام.

تهدف هذه الدراسة إلى تصميم وتنفيذ لوحة معلومات لتحليلات المبيعات باستخدام باور بي آي داخل شركة صناعية لدعم اتخاذ القرارات الاستراتيجية وتحسين الأداء العام للشركة. يتبنى البحث منهجية البحث الإجرائي، التي تتبّع دورات متكررة من التخطيط والتنفيذ والملاحظة والتأمل. من خلال هذا النهج، تسعى الدراسة إلى تحديد مؤشرات الأداء الرئيسية ذات الصلة بتحليل المبيعات، وبناء نموذج بيانات فعال، وتطوير لوحة معلومات تفاعلية، وتقييم أثرها على جودة اتخاذ القرارات وكفاءة العمليات. تشمل النتائج

المتوقعة لهذه الدراسة لوحة معلومات عملية تدمج مصادر بيانات المبيعات المتنوعة، وتوفر رؤى دقيقة وفي الوقت المناسب حول أداء المبيعات، وتعزز قدرة المديرين على تحديد الاتجاهات، والتنبؤ بالطلب، وتحسين استراتيجيات التسعير، وتعزيز تجزئة العملاء من خلال أساليب مثل تحليل ABC و RFM باستخدام Power BI في هذا السياق، يُسهم البحث في سد الفجوة بين الأطر النظرية لذكاء الأعمال والتطبيقات العملية في البيئات الصناعية.

في الختام، تُؤكد الدراسة على الدور المحوري لأدوات ذكاء الأعمال في تعزيز ثقافة اتخاذ القرارات القائمة على البيانات، ودعم القدرة التنافسية المستدامة، وتحسين الأداء التشغيلي في الشركات الصناعية.

الكلمات المفتاحية: ذكاء الأعمال، Power BI، تحليلات المبيعات، الشركات الصناعية، اتخاذ القرارات

الاستراتيجية