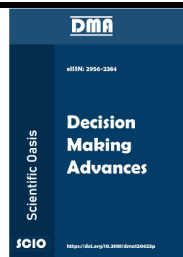




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Developing a Sales Dashboard with Power BI – A Case Study in a Pharmaceutical Company

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ABSTRACT

A dashboard is a steering tool for data-driven decision-making and a lever for innovation in the pharmaceutical industry. It makes it possible to integrate relevant performance measurement indicators, chosen according to the objectives to be achieved and according to specific criteria. In this context, our work is inscribed, which aims to develop a dashboard for the sales department of a pharmaceutical company. The choice of this tool is motivated by its importance and the strategic challenge it presents for companies today. The implementation of this dashboard will be broken down into four phases. First, we collect sales department sales and develop the data marts. Then, to generate the data model, we have to import the database into Power BI (Microsoft Power Business Intelligent). We select the adequate KPIs (Key Performance Indicators) to create the interactive sales dashboard. This dashboard allows the decision makers to analyze and visualize data, moving from traditional sales data storage to big data analytics. Based on this visualization tool, the sales manager can propose potential improvements and essential investments and develop the management review to be presented as an annual report. This report is important for managing and monitoring pharmaceutical activities. Existing data are used and visualized to target the goals of decision-makers.

1. Introduction

The pharmaceutical industry is the economic sector that includes the research, manufacture and marketing of medicinal products for human or veterinary medicine. This activity is carried out by pharmaceutical laboratories and biotechnology companies and remains a key sector, and an important growth engine of the global economy.

According to an article published by Arab International Bank of Tunisia [1], the pharmaceutical profession in Tunisia has passed from the hands of French pharmacists to Tunisians since the beginning of independence, particularly in positions of responsibility in the sector, as well as hospitals

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and pharmacies. From 1957, the departure of pharmacists and representatives of foreign laboratories responsible for the importation and distribution of medicines in Tunisia led to the definition of new prerogatives of the Pharmacy Central Tunisia (PCT), which was responsible for opening drug depots called "pharmaceutical agencies" in towns and cities without pharmacies, and for ensuring the importation of medicines. The Tunisian pharmaceutical industry is marked in 1990 by the privatization of the sector which contributes to its development. The coverage of market needs increased from 14% to 49% in 2013.

The Tunisian drug market is divided into two segments:

- A hospital sector marked by the predominance of medicines produced in Tunisia and whose distribution to public structures is exclusively ensured by the Central Pharmacy;
- A pharmacy sector whose distribution is monopolized by the PCT only at the level of imported products and only at the level of distribution to wholesalers.

For this companies operate in a highly competitive and constantly changing environment. Pharmaceutical companies, towards which drug regulatory and control structures are increasingly demanding, are not spared, and are now obliged to multiply efforts in order to achieve objectives, maintain their positioning and ensure their competitiveness. Thus, evaluating, measuring and improving performance is crucial to develop and survive. The performance of a company thus expresses the degree to which the objectives set have been achieved.

Therefore, to improve this performance, the pharmaceutical laboratories must have a powerful measurement, monitoring and decision making tool to ensure rigorous management aimed at directing decisions towards preset objectives. The first step to improving a company's performance is to study its present situation. Managers need a lot of effort to measure the performance of their current position. The biggest challenge is managing data to create effective measurement systems. One of the most common solutions is to create a dashboard. It is defined as "a relatively small collection of key performance indicators and underlying performance drivers that reflect both short-term and long-term benefits that should be viewed collectively across an organization." [2]. Thus, some studies in the literature focused on developing dashboards in the context of pharmaceutical industry [3, 4]. In fact, performance dashboards aggregate data collected from different sources in your company and present it to stakeholders in different views to help you reach your goals.

In fact, KPI selection is a critical step in developing value-adding dashboard performance [5, 6]. Choosing KPIs based on business goals is very important [7]. Power BI (Business Intelligence) is one of the data visualization software affiliated with Microsoft that provides business analysis services.

Several works were presented in the literature in order to design, create and implement dashboards in different fields, such as Production [8]. For more information on dashboard visualization and user his properties, interested readers can refer to the full review suggested by [9].

Though some work has been done in the literature on the implementation of dashboards in the pharmaceutical sector to propose key indicators and develop dashboards in the pharmaceutical sector [3, 4, 8, 10]. Particularly, we can cite papers focusing on studying sales performance and predictions in pharmaceutical companies as [11, 12]. In the same industrial context, predictive models and forecasting methods are proposed in [13, 14, 15, 16] to improve sales performance.

The main struggle in selecting the appropriate indicators is related to guaranteeing a compromise between completeness and the feasibility of making an efficient monitoring of these indicators. In general, dashboards in pharmaceutical industry are considered in managing productivity and workload, or controlling costs [17, 18].

A pharmaceutical company can benefit from visualizing his KPIs via a dashboard, especially when setting future improvement strategies. Therefore, the purpose of this study is to design and develop an interactive dashboard via Power BI for the sales department of a pharmaceutical laboratory.

A dashboard is considered a visual display of KPIs that provides a view of overall business performance, and can present integrated data from multiple sources in an integrated and interactive manner [19]. This research is based on available historical and real-time data and information. Once the KPIs have been identified, they should be used to create dashboards for sales performance system level visualization and monitoring. This article is organized as follows. Section 2 presents the research methodology used in this work. Section 3 presents results and discussion, and finally Section 4 presents conclusions.

2. Research Methodology

2.1. Data collection

In this study, the collected data belong to the sales department of a Tunisian pharmaceutical company. For privacy reasons, the company name is not published. Collected data includes all general information used in sales and his KPIs. The data collected is essential for the development of sales reports and sales monitoring.

According to the sales manager, the implemented dashboard must fulfill the following requirements:

- Outline the actual situation,
- Know its position on the market,
- Know the local and foreign market through its network of customers,
- Promote internal communication.

The essential element in the implementation of a dashboard undoubtedly lies in the choice of performance indicators to be displayed. They must be relevant in order to allow the decision maker to properly manage and limit the risk in decision making.

Before proceeding with the selection, we must define our scope of work. Indeed, our workspace is the sales department, but due to lack of data and time constraints, it is impossible to track the entire service. For this we will focus on sales.

By referring to the objectives set above and based on a participatory approach, we were able to list the performance indicators that we will take into account in the development of our dashboard. Moreover, the adequate KPIs are nominated as presented in Table 1.

Table 1

The considered Sales KPIs

Turnover	The turnover / customer	Which will allow us to have an overview on the most profitable and least profitable customers.
	The turnover / product category	Which will make it possible to see which are the best-selling product categories
	The turnover / products	Which will allow to visualize the best products
	The turnover / local and export sales	Which will evaluate local and export sales
	The turnover / region	Allows to visualize the regions that make the strength of the company
Rate of evolution of overall turnover	Rate of change = (turnover year N- turnover year N-1)/ turnover year N-1	This indicator will confirm whether the company is growing or decreasing.
Turnover rate by region	(Turnover year N of region X- Turnover year N-1 of region X)/ Turnover year N-1 of region X	It makes it possible to compare the turnover made in a region of a year N compared to a year N-1

For this study, under the authority of the company, we will extract the necessary data from the company software (ERP system, Enterprise Resource Planning) and the IQVIA (IMS Health Quintiles and VIA) as shown in Figure 1.

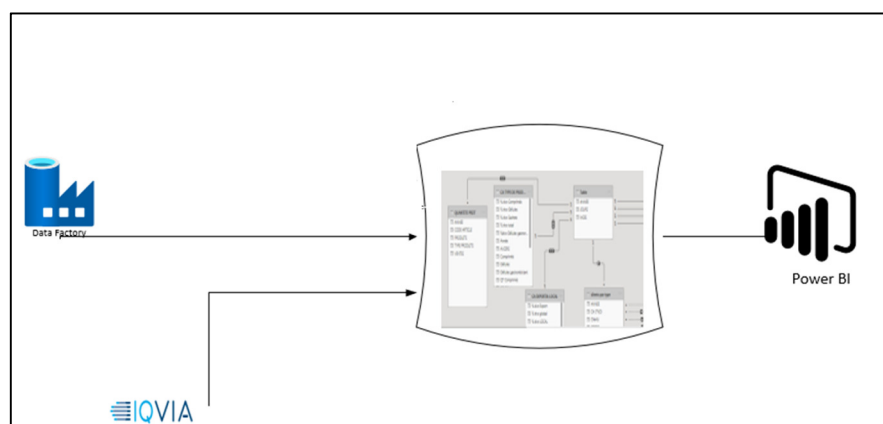


Fig. 1. Data Extraction

2.2. Methodology of data analysis

The sales manager selects Power BI as an vital tool to visualize the data from. The data collection's flow is presented in Figure 2. It also shows how the ETL (Extract-transform-load) is used for analysis, and topic cleaning. A coded list of concepts has been developed to characterize KPIs in the pharmaceutical industry. Then, the categorized data marts are collected to identify the new relationships and themes. Analysis was performed to define the relationship between headings and subheadings using the data model. This is a common technique used for databases. A data model can reduce the steps of complex coding routines and their duration. Lastly, the sales manager will receive the results for verification and certification.

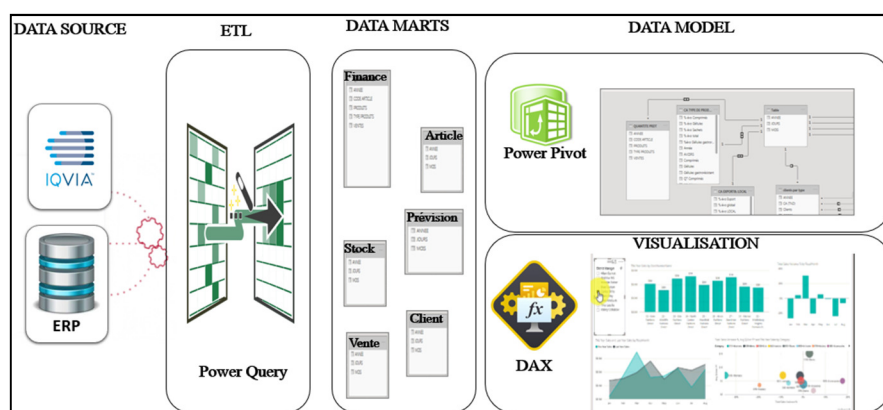


Fig. 2. Summary of the Data Model using Power BI

3. Discussion and results analysis

Generally, we use Microsoft Power BI to visualize data and analyze information. Furthermore, this tool is used to make several dashboard views based on various KPIs related to manufacturing departments.

We present in Figure 2 a developed interactive dashboard view that summarizes the carefully chosen KPIs through the sales department. The KPIs shown in this dashboard can be filtered by date, article, and clients. For additional views of KPIs, Figure 3 shows an example of a subset of KPIs, namely Turnover and Rate of evolution of overall turnover and Turnover rate by region. From the displayed

results, we can conclude that the established dashboard is an interactive tool that supports decision makers in managing their process.

Usually, sales activities comprised drugs sales in the enterprise. Nevertheless, with the increase information's complexity and diversity, sales departments contain various fields beyond the turnover.



Fig. 3. Interactive Dashboard

4. Conclusions

Many studies in the literature show that pharmaceutical sales management can't be ensured without considering and monitoring performance indicators [20]. Dashboards are a tool for continuously monitoring a organization's performance, and metrics are critical to dashboard's success.

In this article, we developed an interactive dashboard using Power BI for the sales department of a pharmaceutical laboratory in Tunisia. First, the required data is imported, collected, then Power Query Editor is used for cleaning. Second, all collected data is organized into data stores and connected via the data model. In fact, connecting the information into one information system as data models, after importing them from different sources, allow a rapid reporting and redundancy reduction on data. Lastly, the use of Power BI is necessary to visualize the selected KPIs. To conclude, the obtained dashboard is as a powerful tool for sales managers, supporting them through their sales process monitoring, to ensure better performance.

As perspectives, several extensions can be envisaged, it is essentially a question of setting up an interfacing between the IQVIA, ERP and the POWER BI software, and it would also be interesting to duplicate this work of setting up the dashboard by selecting the right indicators to harmonize work and help decision making.

Conflict of interest

The authors declare no conflicts of interest.

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