

USE OF BIG DATA IN SALES MANAGEMENT

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Abstract: Managers are constantly looking for tools that adapt organizational data into information to support their strategic decisions to improve the organization in terms of performance and profit. In Business-to-Business, the most valuable data of Big Data is always at hand: sales transactions from an ERP system and sales activities from CRM software. The article explores how Big Data influences sales and management strategies, it shows how it can segment customers using the clustering method, how sales history is used to forecast sales, and, using an a priori ordering algorithm, develop a strategy for modeling buying behavior. By using machine learning algorithms and artificial intelligence, companies can identify hidden patterns and trends in their sales data. This allows for better market knowledge, strategic pricing, and the creation of more effective marketing campaigns. Big Data is not only a tool for the sales department, it is also essential in the decision-making process at the managerial level. Data analysis can provide important insights into operational performance and help optimize processes, increase sales and profitability, and anticipate and adapt to changes and market behavior. By implementing Business Intelligence systems and advanced analytics tools, managers can make more informed and faster decisions. Companies that manage to collect, analyze, and use data effectively have a competitive advantage and can achieve significant results in operational performance.

Keywords: Big Data; competitive advantage, operational performance, sales management, Business Intelligence, CRM, ERP Systems

JEL classification: C80, D40, L11, O30, M10

Introduction

In the contemporary set of business, the proliferation of data has imposed a rapid reaction of change in the paradigm of sales management strategies.

In implementing business strategies at the company or business level, using the power of data analysis is essential. Given the impressive amount of daily data resulting from business operations, this advantage must be exploited to the maximum.

Sales management is the management of activities and processes related to planning, directing, and controlling personal sales. This involves recruiting, training, supervising, and motivating the sales force, as well as developing new sales strategies, coordinating practices, and monitoring and evaluating sales performance. Sales management is a core business process in most organizations that helps them build great sales teams, develop good customer relationships, reduce costs, and achieve sales goals.

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Sales prediction is an important prerequisite for enterprise planning and correct decision-making, allowing companies to better plan their business activities (Schroeder et al., 2010).

There are a variety of data analysis tools, as well as different methods of performing them, to meet specific needs. It is also important to note that competitors will also want to use this large volume of data to their advantage. With the amount of data available today, there is an even greater drive to analyze it to improve the way business is done.

This paper provides a comprehensive overview of the use of big data and data mining techniques in sales management. From predictive analytics to customer segmentation, explore the potential of big data and data mining to be the game changer that revolutionizes sales management practices. Descriptive analytics (such as business reporting and scorecards), predictive analytics (such as data mining and text mining), and prescriptive analytics (such as simulation and optimization) are the three basic categories into which data analytics technologies fall.

This paper seeks to describe the intersection of big data, data mining, and sales management, presenting diversified ways of data processing and analysis in the context of Big Data used by a company in the Romanian food industry, which carries out B2B sales activities, to optimize sales performance.

Big Data is now considered to be the foundation for both competitiveness and innovation. For those who select the appropriate Big Data solutions, gathering, processing, and evaluating massive amounts of data can greatly facilitate company decision-making and generate competitive advantages. The growing need for applications that create and process massive amounts of data has led to an acceleration of the development of big data technology. Business intelligence is supported by the creation of such solutions for businesses. Traditional data methods and platforms are less efficient in the context of big data, responding slowly and lacking in scalability, performance, and accuracy.

Literature review

A survey in the United States and worldwide reports that 80% of industry-leading firms have started big data analytics initiatives to bring greater accuracy to their decision-making (Statista, 2018). Big data analytics enables firms to strengthen their business operations, in supply chain management and customer relationship management.

A firm's potential to effectively use the information gathered during day-to-day activities is business intelligence (BI) (Vidal-García et al., 2019). The BI may play a significant role in optimizing organizational effectiveness (Zhao et al., 2021). While business analytics employs historical data to gather insights and carry out company operations to drive customer requirements and boost productivity, business intelligence uses both current and historical data. BI systems currently rely primarily on centralized and internal business data (Niu et al, 2021). Big data now enables BI to provide insights that would allow companies to understand their customers better, improve marketing technology, make personalization possible, and identify real-time problems and opportunities.

The business value of computers is limited less by computational capability and more by the ability of managers to invent new processes, procedures, and organizational structures that leverage this capability (Brynjolfsson and Hitt, 2000). Accordingly, most business-to-business companies have started their digital transformation projects to further ensure their competitiveness (Tabrizi et al., 2019). But all the changes within the organization, either regarding the design of processes, development of new products, or new business models need to be managed in a competitive way, increasing its effectiveness as well as its efficiency, thus leading towards operational performance.

Sales researchers have been interested in the effects of CRM systems, new communication technologies, and the Internet on selling and sales management since the 1990s, but their focus has grown since the 2000s. By using CRM systems, client data provides a complete record of the customer's interactions in a timely and readily accessible format to drive the analytic CRM process,

the development of marketing strategies, and feedback (or suggestion prompts) to the sales force and channels (Tanner et al., 2005).

Despite the great opportunities, the application of digital technologies never really met its full potential, neither CRM systems nor SFA. The major reason for failures regarding the implementation and application of digital technologies in sales is the companies' current prime focus on "people" and "technology," even though "process" is at least as important as the other two factors (Buttle, 2004).

Building a data management model requires considering the organization with all of its departments as well as its microenvironment to obtain clear managerial advice and sales guidance. For data to be a success factor, it must be thoroughly incorporated into an effective database. These days, digital technologies allow possible access to a wide range of internal and external data sources, which presents a fantastic chance to do more precise market, customer, and competition analysis than in the past (Tanner et al., 2005), but it becomes a must to reorient towards data within the organization. Particularly, customer requirements can be identified more systematically, and the company's product portfolio can be adapted accordingly. Consequently, more effort is required in building up sophisticated MI systems, which require in-depth knowledge about data generation, data analysis, and data preparation within the company – capabilities that most of the interviewed companies still lack in the necessary quality and quantity (Wengler et al., 2021).

Grossman and Siegel (2014) identified three basic models for locating the analytics within the organization. One model centralizes analytics by placing the data scientists in a single unit, a second organizational approach is to decentralize analytics and place a group of data scientists in each business unit. The third model is a hybrid approach in which a critical mass of data scientists is housed in a central unit, and the remaining data scientists are distributed throughout the organization. One common hybrid model is to centralize the data scientists who interact with the IT organization, those who manage the data, or those who deploy the models. In the process of specific sales data analysis, sales personnel may also face many challenges, which is one of the critical problems existing in sales forecasting. The so-called sales data analysis mainly refers to the information mining conducted by relevant staff based on component data to find the most valuable information (Ying and Low, 2019). With the support of big data technology, enterprises can establish and improve the central platform, and manage the sales data and other non-commercial data in a unified way. At the same time, with the support of key technologies such as data mining, they can extract all kinds of valuable information from it. Only in this way can they provide necessary information and data support for the later management and development of enterprises. Analytical skills refer to the employees' statistical skills that are required to conduct analysis and discover patterns in data

Many organizations have been deploying big data applications in running their business activities to gain value from big data analytics. Value is generated from big data processing that supports the right decision. Organizations need to refine and process it to gain value from big data analytics (Dumbill, 2013).

Research Methodology

The research methodology designed for this study and related to the proposed objectives is based on: preliminary documentation, bibliographic documentation, identification of information from financial and non-financial reports that can be useful in this endeavor, analysis of all information collected, establishing the methods of interpretation of the information and the results presented.

The main objective of this study is to provide a detailed and accurate description of a phenomenon. Specifically, identifying patterns or trends in behavior or other phenomena that may be useful in guiding further research or intervention, and generating hypotheses or ideas about potential causes or factors influencing a particular phenomenon. It is an inductive approach.

To achieve the research objective, an empirical study was required on the main processes related to the sales activities in the entity, by involving the descriptive study as a research method or as a way of knowing, as well as the preliminary study to obtain information and explanations.

It analyzes how big data and analytics processes fit within the organization, and how an appropriate analytics governance structure can enable an organization to extract business value and competitive advantage from big data.

Using Big Data in the context of B2B sales management

Following Laney (2001), we consider big data as data whose volume, velocity, and variety make it difficult for an organization to manage, analyze, and extract value using current or conventional methods and systems. We use the term analytics as the process that extracts value from data through creating and distributing reports, building and deploying statistical and data-mining models, exploring and visualizing data, sense-making, and other related techniques.

Master Data (Database) is an organized collection of data containing information of considerable value used to support key business processes - information about customers, suppliers, partners, products, materials, employees, and accounts - and is the core of every transaction, request, and organizational decision. The data warehouse is designed (and optimized) to answer the analytics questions that are critical to your business.

Almost every enterprise is finding that it is not enough to just manage ever-increasing volumes of real-time information in their systems, but also to analyze this information to quickly make the right decisions to compete effectively in the market.

The analysis of information is the basis of the decisions required within five main processes that can lead to success in any organization with Business-to-business activities (Fig. no.1). The main process refers to the management of sales calls, by calls meaning any means of contacting the customer to make or facilitate a transaction.

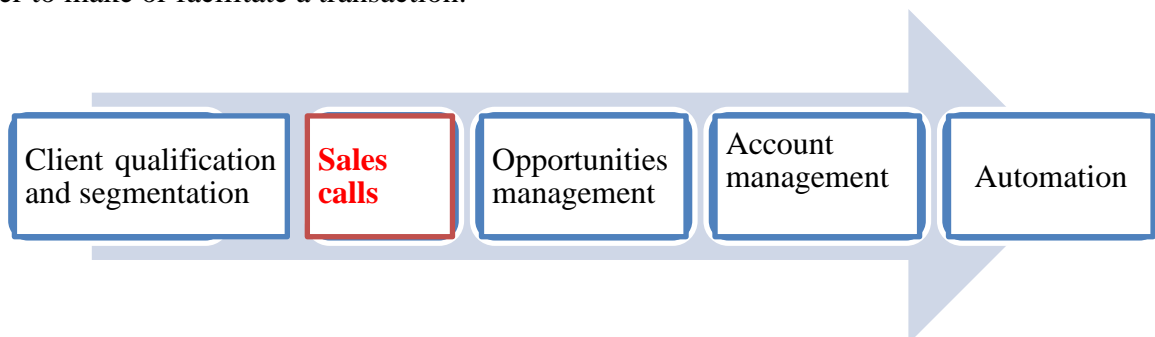


Fig. no. 1 Processes of B2B sales activities

Calling the customer must be preceded by the process of qualifying him as a potential customer. Using data mining techniques, big data is used to qualify customers for sales calls, and this involves segmenting activities specific to them on various relevant criteria or even discovering new segments.

Big data can help in delivering customer profiling. Customer profiling can gain invaluable insight from big data analytics and create a competitive advantage. CRM team generates customers' knowledge profiling to enhance businesses and understand precisely the target audience.

Following the customer qualification process, sales and relationship opportunities are identified, and even created, leading to two distinct but closely connected processes, the opportunity management process and strong personalization through AI and the centralized account management process.

In recent years there has been a major paradigm shift in the sales process represented by the need for sales automation. Automation involves data input, namely collecting and organizing data, crafting actionable insights, and customer profiling. Today, the volumes of data are of an almost

immeasurable size, but to benefit from the advantage of their possession, skills must be assimilated and Big Data analysis tools and means must be implemented.

Business needs must be aware of the three types of analysis that can be implemented with Big Data (Barbu, 2019). The first is descriptive, for example, notifications, alerts, and dashboards. Descriptive analysis focuses on the interpretation of historical data to understand what happened in an organization or system over a period of time. As the name suggests, this type of analysis is intended to broadly describe the situation in which a business or system is located, providing an overall picture. Another more useful form of analysis is predictive. It uses past data to model what might happen in the future.

But for the leaders of the organization the prescriptive analysis is the one that brings direct suggestions to combat the possible future impediments, practically includes the risk analyses, and fulfills the role of the management and control manager. It uses optimization techniques to advise managers and employees on the best ways to perform their roles within an organization. For example, informing a salesperson about the types of discounts they offer to customers or telling a customer what the ideal portfolio is to maximize their sales to consumers.

The stake of Big Data in terms of the organization is the capture of information about the market, customers, products, and services, their analysis, and obtaining a competitive advantage (Fig. no. 2). The four main elements of any Big Data project are data storage (big data storage), data extraction (data mining), analysis and visualization. Each element has several innovative and high-tech tools offered to businesses.

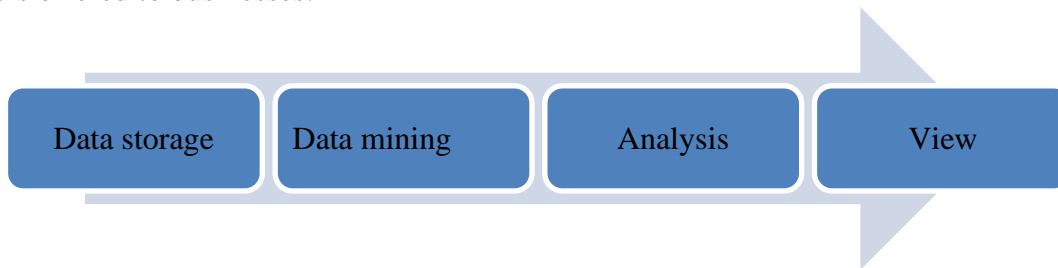


Fig. no. 2 Elements of Big Data Projects

For this, each of us has a favorite tool: whether it is Microsoft Excel, Access, Tableau, or some SQL language, we are all more attracted to one or the other. With a suite of capabilities on offer, QlikView enables its users to create data visualizations from all data sources with self-service tools that eliminate the need for complex data models. More advanced capabilities allow QlikView's visual analytics to be embedded into applications, while dashboards can guide people through producing analytics reports without the need for an understanding of data science.

Artificial intelligence (AI) and machine learning (ML) are resetting the expectations of a modern BI tool. Enhanced analytics suggests new insights and connections, and this helps us quickly analyze data, can increase productivity, and help make better data-driven decisions. Machine learning is the process of creating models from historical data to make future predictions. Machine learning allows us to leverage the power of predictive analytics in more user cases that are not handled by the data analyst. Qlik AutoML enables business users to easily build ML models and generate predictive analytics, helping you move from historical to predictive and prescriptive analytics. And with full explainability, you can understand not just what might happen, but why, so you can take action.

It's not enough to create dashboards and visualizations. The platform should have the ability to initiate actions. This can take the form of prompting human action through sophisticated alerts or orchestrating events in downstream systems.

To get a holistic view of the business, the BI tool should be able to easily bring together data from hundreds of data sources such as applications and databases. You need to identify key factors in historical data and generate machine-learning models using algorithms.

Practical use of Big Data within a food industry organization

The success of the organization in recent years has been the result of adapting to the new era of Big Data and its ability to adapt analytically as a premise of business intelligence.

The emergence of business intelligence can achieve accurate data extraction and information positioning, and provide the necessary information support for its subsequent decisions, which is also one of the realizations of the core application of big data technology.

Adapting the organization to the optics of the big data era

Within the company, in the last 5 years, particular importance has been given to the actions of automating workflows and refining all processes to improve organizational efficiency and productivity, by identifying areas for process improvements, managing workflows and monitoring performance, synchronizing teams, and optimizing the use of resources.

At the beginning of 2020, the company had various systems implemented to collect and centralize data, but no staff was specifically dedicated or sufficiently oriented to the necessary data mining activities. The analyses were mainly descriptive. The COVID-19 pandemic has raised awareness of the need for predictive and prescriptive analyses, and these analyses have imposed the need for qualified and oriented personnel to lead activities in this regard. Hiring and retaining talent with expertise in big data analytics and data mining techniques is a challenge, highlighting the importance of investing in development and training initiatives.

The company adopted a culture for big data and analytics; hiring, training, and organizing a group of analytics staff; developing the required analytics processes, and ensuring that the appropriate analytics opportunities are identified and explored.

By establishing a Development Department, the company created the framework and established the main pillar for much-needed process and system developments, developments that may seem like a chore to department managers like Sales, Logistics, Operations, and Production and therefore do not give or are not fully able to give the necessary attention to the use of the data at their disposal and its transformation into predictive and prescriptive decision-making tools. It also represented the right place in the organization for what specialists today call a data analyst.

The company adopted a new approach to data processing and information use - Aligning technologies and business strategies with information management. The organization's ability to process information is at the heart of organizational and managerial skills, and strategies are designed to improve information processing ability and the information systems that provide this ability have become formalized and automated.

The key development objectives are: increasing sales through intensive and extensive methods; increasing profitability by personalizing offers and improving customer experience; increasing operational efficiency by optimizing processes and resources; faster and more informed decision-making at the managerial level; anticipating and adapting to changes in the market and customer behavior.

Dealing with big data within the organization

In the organization, we find several sources of information. They span the entire organization and must be closely coordinated. We find information that seems specific to departments, but whose synchronization acquires new meanings and powers, which lead to the optimization of processes and the maximization of results.

The sources and flow of information are represented in a synoptic way, and not processual or cyclical as traditionally expected (Fig. no.3). All of these synoptic connections were developed and automated with the help of the data analyst's general view on the processes, and their full engagement in the development and implementation process.

The dotted lines represent the information circuits developed for the analytical treatment of big data. Transport management uses advanced analytics that translates into automatic route

optimization, or data collected through SFA by the sales agents are transformed automatically into sales opportunities for them to pursue, with numbers to achieve, whether it is sales revenue, number of clients, or number of orders. The BI platform offers a view on production planning and it correlates with the need for materials, thus serving data for the automatic acquisition plan. And, if we refer to production, all the activities and their planning are in line with the sales data and forecast.

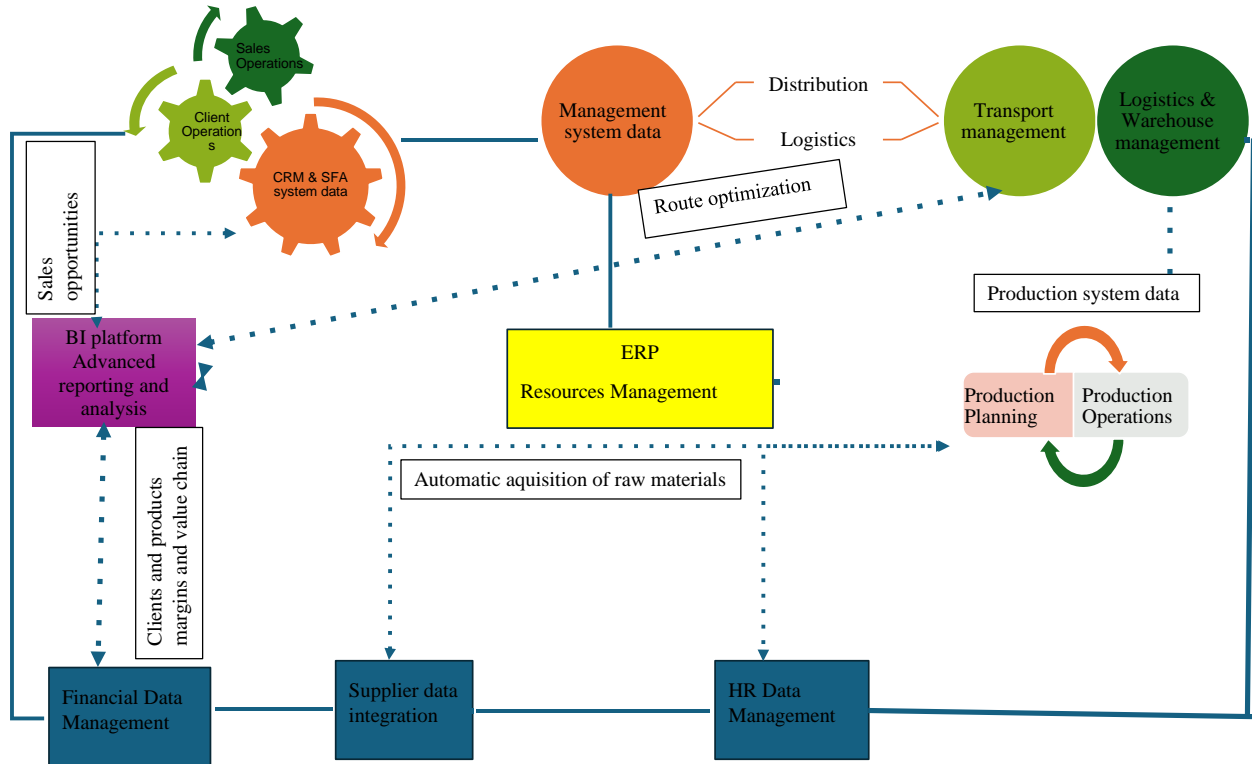


Fig. no. 3 Information source flows

Analysis and forecasting opportunities for the organization

The advent of big data is bringing a new wave of Customer Relationship Management (CRM) strategies to support sales and service personalization. Big data CRM has enabled businesses to become more aggressive in their sales strategy (targeting customer segments, choosing distribution channels, positioning prices, and developing product portfolios).

Big Data has become an indispensable tool in sales and management in the digital age. The amount of data is captured, collected, and processed by the organization through digital sensors, communications, calculations, and storage itself. There are monitoring, control, or tracked KPI systems that are data generators (Fig. no.4). It is a development that has created systems of connection between these data to bring added value and competitive advantage.

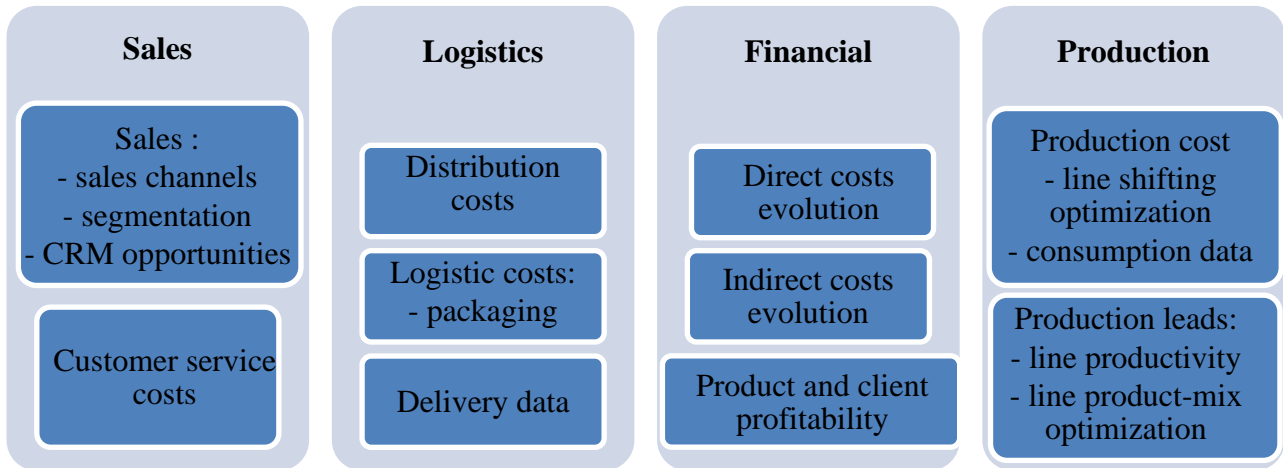


Fig. no. 4 Big data generators within the organization

The information collected through CRM tools is internal and external, and correlated, it aims to show the image of the market (external) and the activities undertaken by the sales force (internal) and to propose opportunities to increase sales (Fig. no.5)

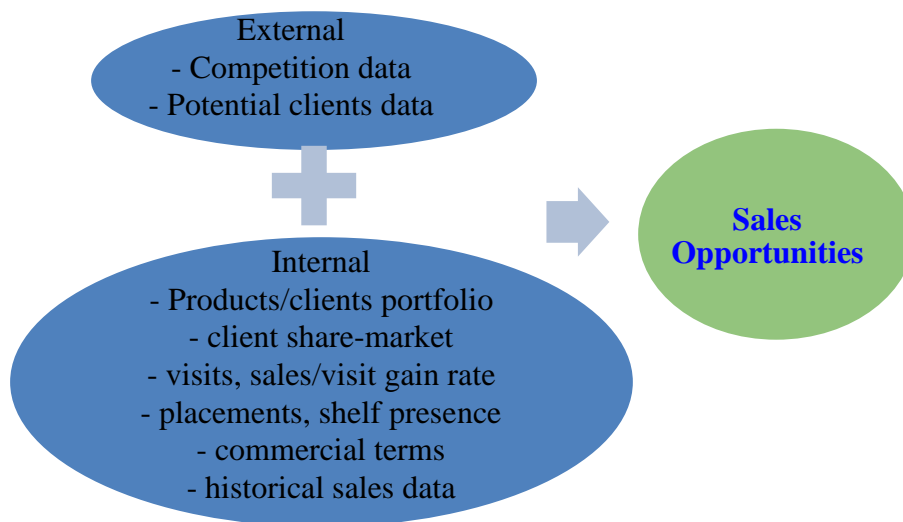


Fig. no. 5 Sources for sales opportunities from data collected through CRM applications

Big Data analysis within the organization takes multiple forms, and varies from one department to another, from specific indicators to general indicators of operational performance.

The organization uses QlikView as its Business Intelligence (BI) software, to collect all data create intuitive visual analytics applications, and transform data into understanding.

Predictive analytics for sales forecast tracks historical sales data and external factors such as market trends and volume status, taken from the data collected through SFA and CRM. On top of that, predictive analytics can generate more accurate forecasts and optimize the allocation of resources related to the sales force or distribution and logistics capabilities, as well as optimal production planning (Fig. no.6).

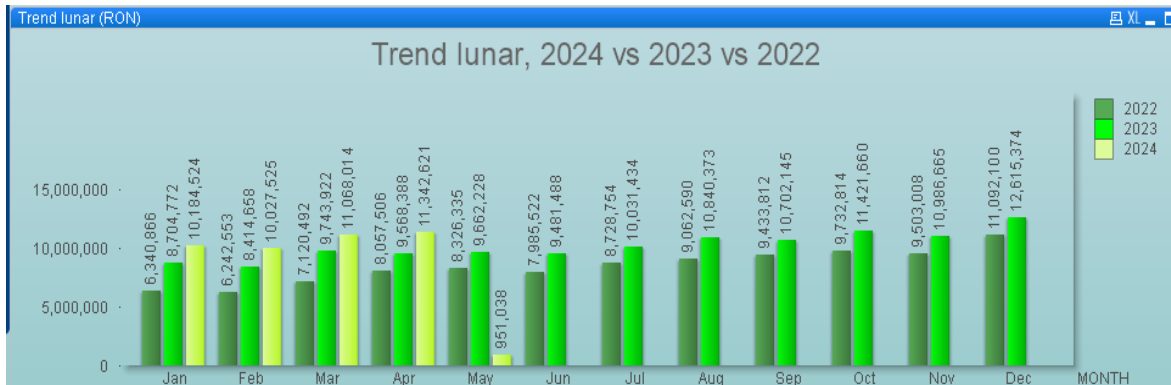


Fig. no. 6 Monthly sales trend

The data most often used in time series forecasting is historical sales data. The obvious appeal of such data is that it is available from the most rudimentary sales systems. Time series methods are commonly used to estimate patterns from past sales data, which are then extrapolated to forecast future demand (Fig. no.7)



Fig. no. 7 Estimated evolution of sales

Customer segmentation and qualification involves differentially identifying customers and tailoring sales strategies to meet their needs. **Customer profiling** has been extended not only to differentiating customers by the type of activity carried out by the customer or by the size of his sales space, but it implies, more importantly, the potential to create value for both the customer and the organization (Fig. no.8). The potential is measured by current sales data, the value chain of the products sold to the customer and sold by him further to the consumer, current market share data, and growth potential.



Fig. no. 8 Customer profiling

Automated recommendation systems – ML represents the main challenges of the development department. These systems track: recommending products, proposing or optimizing pricing strategies, forecasting demand, prioritizing leads for the sales team, orders proposals according to history or according to the growth plan.

In the case of pricing strategies, a view was developed in Qlik that brings data from SAP regarding the recipe, costs, and consumption required according to the product strategy - characteristics, validity period, data from CRM regarding the possible positioning in the market (prices of shelf similar products, market share of products in the same range, market share of main competitors, etc.), and, just as importantly, logistics and distribution data from the Transport Management System (packaging and transport mode, direct costs of distribution automatically calculated according to distance, estimated quantities, means of transport used). All the possible combinations of these data are defined as the value chain of the product and can be iterated quickly to see the possibilities of positioning, the possibilities of correcting some data, and making the optimal decision (Fig. no.9).

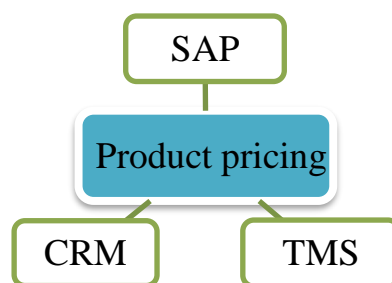


Fig. no.9 Automatic product positioning strategy

Another automation is that of taking 40-45% of customer orders. The system only works on linear products regularly ordered by customers. It only works on series with a maximum dispersion of 30% relative to the arithmetic mean of the orders. The benefits consisted of the automatic update of pre-orders previously entered manually by customer service, the reduction of order taking time,

the effort of operating orders decreases by 30%, the securing of sales, if a customer forgets to place his order one day, the system automatically delivers this smart standard to him.

All data-driven automatic recommendation systems used **data mining techniques to impact sales: the creation of order automation rules, agent visits, market information collection, and sales clustering techniques.** We are looking for learning algorithms that anticipate customer behavior and needs and can drive proactive sales and marketing strategies, suggest upselling opportunities, and calculate customer lifetime value (customer lifetime value prediction).

Integrating big data into sales and operational processes

Big data integration can have a significantly positive impact on sales and operational performance. Big data enables detailed analysis of customer behavior and preferences, making it easier to personalize the offer and increase customer satisfaction. Big data analysis can help identify weak points in operational processes and implement improvements to optimize them, like identifying and eliminating supply chain inefficiencies can reduce operational costs and improve delivery times.



Fig. no. 10. Sales Intelligence platform: system architecture integrating a data mining engine (Massaro et al., 2018, p.41)

A business model is a non-linear model that can be constructed appropriately through the integration of the different processing phases of the data mining (Linoff and Berry, 2011), and an accurate analysis of the market model associated with customers (Buttle and Maklan, 2019). For this reason, a complete system information like the one used by this organization can provide a business model that should be able to integrate, meaning organize, and create the links to connect when useful, all the data of the enterprise resource planning – ERP – platform.

After connecting all the systems and all the databases, the challenge remaining is to create well algorithm-based data mining predicting sales either through ML or through AI. The company is trying now to develop an algorithm that forecasts the daily sales, automatically sends the optimal production orders, and optimizes the transportation routes each day. Sell-production logistics should be an automated order machine that should intervene at any moment, and that should do another iteration when needed (production line faults that cause delays, logistics resources issues).

Conclusions

Big data analytics is nowadays an all-organization, which requires full management attention and support. It has to be recognized as a continuous process keeping the company awake. Within this process, the company's employees will play a significant role, because they will be the ones who have to initiate and implement sales strategies.

Data analysts play a crucial role in today's data-driven business environment. They can interpret and make sense of large datasets, and they can put into practice the view that they or the managers have on this data verse of machine learning, sales algorithms, and data collection. Data analysts can uncover insights and trends that help businesses make informed decisions.

The development and alignment of the people, processes, and data are the premises for the company's success. Big data analytics and reports provide valuable information to decision-makers, guiding them in strategy formulation, resource allocation, and risk management. As technologies become more powerful, larger data sets can be analyzed which in turn will increase predictability.

Challenges remain regarding ethical considerations and data privacy, on the one hand, integrating unstructured data into the organization's systems and keeping up with the development of AI and ML systems.

The integration of big data and data mining techniques in sales management represents a premise for the organization that seeks to obtain a competitive advantage in today's dynamic business environment, where direct costs can no longer be differentiated so much, and the key to success is the simultaneous identification of what is most efficient to produce, where and to whom, and have the analytical ability to see changes as fast as information data.

The big data use in sales management is in a still emerging, relatively unexplored field of science, if we consider the development of capabilities to use AI in recent years. The paper contributes to the collection of information on the role of big data analysis in BI and contributes to the understanding of the effects of information technology on BI. The findings could be used as best practices for understanding the industry and increasing decision-making efficiency and productivity by management and business stakeholders in developing plans to use big data analytics.

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