

Process Improvement: A Key Function for Enterprises and their Value Delivery

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Abstract

This work intends to discuss process improvement as a source of management value. It involves the redesign of an important process of the supply chain (stock's management). This research aims at improving the current process in a company, to take full advantage from the firm's ERP (Enterprise Resource Planning). The DMAIC method (Define-Measure-Analyze-Improve-Control) is systematically applied, and new data emerge from the tests made. The improved process will reduce the execution time as well as the number of actors and amount of information outside the system.

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Introduction

This work aims to study a process design challenge in a Portuguese enterprise, by reviewing its stocks' process. Large amounts of stock are considered a waste by companies, leading managers in recent decades to focus on improving the efficiency of stock they have in their warehouses [1].

2. Continuous improvement of business processes;
3. Comparison between current process and improved process.

Trends in Data Management

Organizations have become more dependent on IT and, as a result, they have accumulated a wealth of data that has been traditionally

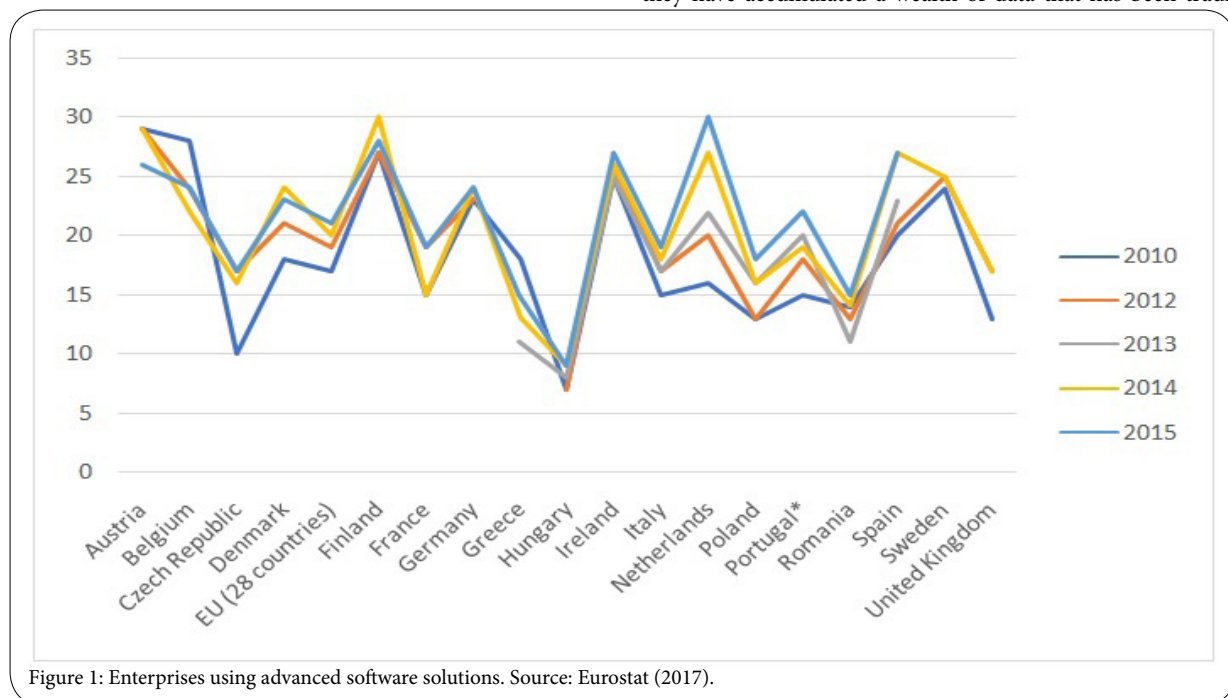


Figure 1: Enterprises using advanced software solutions. Source: Eurostat (2017).

This case aims to compare the efficiency of the process in its current practice with a new improved proposal. The process currently uses intermediate processes (in Excel) instead of being entirely done in the company's ERP (Enterprise Resource Planning system). As SAP has been the global leader in the ERP systems market for a long time, how can companies still use intermediate processes outside of an ERP? Several empirical studies have studied this issue [2]. Thus, the following areas were considered for this work:

1. Business process research and process design;

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underutilized. As IoT (internet of things) connects tools and employees to the internet, this data generation is set to grow exponentially.

By employing analytical tools, organizations can begin to use these data to make accurate predictions that form the basis of a more intelligent approach to business strategy [3]. As more devices and products become connected to the internet, more data can be automatically funneled. Harnessing these data could prove beneficial across any industry. With businesses increasingly operating in a multichannel world, using technology that understands the situation will begin to have a real impact on performance.

Figure 1 shows how is Portugal regarding the capture and monitoring of data from sources such as ERP, CRM and social networks. This is increasingly relevant today because research areas such as process improvement and data analytics nurture from it.

We can observe that in Portugal, from 2010 until 2015, the capture and mining of data through those tools has increased. However comparing it with Netherlands, Finland, Ireland and Germany, we see that much more can be done. According to data from the National Institute of Statistics (INE) in Portugal, 70% of companies have online presence, either with a simple webpage or with a global digital strategy. But the percentage related to cloud ERP and smart data analysis is much lower.

In this context, “companies are looking for more experts in this area”, said Sofia Montalvo head of digital marketing and e-commerce at Michael Page [4]. In the case of soft skills in the digital area, analytical thinking (57%), high communication capacity (52%), creativity (52%), teamwork (50%), pro-activity and passion (48%), trained critical opinion (44%) and previous experience in digital initiatives (26%) are valued.

Importance of Business Processes

According to Laudon and Laudon [5], a business process is a set of logically related tasks to produce specific business results, as well as the mechanism as they are organized and directed. According to the Association of Business Process Management Professionals (ABPMP), a business process is an integration of activities and behaviors, performed by people or machines, to achieve one or more outputs. Business processes can be subdivided into three types:

1. Primary processes: typically internal and responsible for adding value to the product. They are usually considered first-rate processes, as they represent the essential activities of the organization to fulfill its mission. They can flow through various functional areas, giving a complete view of the value creation chain. Examples are the dissemination of new products, the sales process and the after sales process (in these cases, contact with the customer is important);
2. Supporting processes: These serve not only to support primary processes, but also to support other support processes. The main difference lies in delivering value. If primary processes deliver value directly to customers, support processes deliver value to other processes. Supporting processes can be strategic for the business as they increase their ability to perform primary processes. Examples are computing, human resources, among others;
3. Management processes: have the objective of measuring, monitoring, controlling the activity and managing the present

and future of the organization. Like support processes, they do not deliver value directly to the customer, but are important in ensuring that the organization meets its objectives. One example is management control, a function that measures and monitors company data, making it available to management for decisions that impact on the future of the organization.

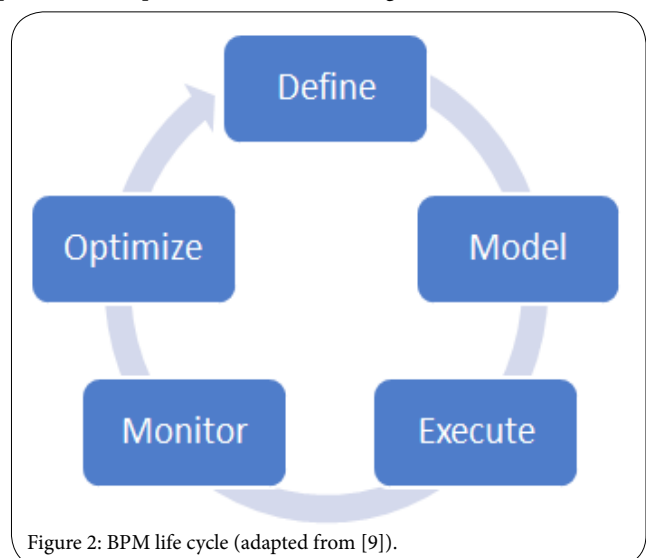
Processes are becoming increasingly important because they highlight value chains, eventual problems and relationships which stand out in process design/mapping.

BPM (Business Process Management)

According to ABPMP [6], BPM is a management area, which integrates organizational objectives, focusing on processes that cut across the various organizational areas and positions. For Hammer [7], BPM is a comprehensive system for transforming organizations, based on a set of ideas on organizational performance.

The history of BPM is divided into three periods [8]: 1) early twentieth century, by Taylor's principles focused on scientific management where was measured the ability of each worker to improve their performance (producing more at lower costs); 2) 50's, with works developed focusing on the management of statistical process control; and 3) recently, giving priority to the optimization and redesign of business processes as a means of organizational transformation.

According to ABPMP [6], business processes must be managed based on a cycle that maintains their integrity and allows their transformation, that is, a feedback loop to ensure that they are aligned with the business strategy. To do so, the functions - define, model, execute, monitor and optimize - are phases of the BPM life cycle (for processes with predictable behavior) - Figure 2.



Define: identify the existing process and create an evaluation plan;

Model: While the new process is still on paper, the project team can test various changes to the original plan and evaluate all combinations of variables;

Execute: after the defined model the project team creates, improves or acquires an application that executes the process;

Monitor: This step tracks the processes by measuring their performance;

Optimize: Once performance is recorded, the project team identifies opportunities for improvement (in terms of cost, speed, etc.).

Maturity Models for Process Improvement

BPMM is a conceptual model based on best practices applied to a domain [10], i.e. applied to a set of activities where the people involved share interests (such as marketing, banking, assembly lines, finance). BPMM describes the essential elements of effective processes for one or more selected domains. Such elements provide a basis for the quantitative control of the process, fundamental for continuous process improvement.

There are other maturity models, such as ISO/TEC [11] or Capability Maturity Model Integration (CMMI) for software, deriving significant benefits over the years. These models have been mainly used in IS projects. For many organizations (such as banks, pharmacies, retail, equipment manufacturers, consulting services) such maturity models address about 10-20% of their business.

BPMM describes a path of constant improvement that guides organizations from moving from inconsistent to disciplined processes. Includes several steps, where enhancements from each step provide a foundation for creating improvements in the next step. The approach helps to identify process deficiencies and drives improvements through logical and incremental steps. A maturity level is an evolutionary strategy defined as process improvement. Reaching each level establishes a different component in the process, resulting in increased responsiveness of the organization itself.

On the other hand, the reduction in process variation leads to an improvement that allows centralizing the process and ensuring accuracy and reliability. For example, the average delivery time for a product is five days, but there is a possible variation between two and eight days. This wide variation can lead to customer confidence breakdown and a loss in sales. This is one of the goals of the DMAIC method, the reduction of the variation of the negative effects of the process (Figure 3).

A Case Study in Portugal - Stocks' Management

According to Slack et al. [13], stock is the accumulated or stored of the transformed resources of an operation. For Kumar and Suresh [14], stock generally refers to materials in stock. Stock represents items of the manufacturing process that are available for sale, or that are in the form of unused materials. For Chiavenato [15] stock is the composition of raw materials, products in process, semi-finished products and finished products that, although not used at a given moment, need to exist in function of future needs. For this project, we will talk about stock as all finished products that the company stores in its delegations, to serve the customer daily. As this is not a production company, but a product marketing company, there is no product creation process.

Good scientific stock control brings benefits to the company, such as:

1. improve the daily relationship with the customer due to the timely delivery of goods and services [14];
2. better deal with delays in the supply network. Good safety stock management reduces the impact of unforeseen events;
3. eliminate the possibility of duplicate orders [13];
4. provide economies of scale [15] and expand bargaining capacity;
5. make effective use of company equity [13]. Effective management of business needs avoids the purchase of unnecessary products.

The key question is how managers decide which levels of control apply to different stock products [13]. The most common method of doing so is the ABC stock classification, which relies on the Pareto principle to distinguish stock types [16]. In this approach, the classification of existing inventory is based on consumption and annual value of products. Obtaining the amount of inventory products consumed during the year multiplies by the unit cost to obtain the annual usage cost. The products are then organized in descending order of this cost. The analysis is based on a graph based on the cumulative use of cost of consumption.

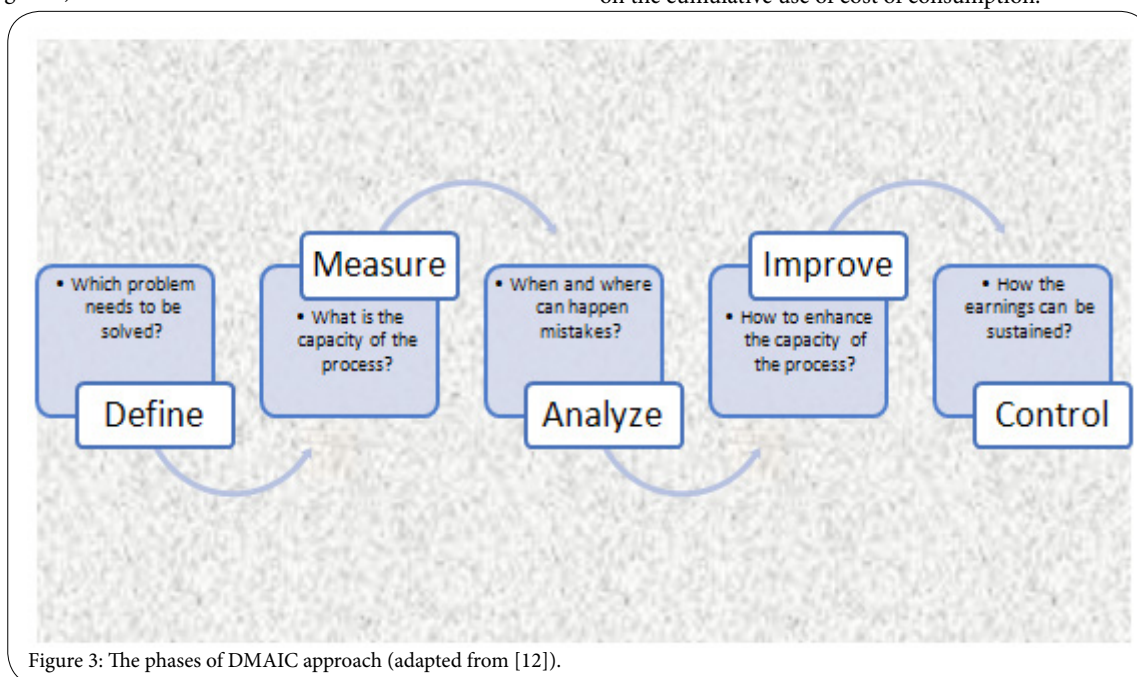


Figure 3: The phases of DMAIC approach (adapted from [12]).

Processes redesign

This section presents the solution that best fits the real needs of the company in the process under study. After researching and analyzing the solutions that ERP - SAP offers, in the stock replenishment, it was possible to create a model that combines MM (Material Management) transactions with PP (Production Planning) transactions - Figure 4. ERP functions include the following modules: Logistics (green) - such as sales and distribution (SD), materials management (MM), production planning (PP), quality management (QM) and plant maintenance (PM); Human resource management (in yellow); Functional applications (in purple); and Finance (in red). In the MM (Material Management) module, the ERP has a 'consumption' storage field for each of its database products.

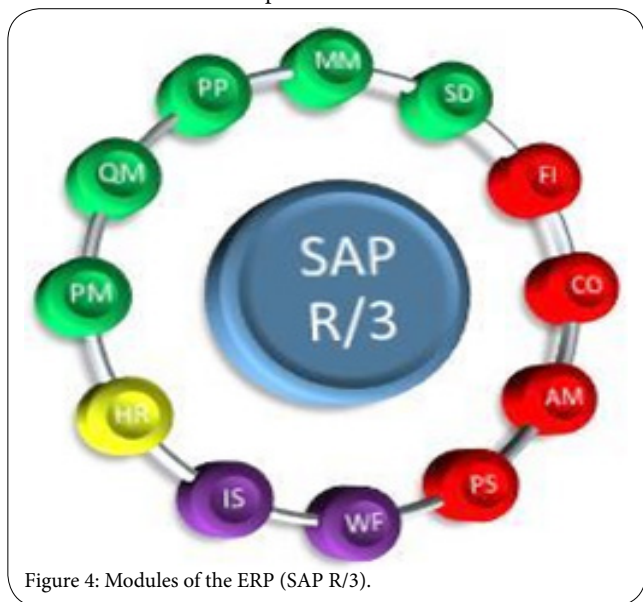


Figure 4: Modules of the ERP (SAP R/3).

The first phase allows the procurement and logistics coordinator to prioritize the most important materials for the daily activity of each of the company's 11 delegations. In the second phase of the proposed process, the method used by the supply and logistics coordinator to parameterize the material codes in the ERP database, automatically and independently of the user, to calculate: the replenishment point, stock of safety, and needs for subsequent periods. The third phase presents the tasks performed by the procurement and logistics employee, from forecasting needs to sending the purchase order to the supplier.

Comparing the current process, with a maturity analysis for a new process that better uses the whole ERP facilities, Table 1 shows this effectiveness:

	Current process	Proposed process
Documents in the process	157 documents	0 documents
Involved people	7 people	2 people
Hours spent	468 hours/year	226 hours/year

Table 1: Comparative indicators: current process vs. improved process.

Thus, it can be concluded that the proposed process will have fewer human resources, as well as the elimination of the flow of documents circulating among the various departments of the company. And the most important factor is reducing the time spent on stock replenishment to less than half of the current process.

Conclusion

In retrospect of the work developed, we highlight some implications of the contribution of each point of this project. It was initially studied the theme business processes, in its management and continuous improvement aspects. The BPMM method whose good practices were useful for the creation of a methodology that responded to the need to improve the stock replenishment process of the company under study was mentioned. Problems such as the number of documents generated circulating during the process, the number of actors and the number of working hours to complete the process were the main factors that motivated the change.

The DMAIC method was systematically applied in this project, from which new data emerged that rethought the result involved. Part of these data was obtained based on the tests made in the company's ERP. Aspects such as identifying products and services to be purchased and customer requirements were key in building the tasks to be performed in the new process. The proposed process, once implemented, greatly reduces the execution time and the number of actors as well as the amount of information circulating outside the system.

Competing Interests

The authors declare that they have no competing interests.

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