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The Subject of the Thesis

The Effectiveness of Enterprise Resource Planning In Strategic Performance Measurement

A Case Study on a Selected Sample

Thesis presented as part of requirements for acquiring PhD in management sciences

Major: Strategic Management

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DEDICATION

I dedicate this work to my parents, whose unwavering love, sacrifices, and belief in my abilities has been the driving force behind my academic pursuits. Your endless encouragement and support have shaped me into the person I am today. This dissertation is a tribute to your boundless dedication and the values you have instilled in me.

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Lastly, I dedicate this work to all those who strive for knowledge and understanding in pursuit of a better world. May this dissertation contribute, albeit modestly, to the collective endeavor of advancing human understanding and improving our society.

ABSTRACT

This study examines the effectiveness of Enterprise Resource Planning (ERP) systems in measuring strategic performance using the balanced scorecard model. The shift from an industrial economy to a knowledge-based economy emphasizes the need for robust tools to measure intangible assets and strategic performance. However, most ERP systems focus on transactional processes, providing raw data rather than insightful strategic indicators.

Using case studies of two organizations, the research found that while ERP systems excel at managing operational data, they are ineffective in delivering strategic insights. The study's main hypothesis—ERP systems are ineffective in measuring strategic performance—was confirmed, as the systems lack tools to develop key performance indicators (KPIs) and fail to fully utilize their vast data potential. Sub-hypotheses revealed ERP inefficiencies in tracking non-financial metrics.

Key recommendations include enhancing ERP integration for performance measurement, training management to better exploit ERP data, and incorporating AI tools for automated performance analysis. The study also suggests future research to refine development and growth indicators and cost metrics for more comprehensive performance management.

الملخص:

تتناول هذه الدراسة فعالية أنظمة تخطيط موارد المؤسسة (ERP) في قياس الأداء الاستراتيجي باستخدام نموذج بطاقة الأداء المتوازن. يُبرز الانتقال من الاقتصاد الصناعي إلى الاقتصاد المعرفي الحاجة إلى أدوات قوية لقياس الأصول غير الملموسة والأداء الاستراتيجي. ومع ذلك، تركز معظم أنظمة ERP على العمليات التشغيلية وتوفير البيانات الخام بدلاً من تقديم مؤشرات استراتيجية مفيدة.

اعتمادًا على دراسات حالة لمنظمتين، وجدت الدراسة أن أنظمة ERP تُدير البيانات التشغيلية بكفاءة، لكنها غير فعّالة في تقديم رؤى استراتيجية. وتم تأكيد الفرضية الرئيسية للدراسة—أن أنظمة ERP غير فعّالة في قياس الأداء الاستراتيجي—بسبب افتقارها إلى أدوات تطوير مؤشرات الأداء الرئيسية (KPIs) وعدم استغلالها الكامل للبيانات الضخمة المتاحة. وكشفت الفرضيات الفرعية عن قصور في تتبع مؤشرات الأداء غير المالي.

تشمل التوصيات الرئيسية تحسين دمج ERP لقياس الأداء، وتدريب الفرق الإدارية على استغلال بيانات ERP بشكل أفضل، ودمج أدوات الذكاء الاصطناعي لتحليل الأداء تلقائيًا. كما توصي الدراسة بإجراء أبحاث مستقبلية لتطوير مؤشرات النمو والتطوير وكذلك مؤشرات التكاليف لتقييم أشمل للأداء.

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LIST OF ABREVIATIONS

- AI: Artificial Intelligence
- BI: Business Intelligence
- BOM: Bill of Materials
- BSC: Balanced Scorecards
- B2B: Business To Business
- B2C: Business To Customers
- CRM: Customer Relationship Management
- DEP: Department
- ERP: Enterprise Resource Planning
- HR: Human Resources
- HRM: Human Resources Management
- KPI: Key Performance Indicator
- PM: Performance Measurement.
- PVC: Polyvinyl Chloride
- P&L: Profit and Loss Accounts
- QTT: Quantity
- ROI: Return On Investment
- SAP B1: SAP Business One.
- SQL: Structured Query Language

INTRODUCTION AND RESEARCH FRAMEWORK

A-INTRODUCTION AND PROBLEMATIC

Introduction

A study by the Brooklyn Institute in 1982 found that the accounting value represents 62 % of the organization's market value; ten years later, this percentage dropped to 38% to reach 10% in 1999 (Blair, 1996). These developments reflect the increasing importance of intangible assets (Baruch-Lev, 2000). These have become an essential source of value creation at the expense of the material investments that characterized the industrial era from 1850 until 1975.

This transformation from an industrial economy based on physical assets to a knowledge-based economy that relies more on intellectual and knowledge capital imposes on organizations a new reality in which the success and growth of the organization depend on its ability to use and develop all the knowledge assets in order to create value and gain sustainable profitability regarding competition and environment.

In the lack of appropriate tools that allow measuring and managing knowledge assets, it is difficult for the organization to implement its strategy and follow it up effectively. The reliance of traditional leadership systems on financial performance indicators can affect managers' decisions by sacrificing knowledge assets and opportunities for value creation in the long term at the expense of incentives linked to short-term performance; hence, measuring knowledge assets is fundamental and strategically important in all organizations.

In this context, balanced scorecards build tools that focus more on measuring knowledge assets, which balance financial and non-financial performance, future and past performance, and internal and external performance. It is now considered one of the most important tools used in implementing the strategy and following up on its success through measuring strategic performance.

At the same time, the emergence and development of Enterprise resource planning systems (ERP) as an information system that supports all the activities and operations of the organisation at all organizational levels through a single integrated database made it a precious deposit of data that could contain beneficial information for decision making and strategic monitoring.

Being the main framework and information system that supports all business transactions across all management functions, the performance of management processes and activities now depends on the quality of the ERP, the capability of its features and the quality of the implementation in the organization.

These facts lead us to investigate the question of the ability of ERP to support performance measurement processes; in another way, in this study, we will examine whether ERP systems enhance decision-making with insightful information within the organization or support the basic transactions of the business.

Hypothesis of the study:

During tenure as a business analyst within an industrial organization experiencing difficulties in product sales, delivery lead time emerged as a critical factor influencing customer satisfaction. Extended delivery delays were identified as a primary reason for customers' reluctance to purchase the organization's products. Despite the Enterprise Resource Planning (ERP) system containing comprehensive data on each order's workflow—including the order date, target delivery date, and final delivery date—information that could facilitate the development of key performance indicators (KPIs) to monitor delivery performance—neither senior management nor the management control team had established any KPIs to track delivery times, despite their strategic significance.

This observation led to exploring the potential of ERP data as a resource for generating strategic indicators. The ERP system was frequently noted to contain extensive strategic value data for measuring and monitoring performance. However, this data was not effectively utilized to develop meaningful indicators to enhance decision-making processes and improve operational efficiency. Hence, the hypothesis for this study is:

The enterprise resource planning system is ineffective in measuring strategic performance since it does not utilise all the data it possesses to calculate strategic importance indicators (based on the balanced scorecard model.

This Main hypothesis is based on those four sub-hypotheses:

- ERP systems are ineffective in measuring financial performance.
- ERP systems are ineffective in measuring customer's performance.
- ERP systems are ineffective in measuring operational performance.
- ERP systems are ineffective in measuring organizational growth and learning performance.

Problematic of the study

From the previous hypothesis, the research problem can be summarized in the following question.

How effective is the Enterprise Resource Planning system in measuring strategic performance based on the balanced scorecard model in the organization under study?

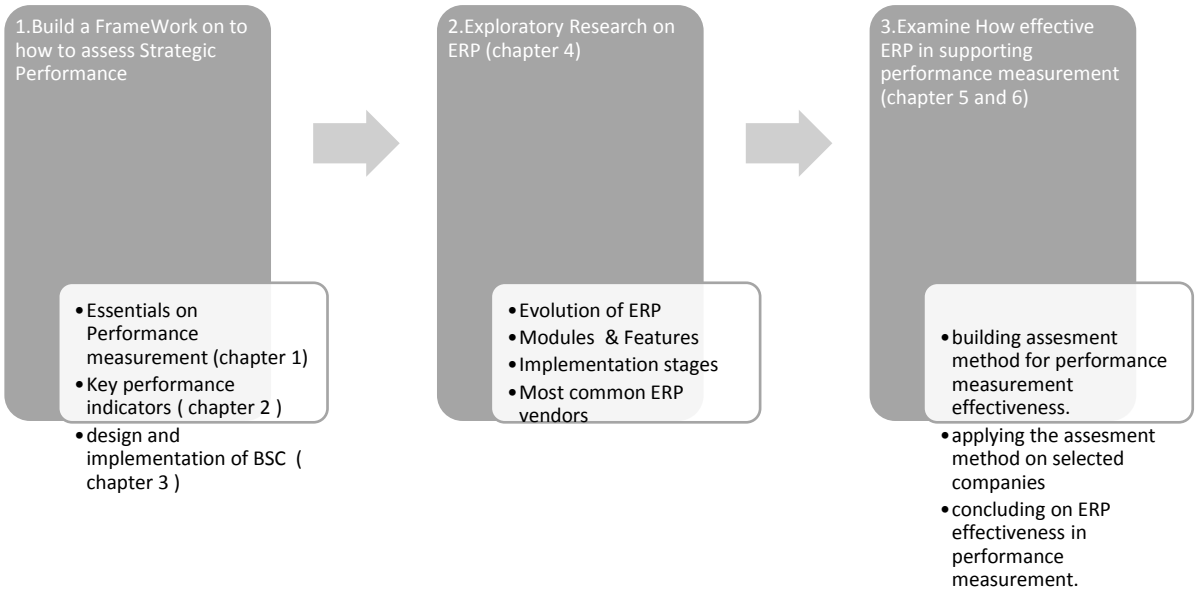
Using the Balanced Scorecards model to structure the strategic performance of the organizations leads to four sub-problematic questions:

- How effective is an ERP system in measuring financial performance?
- How effective is an ERP system in measuring customer performance?
- How effective is an ERP system in measuring the performance of internal operations?
- How effective is an ERP system in measuring organizational growth and learning performance?

Objectives and importance of the study

The following figure shows the objectives of our study:

Figure 1 – The objectives of the study



In addition to the objectives that outline the key milestones of this research, the study aims to achieve the following goals:

- To identify the factors contributing to the effectiveness and ineffectiveness of the Enterprise Resource Planning (ERP) system in measuring strategic performance within the organizations under investigation.
- To assess the level of maturity and the quality of ERP implementation in the selected companies.
- To propose actionable recommendations for enhancing performance measurement processes..

The importance of the study is addressed individually for each objective, highlighting its relevance and contribution to the field:

- **From the academic perspective**

From an academic perspective, this study offers a significant opportunity to examine the complexities associated with performance measurement and monitoring in greater depth. It aims to investigate the underlying factors contributing to the suboptimal utilisation of the capabilities provided by enterprise resource planning systems. Additionally, this research enriches the university's library by contributing valuable scholarly material on this emerging topic.

- **For the selected organizations:**

For the selected organizations, developing strategic maps will facilitate establishing a unified vision and formulating coherent strategies. That process will also train individuals within these organizations to use this tool, empowering them to participate actively in strategic planning. Additionally, the study will offer valuable feedback on the effectiveness of the implemented enterprise resource planning (ERP) system, particularly in the area of performance measurement.

Furthermore, this research aims to raise awareness among the management teams of these organizations regarding the importance of investing in and prioritizing the ERP system. By emphasizing its potential benefits, the study seeks to encourage a greater focus on optimizing the use of ERP systems to enhance organizational performance and strategic outcomes.

- **For controlling managers, students and financial and business analysts and planners:**

The theoretical section of this study serves as an illustrative guide on the design and implementation of The Balanced Scorecard. It also highlights the critical role of the information systems management team in developing and maintaining a Balanced Scorecard.

- **Justifications for Choosing This Topic**

The choice of this research topic is justified by its alignment with the academic focus of both master's and doctoral studies. Specifically, performance measurement and strategic balanced scorecard bridges the gap between the significant areas of study in the master's programme (management control) and the doctoral programme (strategic management). Additionally, the research reflects a strong interest in information technologies and their practical applications within the business domain, further motivating the selection of this topic.

B-PREVIOUS STUDIES

The First study is performance measurement - does ERP systems measure up? (K. Bredmar, 2011).

This study examined and compared the effectiveness of different ERP systems in meeting performance measurement needs (K. Bredmar, 2011).

For the needs and requirements of performance measurement, the study focused on seven areas that the author believes to be relevant for providing quantified information that serves performance measurement and are critical to the business success. These seven areas are :

- **Process and activities:** How can the process and activities in a business be described?
- **Customer and product**: To what extent can the contribution of a single customer or product be analyzed?
- **Quality:** How can ERP systems assess and evaluate the quality of different processes and activities?
- **Financials:** What financial dimensions are treated?
- **Strategic issues:** In what ways are the strategic issues visible in the ERP systems?
- **Employee:** How is the performance of the employees assessed, and how is the intellectual capital managed as an asset?
- **Logical links:** To what extent are the logical links between different parts clear?

The study selected four ERP systems: Oracle, PeopleSoft, SAP, and JD Edwards World.

- **Oracle E-Business Suite**: It is predesigned and developed prior to the needs and wishes of managers who will eventually work with it. E-business Suite is a comprehensive system with several options, but in several areas, it does not meet the needs of modern management control and performance measurement.
- **PeopleSoft** is a collection of predesigned and sold applications with a focus on delivering a flexible solution that makes it adaptable to the needs of management but not fully developed based on management needs.
- **SAP** has several applications that address different processes and activities but also focus on logistics.
- **JD Edwards World.** It does not work with business processes and activities and focuses on products and internal perspectives such as stock, inventory, sales and ordering.

Working on these areas, the researcher used a questionnaire presented to 600 ERP system users. The study concluded that while each system varies in its ability to cover the performance measurement needs of various functions, What prevails for all the systems is their effectiveness and strength in financial and customer indicators. The research found that most ERP systems are weak in tracking non-financial indicators, linking indicators in strategic

maps or dealing with modern management control tools such as value management, activity-based management or process reengineering.

Table 1 - a comparative study on ERP abilities in performance measurement

Questions	Oracle E-Business Suite	PeopleSoft	SAP/R3	JD Edwards One World
Process and activities	Maybe	Maybe	Yes	No
Customer and product	Yes	Yes	Yes	Customer; no products; yes
Quality	No	No	No	No
Financials	Yes, plenty	Yes, plenty	Yes	Yes, traditional
Strategic issues	No	No	No	No
Employee	Yes, not as assets	Yes	Yes	Yes, traditional
Logical links	No	No	No	No

The author presumes that numerous software packages frequently operate as marketing instruments designed to promote their solutions rather than serving as effective responses to managerial needs. Consequently, a noteworthy challenge lies in developing more refined tools that are better tailored to support the specific managers' needs.

Compared to our research, this study shares a similar objective: to evaluate the effectiveness of Enterprise Resource Planning (ERP) systems in performance measurement. However, this study employs a survey methodology, in contrast to the case study approach utilised in our research. The primary distinction lies in the focus of the analysis: this study examines whether the ERP system meets the requirements for performance measurement and management control across seven standardised areas. In contrast, our approach directly assesses the effectiveness of the ERP system based on its capacity to provide data and generate insightful indicators. The table below delineates the key differences between the two studies.

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Table 2- comparison between our study and previous study: does ERP measure up?

The subject of comparison	**Our Study**	**Does ERP measure up?**
Goal of the Study	Effectiveness of ERP in meeting needs of performance measurement.	The same.
Methodology	Interpretivist (Case Studies)	Positivist (Surveys)
Nature of Areas of ERP effectiveness	Specific to each organization according to its balanced scorecards goals and map	Standard areas (7 areas)
Areas of ERP effectiveness	▪ Financial Performance ▪ Customer Performance ▪ Internal Processes Performance ▪ Organization Growth Performance	▪ Process and activities ▪ Customer and product ▪ Quality ▪ Financials ▪ Strategic issues ▪ Employee ▪ Logical links
ERP solutions studied	▪ SAP B1 ▪ Cantor ▪ Sage	▪ SAP R/3 ▪ Oracle ▪ PeopleSoft ▪ JD Edwards World

Source: made by the author

The Second Study: Evaluating the Effects of ERP Systems on Performance and Management Accounting in Organizations (H. Vakilifard et al.2013)

This study did not focus on performance measurement as a primary variable but as a sub-area of the performance and management practices (H. Vakilifard, S. A. Meinagh & M. R. Khataee, 2013). The study instead aims to check whether the ERP systems have increased efficiency and changed management accounting practices. In addition, the study examines whether the accountants are gaining new roles within the organisation due to the ERP implementation.

The survey-based study covers 50 experts in organisations that have implemented ERP systems.

The examined areas include sales, planning, procurement, production, inventory and management accounting. We will focus only on the management accounting unit since the study results in this unit are related to performance measurement.

The hypothesis and results of this study relating to accounting unit are as follows:

1. ***ERP Systems increased performance in accounting:***

   The hypothesis is accepted: ERP made significant improvements in accounting practices:

   - The ERP system has increased flexibility in information generation and acquisition
   - Less time was needed to prepare budgets and reports.
   - Improved accuracy of reports.
   - The new system provides real-time information.

2. ***ERP adopters will experience only minor changes in management accounting function after implementation:***

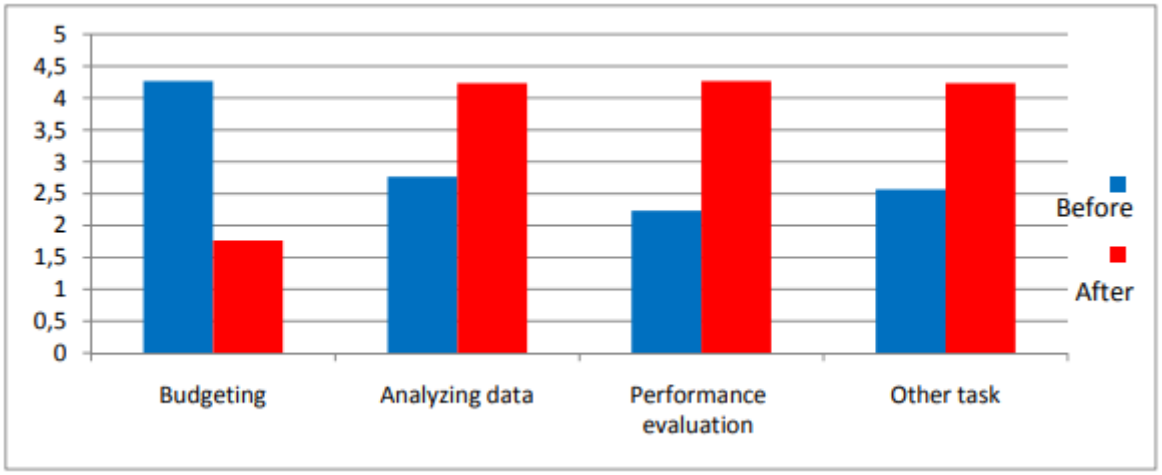
   The hypothesis that ERP adopters will experience only minor changes in the management accounting function post-implementation was rejected. The findings reveal that ERP systems have significantly impacted budgetary processes and reporting mechanisms. Furthermore, implementing these systems has enabled organisations to adopt more sophisticated management accounting tools, including target costing, non-financial key performance indicators (KPIs), benchmarking, and balanced scorecards. That suggests ERP systems play a transformative role in enhancing the scope and functionality of management accounting practices.

3. ***Management accountants' roles and work tasks change after the ERP implementation***

   That was tested by evaluating the time used for each task before and after the ERP implementation. The hypothesis was confirmed again, and the results show that respondents used less time in budgeting and cost accounting. In comparison, more time was devoted to analysing data, measuring performance, and other tasks. The

following figure shows the time used before and after the ERP implementation for each task.

Figure 2 – Study results - Time use for each task



Source: the study paper

Considering that the hypothesis of the research was confirmed, it is important for the organizations to implement ERP systems in order to enhance performance, reduce time to perform routine accounting tasks, spend more time for data analysis and performance measurement. And at the same time implementing ERP system improves accuracy and validity of reports and increases the flexibility and use of information.

The added value of this study is that our study examines directly the ability of ERP systems to support performance measurement by providing needed data and tools. Thus, This study opens a new insight into the indirect positive impact of ERP implementation performance measurement by allowing users to consume less time on daily routine tasks and dedicate more time and energy to performance measurement.

Table 3 - comparison between our study and previous study: ERP impact on accounting?

The subject of comparison	**Our Study**	**This previous study**
Goal of the Study	Effectiveness of ERP in meeting needs of performance measurement.	ERP impact on accounting practices.
Methodology	Interpretivist (Case Studies)	Positivist (Surveys)
Nature of Areas of ERP effectiveness	Specific to each organization according to its balanced scorecards goals and map	Standard units (3 units)
Areas of ERP effectiveness	▪ Financial Performance ▪ Customer Performance ▪ Internal Processes Performance ▪ Organization Growth Performance	▪ Accounting ▪ Management accounting ▪ Accounting tasks
ERP solutions studied	▪ SAP B1 ▪ Cantor ▪ Sage	Not Mentioned

Source: made by the author

The Third Study: The organizational performance impact of ERP systems on selected companies (C. A. Hart & D. R. Snaddon, 2014).

This study intended to find a link between ERP performance and organizational performance (C. A. Hart & D. R. Snaddon, 2014, pp. 14-28).

The study went in two phases; the first phase was exploratory and was conducted with interviews to define the determinants of ERP and organizational performance. Respondents were asked in the first section to rank ERP benefits according to their perceived importance and in the second section to rank success factors for organizational performance.

In the study's second phase, market research was conducted using an e-mail questionnaire survey. The study was conducted on a random sample in South Africa of 79 manufacturing organizations implementing ERP systems.

Note that the Balanced ScoreCard model was used to describe the four axes' ERP benefits and track ERP performance for four years.

This study examined the link between ERP and organizational performance and did not give particular attention to the impact on performance measurement. However, the interview conducted during the study's exploratory phase reveals that performance measurement was ranked among the least critical issues among all organization performance success factors (12 of 14), as shown in the table below.

Table 4 – organizational performance success factors ranked by importance (from most to least critical)

Rank	Critical Success Factor	Vendor 1	Vendor 2	Consultant 1	Consultant 2	Consultant 3	Business User 1	Business User 2	Business User 3	Business User 4	Business User 5	Median	Interquartile Range
1	Top management commitment	2	1	3	1	1	1	1	1	1	2	1.0	0.75
2	Business plan, vision & strategy	1	10	7	2	2	4	2	2	8	1	2.0	4.25
3	Change management	9	2	1	4	4	6	3	3	2	3	3.0	1.75
4	Education and training	6	5	4	5	9	5	5	7	4	8	5.0	1.75
5	Business process re-engineering	4	8	5	3	3	8	4	6	9	13	5.5	4.00
6	ERP team composition	7	7	8	8	7	7	13	4	10	4	7.0	1.00
7	Project management	12	4	11	6	5	10	8	5	5	9	7.0	4.75
8	Effective communication	10	3	2	7	8	9	6	11	3	7	7.0	5.00
9	Minimum customisation	5	6	14	10	14	2	11	12	6	11	10.5	5.75
10	Software development, testing & troubleshooting	11	12	6	11	11	11	12	8	7	11	11.0	2.25
11	ERP package selection	8	13	13	12	10	3	14	9	14	5	11.0	4.75
12	Performance evaluation	13	9	12	9	6	12	10	14	11	14	11.5	3.50
13	IT infrastructure	14	11	9	13	12	13	9	10	13	6	11.5	3.75
14	Appropriate business & legacy systems management	3	14	10	14	13	14	7	13	12	12	12.5	3.25

Source: the study paper

The Fourth Study on ERP effects on management control and decision-making process: (OUAFEK & OUACHERINE, 2020)

This study aims to assess the impact of ERP implementation on Management control and decision-making process (OUAFEK & OUACHERINE, 2020).

Interviews were conducted on 12 employees of two SMBs: CEPRO and CM Consulting. For the General Benefits of ERP systems, the study has found that ERP has:

- Enhanced collaboration, communication and coordination of different departments.
- The information was more reliable and more available
- Saving time and effort and having a clear vision over processes.

For the Management Control part, the study has found that the management control department lacked efficiency because of the absence of tools and information, it was challenging to gather data, and the cost calculations lacked reliability. However, it was found that SAP Business One improved some management control activities, such as cost calculations, resource planning, and control, which positively impacted decision-making.

We did not find substantial material in the study that supports the findings. At the same time, the study focuses only on cost and budget management, giving almost no particular attention to performance measurement. That leads us to say that the study seems to be exploratory in the sense that it intended more to describe the management control features of the ERP systems, such as cost control or budget management, rather than trying to find a significant link or impact between the ERP and management control or performance measurement.

Another thing in the study is that SAP Business One was effective in enabling cost and budget control, which agrees with our conclusion on the software capabilities of SAP Business One.

The Fifth Study: A balanced scorecard-based framework for assessing the strategic impacts of ERP systems (D. Chand, G. Hachey, J. Hunton, V. Owhoso, S. Vasudevan, 2005).

This study aimed to build a framework for the assessing the benefits of ERP implementations using the strategy maps charts inspired by the balanced scorecards. These causal charts are named ERP scorecards in the study (D. Chand, G. Hachey, J. Hunton, V. Owhoso, S. Vasudevan, 2005).

The research was based on a case study of an aircraft engine design and manufacturing business which uses SAP ERP.

The study found that the ERP resulted in many performance improvements. The following table shows the main improvements in each axe of performance.

Table 5 – ERP implementation benefit in the Engine Manufacturing Organization

Process dimension	Customer dimension	Finance dimension	Learning and innovation
Average work stoppage per month	Percent on-time delivery of overhauled engines	Inventory availability rate	Learning from ERP implementation phases
Data Integrity	Percent on-time delivery of spare parts	Engine assembly cost	Implementation knowledge transfer
Internal controls	Customer satisfaction		Training method effectiveness
Data standardization			
Data timeliness			
Data availability			

Source: the study paper

Conclusion on previous studies

While we have seen many studies addressing the variables of ERP, balanced scorecard and organization performance, management control or performance measurement, our research remains unique in that it directly addresses the technical ability of ERP to meet the needs of performance measurement. Rather than working on surveys or interviews, our study aimed to look inside the ERP system to see whether the system supports the key performance indicators with the required data. The interviews in our study were used only to build balanced scorecards according to the industry's specificities and the organization's goals.

Another observation is that almost all studies on ERP include SAP; the reason behind this is that SAP software is currently the ERP market leader and is used by many organizations. We had to include an organization that uses SAP in our case studies. Another observation is that almost all studies on ERP, include SAP, we suggest that the reason behind is that SAP software is currently the ERP market leader and used by many organizations the reason why we had to include an organization that uses SAP among our case studies.

C-PRELIMINARY RESEARCH METHODOLOGY

Research Methodology and Epistemological positioning

This study started from direct observations limited to a single organization and single performance indicator and aims to generalize conclusions on the overall ERP practices in firms and therefore my approach in this study is considered to be **interpretivist**.

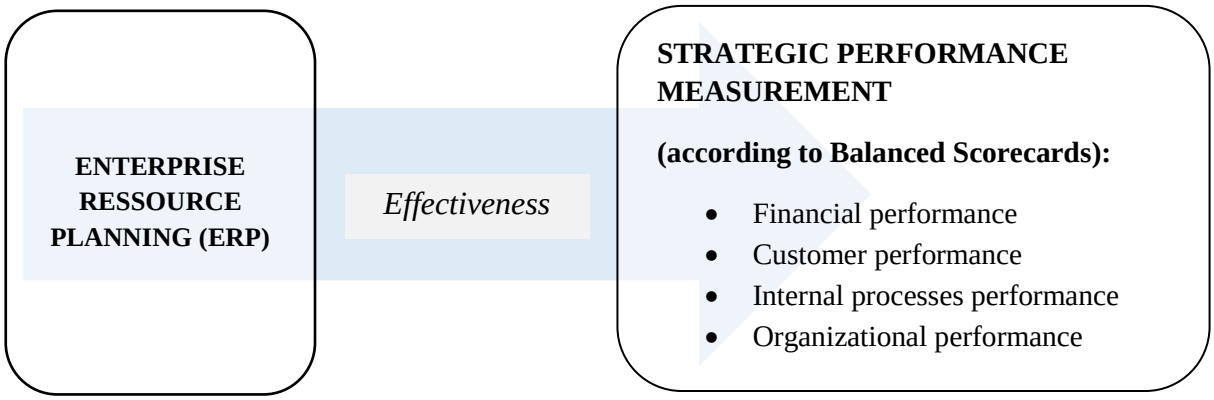
On the other hand, and since we are in interpretivist approach, we will use direct observation and analysis of the data used and how ERP in functions in each organization rather than analyzing data from surveys.

Because we are more likely to assess the effectiveness of ERP systems in measuring performance and examine the relationship between them rather than studying the impact of the first variable on the second one, we are not intervening in any of the variables and therefore out study methodology is considered to be **descriptive.**

A- Independent variable: effectiveness of enterprise resource planning system

C- Dependent variable: measuring strategic performance according to balanced scorecards

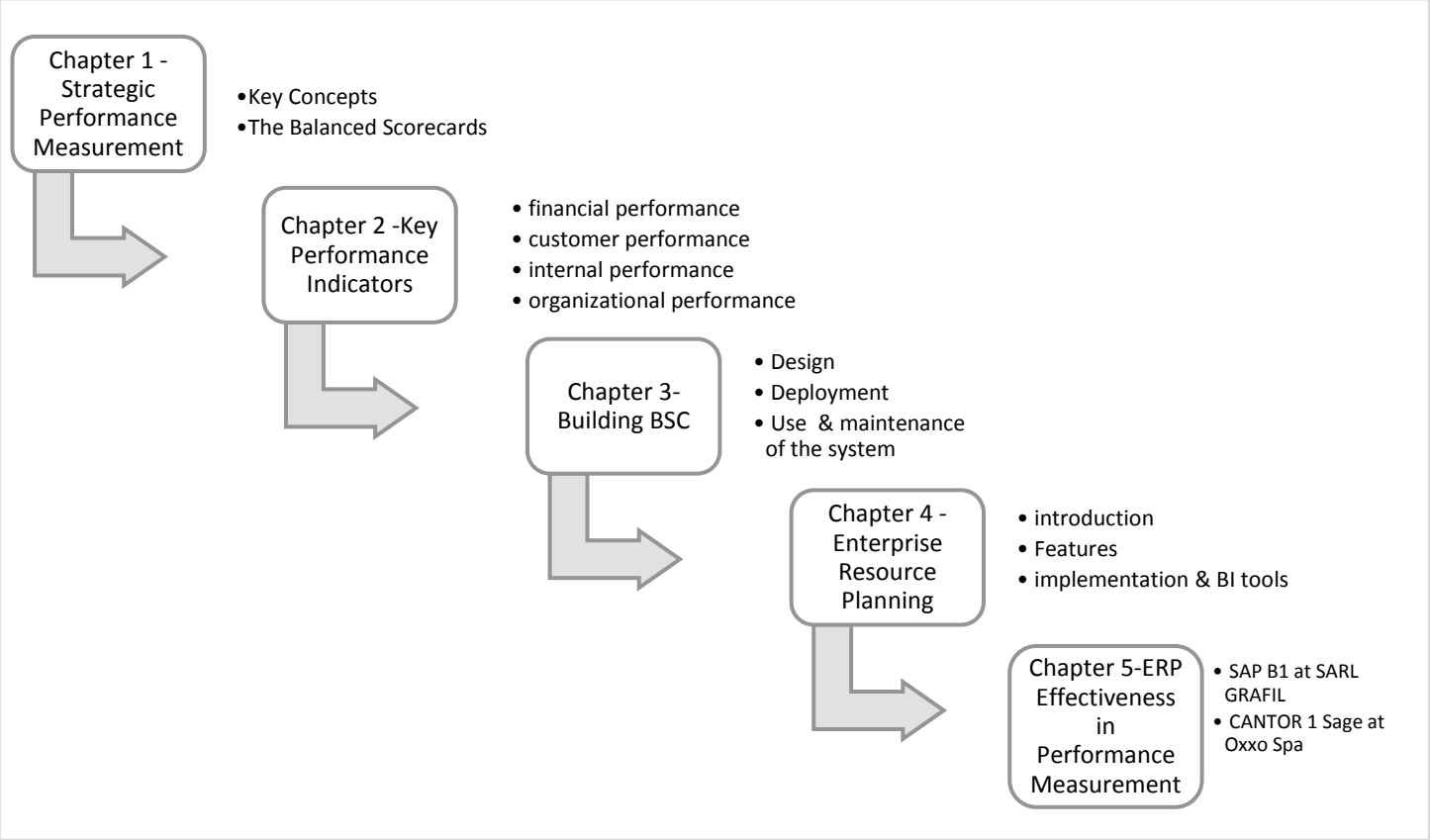
Figure 3 - Preliminary Study Model



Source: made by the author

The Plan of the study

Figure 4 - Plan of the research



Source: made by the author

We have dedicated three chapters for each variable we have in the study: Performance measurement, balanced scorecards and ERP and since we had to build a balanced scorecard in every case study, we had to add a chapter that gives us the needed methodology and tools to implement the balanced scorecards in the selected organizations.

On the other hand, because we have observed that many sources about performance measurement lack information and examples about performance indicators, we have added a whole chapter about performance indicators rather than presenting it in a section under the Balanced Scorecards chapter.

This summarized plan of the study:

- Chapter 1: Strategic Performance Measurement.
- Chapter 2: Strategic Performance Indicators.
- Chapter 3: Implementing Balanced Scorecards.
- Chapter 4: ERP- Enterprise resource planning
- Chapter 5**:** Case Study 1
- Chapter 6**:** Case Study 2

The limits and boundaries of the study

- **Study population**: The study population comprises all industrial companies using the studied ERP information system.
- **Study sample**: The study sample includes three industrial companies active in the city of B.B.Arreridj (Algeria) that use ERP software.
- **Time limits**: The study will take place between 2021 and 2024.

CHAPTER 1 - STRATEGIC PERFORMANCE MEASUREMENT:

The success of any organization in the current environment depends on its ability to direct the day to day activities and resources toward achieving strategic goals and leading the organization in its journey from the current situation to the target situation it projects in its long term vision. One of the key success factors to achieve this goal is the performance measurement system. It can play a crucial role in the deployment of the strategy as it gives continuous feedback on reliability of strategic hypothesis, effectiveness of implementation, in that context we will explore the Strategic Performance Measurement through the following questions:

- What are the challenges of performance measurement in the current economic environement?
- What is the concept and principles of strategic performance measurement?
- What are the appropriate tools an organization uses in order to measure the performance of its strategy?

1.1 - STRATEGIC PERFORMANCE MEASUREMENT

In a study on the ability of organizations to implement the strategy conducted with 275 employee showed that the ability to implement the strategy successfully was more important than the strategy itself (Ernest & Young, 1989, p. 9) and this was confirmed by another study where it was found that only 10 percent of good strategic plans were successfully implemented (Walter Kiechel, 1982, p. 38).

These data confirm the fact that strategic implementation, monitoring and performance measurement play a crucial role in the success of strategy at a time where most of the academic studies focused on strategic planning process.

If strategic performance measurement is that much important, what are its principles? its goals? its tools? And What are its key success factors?

1.1.1 - Organization Challenges in the Knowledge Economy Era

Since the nineties of the last century, the industrialized countries have been witnessing profound transformations from deflation of prices and low interest rates, liberalization of trade exchanges and privatization to the emergence of information and communication technologies into a large part of the economic and social situation. What are the dimensions of these transformations? what is the impact on the organizations, on their challenges, and on management practices?

The current environment of economic organizations:

Globalization has contributed to the removal of all kinds of barriers that would hinder exchanges across global markets (tariffs, standards and consumer patterns), and this is what led to the extension of the ambition of organizations to reach the continental and even global horizons (J.Brilman & J.Hérard, 2006, p. 7).

The major changes can be summarized in the following points (J.Castelanau & others, 2002, p. 21) :

- Supply is greater than demand, and it is the one that swings the balance of power in favor of the customer.
- New characteristics and requirements of the customer (high satisfaction of specific desires, high quality and customized products...).
- Market globalization and increased competition.
- Rapid obsolescence of products and hardware.
- Entry of information and communication technologies.
- New standards related to sustainable development.

- **Competition in the era of the knowledge economy**:

In the industrial era (1850-1975), the organization's performance was linked to the ability to achieve technical progress in equipment, enabling the organization to produce standard commodities in large quantities and enabling it to benefit from scale economies and guaranteed success, but at the present time when knowledge is the main source of competitive advantage, the success of the organization requires new competencies and depends on its ability to use and develop knowledge assets that have become more important than physical assets as they contribute to achieving the objectives of organizations in the light of the current changes in the economic environment (R.S. Kaplan & D.P. Nortan, 1998, p. 15) :

- Developing sustainable relationships with customers and effectively satisfying new market needs.
- Offering modern products and services that meet the needs of target markets.
- Offering high value products at an acceptable price and in quick turnaround times.
- Mobilizing and developing the efficiency and vitality of workers in order to strengthen their capabilities and improve the performance of operations.
- Applying modern information and communication technologies in management and management and stimulating organizational learning based on information systems.
- Hamel believes (G. Hamel and C.K. Prahald, 1990, p. 2) that the success of the organization in the current environment is not limited to its control over the variables of the competitive environment, but rather depends on its ability to formulate new rules for the market, dislodge the current borders of the market, or create new markets through

introducing new and innovative products. It can get this only by innovating and identifying the core competencies in order to master its competitive advantage[1].

The impact of economic transformations on the reality of organizations:

These transformations taking place in the global economy require to organizations that they adapt their activities, objectives and structures in order to ensure harmonious and sustainable interaction with the variables of the environment, on the other hand the intense competition makes organizations in a continuous race towards outstanding performance.

Below we will illustrate the most important transformations that affected the structure of the organization, its objectives, activities and management patterns.

- **For the organizational structure**:

- Restructuring the organization and re-engineering activities in order to direct them horizontally towards the desires of customers and reduce costs.
- Handling secondary activities and focusing resources on the core activities of the organization (J.Castelanau & others, 2002, p. 22).
- Reducing the number of organizational levels and increasing autonomy in order to get the necessary flexibility to interact with the fast environment.
- Resorting to strategic alliances that achieve added value as a result of the synergic association.
- Transfer of investments abroad «Delocalization» to reduce production costs and depreciation of research and development expenses (J.Brilman & J.Hérard, 2006, p. 15) this led to the emergence of international companies that are operating in different countries across the globe.

- **With regard to the objectives of the organization:**

- **Fiscal policy:** managing assets and risks and following up the level of debts to achieve stability that guarantees the required productivity, and ensures the conduct of research and development activities in light of the difficulties facing financing through the financial market.
- **Environmental and Social Responsibility:** The Foundation's objectives have extended from the financial and economic dimensions to include the environmental and social dimensions as a result of the change in the balance of power between stakeholders with the power of new laws and standards related to sustainable development (J. Pluchart, 2011, p. 16)

The following table shows the evolution of the organization's goals, its success factors, and the skills it needs over time (J.Castelanau & others, 2002, p. 23).

[1] In order for a competency to be classified as vital, it must contribute to the establishment's entry to new markets, increase the value of products in the eyes of customers, and cannot be imitated by shareholders.

Table 6 - the development of the organization's goals and challenges

Year	Objectives	Leader job	Skills	Success Factors	Economic System
1950	manufacturing	technical	volume/price	technical	production economy
1965	selling	marketing	sales techniques	marketing	market economy
1978	cost control	financial	budget control	technical	
2012/1993	Responsiveness, adaptability and creativity	strategist pedagogist	proactive	economic intelligence	knowledge, economy, environment and globalization

- **With regard to the management practices**:

To meet the challenges of the new market, new management tools have emerged, all these tools seek to achieve outstanding performance through a transformative process for the organization's activities and structure including:

- Total Quality Management-JIT and ISO standards (ISO).
- Just-In-Time-JIT production and supply systems.
- Management in a "Lean Management" style.
- Directing activities towards achieving customer satisfaction and reducing delivery times.
- Costing (ABC).
- Empowerment and participation of workers.
- Business Process Reengineering - BPR

These tools, despite the improvements they bring to the organization often fail to translate performance into financial profitability. This failure is due to several reasons.

These projects are usually not linked to the strategy of the organization also when the organization is involved in an environment in which competitiveness, technology and high efficiency play a major role in the success of the business, it is not enough to monitor performance based only on financial indicators (R.S. Kaplan & D.P. Nortan, 1998, pp. 18-19).

The best example of this is the failing experience of the American car industry "General Motors" in the seventies, as a reaction to the high competition of Japanese firms, GM made an attempt to integrate the just-in-time production system "Just-In-Time" [1] at a time when the

[1] The just-in-time production system depends on withdrawing flows instead of paying them, as only what will be sold is produced at the specified time, and thus the supply, production, delivery, and inventory elimination times are shortened.

objectives of production units remained linked to the cost price, which resulted in a conflict in the organizational goals due to the fact that cost reduction strategies requires large scale manufacturing especially in industries where cost overhead is high and this often results in raising inventory levels which is not relevant for the Just-In-Time approach that tends to lower inventory levels (Yves de Rongé & K. Cerrada, 2005, p. 234) .

Based on the foregoing, it can be said that the improvement of performance through these programs requires upgrade of the strategic performance measurement tools. The new measurement tools must provide the following features (J.Castelanau & others, 2002, p. 19) :

- Monitor the active factors in the environment.
- Focus on competitive advantages.
- Analysis of the future horizon for strategic planning.
- Determine the appropriate information.

1.1.2 - The concept of strategic performance measurement

The gap between the outlined strategic goals and the achievements represents the performance gap that has to do with the success of the strategy implementation and are related either to marketing goals such as increasing sales volume or to financial goals such as reducing costs or even to social goals such as improving the competencies of workers and their working conditions.

The analysis of the source of the performance gaps leads us to investigate the circumstances in which the strategic performance measurement of the organization takes place (H.Savall & V.Zardet, 1989, p. 65) what is strategic performance measurement ? What the tools for it? And what are the key success factors of it?

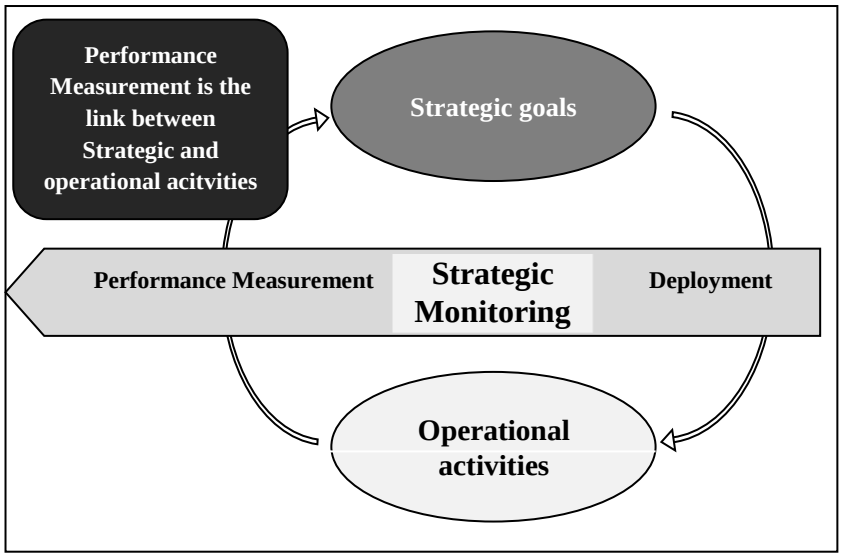
Definition of strategic performance measurement:

Strategic performance measurement is defined as a management function that aims to link strategy with practical activities on a permanent basis, through:

- Extending the strategy in the form of integrated action plans to lead the organization and ensure the success of the strategy.
- Building a network of performance indicators that measure the results of the corresponding activities, in line with the strategic directions.
- Follow-up and provide feedback on the quality of the strategic implementation of practical plans and on environmental changes based on dashboards and on a problem-solving method (P. Lorino & Others, 2002, p. 13).

The following figure illustrates the strategic performance measurement process (F. Guerra, 2007, p. 118).

Figure 5 - Leadership is the link between strategy and operations



Principles of strategic performance measurement

Henry Savall believes that strategic performance measurement is based on three principles (H.Savall & V.Zardet, 1989, p. 65):

- Making decisions and carrying out actions related to strategic plans: ***the 'motivation principle'***
- Sharing the content of the decisions with the various actors, as coordination is necessary for the success of the practical programs and for the progress of the decisions ***(the principle of coordination).***
- well-designed and easy-to-use balanced scorecards by managers ***'the principle of relying on the dashboard'.***

Based on the above, it can be said that the dashboard represents the tool and the main axis on which Strategic performance measurement is based.

By measuring performance and providing managers with sufficient and necessary information about the quality of strategic implementation and about changes in the active factors in the environment the performance measurement system supports decision-making process for managers regarding the implementation of the strategy on the operational level.

Strategic performance measurement objectives:

The objectives of strategic performance measurement are:

- Assessing strategic achievements and failures in regard of strategic hypotheses.

- Measuring the stakes and risks associated with the strategic vision.
- Extracting knowledge from the external environment data in order to develop strategic competencies.
- Anticipate potential shifts in the environment, markets or in performance and internal capabilities.
- Submit and review corrective actions (J.Castelanau & others, 2002, p. 162) .

Strategic performance measurement success factors:

The success of any strategy is related to the capability of performance measurement system to:

- Clarify the strategy for all employees and disseminate the strategy across all departments to foster a shared understanding and make the strategy the daily concern for everyone in the organization.
- Ensure compatibility between the objectives of the sub-units and the centers of responsibility and the objectives of all employees in the organization.
- Connect long term intentions and goals with annual plans and budgets.
- Ensure feedback on the strategic process and continuous update (R.S. Kaplan & D.P. Nortan, 1998, p. 31).

1.1.3 - Strategic performance measurement Tools

In the study of the office "Ernest & Young" year 2006 It was found that the accounting data (92 percent) and cost accounting (91 percent) They are the first sources of information that support leadership in organizations, where financial instruments are the most followed-up axis by managers and management control teams (97 percent) (X. Bouin & F. Simon, 2009, p. XI)

Below we show the most important financial tools represented in budgets and cost accounting, their roles and the criticisms leveled at it with regard to relying on it in measuring performance and leadership.

Costing Methods:

Cost accounting calculates and analyzes costs which is essential for measuring and controlling results. It provides managers with necessary information to make decisions, which contributes to improving the performance of the organization (L. Langlois & Others, p. 22).

Cost accounting provides information about the cost price that the organization supports divided by products, services, customers or even by orders.

There are several ways to calculate costs, the selection of the appropriate method depends on the goal of the cost analysis:

- **Full costs method**, which calculate total costs, such as the method of standard cost allocation method based on homogenous sections or activity-based costing.
- **Partial costs method** which does not take into account all costs, but only part of them according to their nature, such as direct costs or variable costs (L. Langlois & Others, p. 22).

- **The common role of cost accounting:**

  - It helps define selling prices and profit margins that cover costs of the activity ensuring the desired profitability.
  - Assist in developing predictive plans (strategic plans, predictive budgets).
  - Determine the value of inventory recorded in the budget.
  - Redistribute responsibilities in the organization**.**

- **Role of Cost accounting in performance measurement**

In addition to these common goals, the cost accounting process serves performance measurement in (A. Boutat & Others, 2008, p. 14):

- Link production to current accounting in order to ensure consistency of results.
- Identify sources of waste in resources.
- Identifies activities with high added value and loss-making activities.
- Assessing performance achievements «a-posteriori».
- Evaluate the performance of internal operations.
- Upgrade performance standards and benchmarks Redistribution of responsibilities in the organization**.**

Budget Management

Forecast budget is a predictive allocation of objectives and resources to responsibility centers for a specified period (usually within a year). The annual budget is the projection of the strategic plan on the short-term horizon and the financial translation of the activities and operational plan programs.

Budgets are a tool for coordination between the various centers of responsibility. and for the distribution of powers within the framework of decentralization, through a contract of commitment concluded between the senior management and manager to whom the powers have been delegated.

By confronting forecast budgets to the current realizations of the different units, budgetary control enables the leadership to evaluate the performance of responsibility centers (L. Langlois & Others, p. 23) .

The negatives and shortcomings of traditional financial instruments:

The reliance of senior management on financial tools and indicators in decision -making and in the leadership of the organization raises many criticisms:

- The focus of management on financial indicators directs the decisions towards the short term at the expense of research and development investments and marketing activities that build value on the long term, which some call " managers' shortsightedness ".
- Financial and accounting indicators give an idea about past performance and are therefore not valid for guiding future activities.

- The financial indicators ass return on investment or profitability focus on tangible assets while value creation depends more on intangible assets.
- Budget management tools enhance the vertical organization (Silos) at the expense of optimizing horizontal process that create value for the customer (Yves de Rongé & K. Cerrada, 2005, p. 227).
- Henry Savall believes that traditional information systems like general accounting and cost accounting, are unable to measure the phenomena occurring at the most accurate levels, namely the individual levels, and are therefore unable to measure the socio-economic performance of the organization which means that the organization is unable to track or see hidden costs and performances. (H.Savall & V.Zardet, 1989, p. 101).

These developments in the environment of organizations and the relative strategies require significant in the information system in order to support the organization in leading this transformation, while traditional financial tools are incapable of leading this change, the organizations seem to need a dashboard that is at the core of effective performance measurement ensuring valuable feedback to managers on how successful is the strategy going and on the continuous changes in the economic and competitive environment.

1.2 - BALANCED SCORECARDS:

Since the traditional financial tools are unable to measure future performance and focus only on past activity and do not intellectual capital upon which all organization strategies in the knowledge economy are based, what is the best instrument to do that? And what are the best indicators to track strategic performance in a broader way? And how can these indicators be linked together?

1.2.1 - The concept of Balances Scorecards

According to Kaplan the answer is easy, the best indicators to track strategic performance are those ones reflecting the organization's strategy best (R.S. Kaplan & D.P. Nortan, 2003, p. 4). Therefore, the ideal dashboard would be the mirror that reflects the vision of the organization.

Definition of the Balanced Scorecards:

It is important to define the performance indicator beforehand, since it represents the basic unit on which we build a dashboard.

A performance indicator is defined as a synthesis of a set of information that is regularly updated and analyzed and that gives a particular meaning linked to a strategic objective of the organization (H.Savall & V.Zardet, 1989, p. 67).

The performance indicator allows its user (decision-maker) to monitor the performance of the activities under his responsibility center and it allows him to know the state of the system he manages and the state of the environment that surrounds it (P. Lorino & Others, 2002).

The balanced scorecards can be defined as a set of indicators that reflect the strategy and contribute to the control and management exercised over the activities of strategic implementation on the long term (L. Langlois & Others, p. 384).

The indicators are linked and distributed along four axes: the financial axis, the customer axis, the internal process axis, and the organizational development and growth axis (F. Guerra, 2007, p. 113).

It is named balanced because this instrument tends to balance between:

- Past performance and future performance
- Financial performance and non-financial performance
- Internal performance (the internal process and development axis) and external performance (the financial and customer axis)
- Short-term objectives and long-term objectives

Levels and elements of the balanced scorecards:

- **Levels:**

The balanced scorecards are based on the assumption that there is a common model that represents performance on four levels and in which indicators can be placed according to their causal links.

The four levels are:

- Investor satisfaction
- Customer satisfaction
- Internal process improvement
- Promotion of internal development and innovation.

The Elements of the Balanced scorecards:

The balanced scorecards tool is composed of five elements which are, objectives, key success factors, indicators, target values and initiatives and are linked to each other on the four axes of the tool.

The objectives and key success factors are linked together at different levels in what is called the strategy map or network of causality.

Each of key success factors is tracked with a set of indicators, and for each of indicators there is a reference or target value (to be attained) that allows to form an opinion about the indicator.

The initiatives describe the programs and actions that could improve the given indicator.

In the following table we show an example of a dashboard of a single success factor that is represented with two indicators.

Table 7 – Indicators of a dashboard related to employee productivity

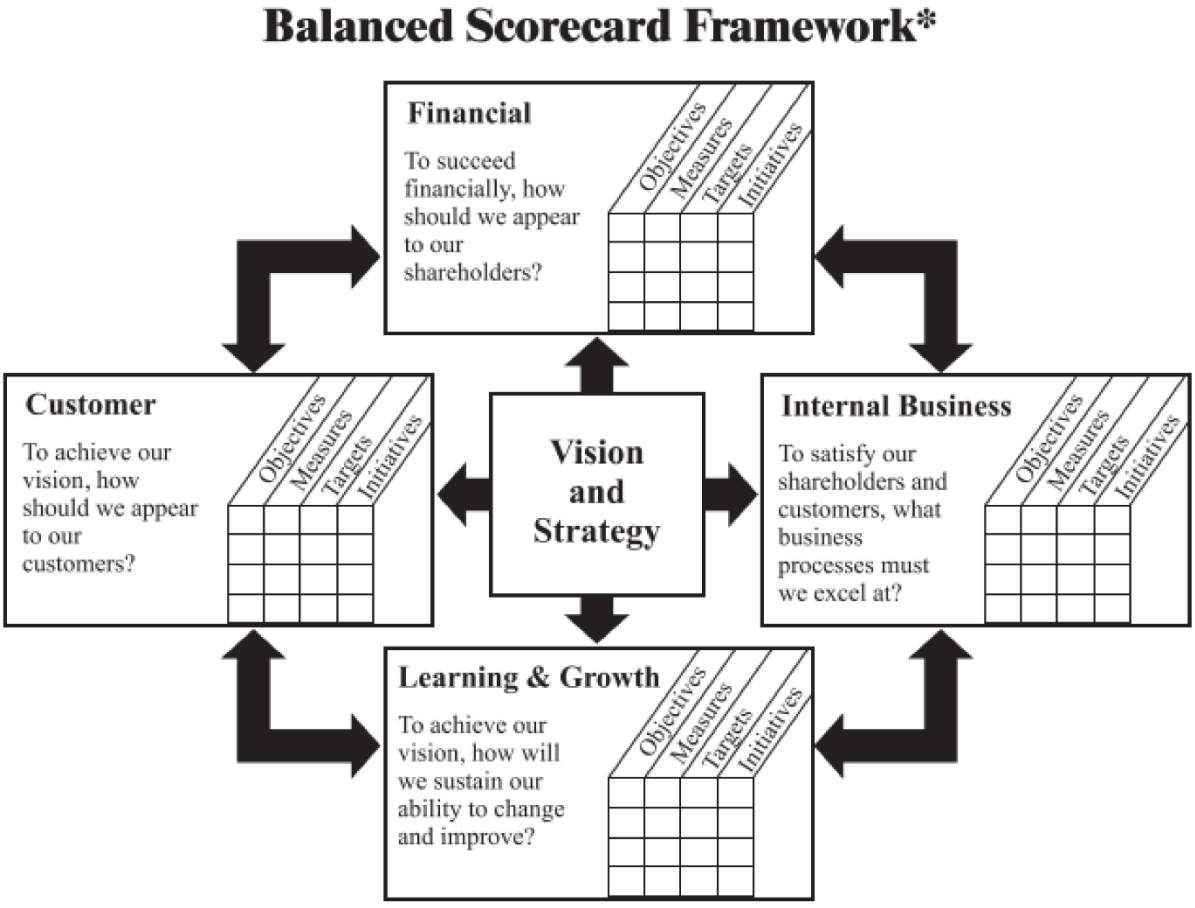
Objectives	Key Success Factors	Indicator	Target Value	Initiatives
Increase Employee Productivity	Improvement of working conditions	Absenteeism rate	2%	Nuisance reduction
	Skills development	Skill Coverage Ratio	80%	Training internships

Source: the author

Axes of the Strategic Steering Table:

This figure illustrates the axes of the scorecard, each axis grouping the four elements of the balanced scorecards (R.S. Kaplan & D.P. Nortan, 2007, p. 4)

Figure 6 – The structure of the balanced scorecards



- **The financial axis:** It gathers the indicators of the financial performance and which represents the financial results of the previous activities of the organization and makes it possible to ensure that the organization generates the profits expected by the investors, one finds on this axis of the indicators such as the sales turnover, the

return on investment, the gross operating surplus...

- **The Customer axis**: includes indicators that describe the organization's commercial performance, i.e. customer acquisition, satisfaction and loyalty, as well as the organization's ability to anticipate customer needs. In general, we say that the customer axis reflects theorganization's marketing strategy.
- **The Internal Processes Axis:** it gathers the indicators that allow the monitoring of the processes on which the organization's strategy is based and which have weight in the organization's value chain. The key internal processes allow:
  - Deliver attractive products and services
  - Ensure the profitability required by investors

  Internal processes are grouped into three main categories: operational processes, innovative processes and processes related to social and environmental responsibility (F. Guerra, 2007, p. 118).

- **The axis of organizational capacity:** this axis concerns the basic infrastructure that the organization must establish in order to improve the performance of the other axes and achieve long-term development and is reflected in four objectives:
  - Develop skills and increase the organizational capacity of employees and theirindividual and collective skills.
  - Develop information systems.
  - Motivation and allocation of responsibilities.
  - Ensuring compatibility between the organization's objectives and the employees' objectives (R.S. Kaplan & D.P. Nortan, 1992, p. 1).

The following table illustrates an example on a balanced scorecards of a petroleum refining unit affiliated with the American oil company "Mobil" (R.S. Kaplan & D.P. Nortan, 2003, p. 43).

Table 8 – example of a balanced scorecards in an oil refining organization

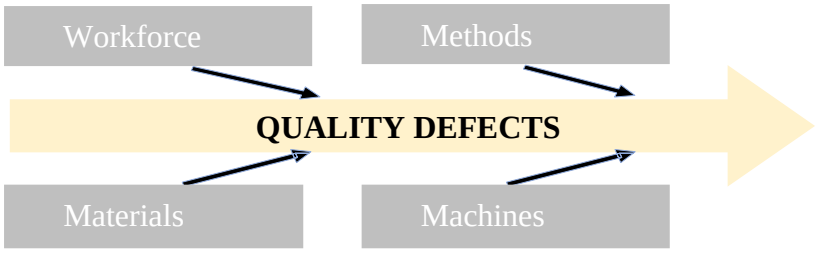
	Strategic Areas	**Strategic Objectives**	**Strategic Indicators**
Financial	• Financial Growth	**1.** Return on investment **2.** Assets use **3.** Profitability **4.** Low-Cost Leader **5.** Profitable growth	▪ Return on investment ▪ Cash flows ▪ Ranking by margin ▪ Cost of the unit (compared to the competition). ▪ Growth rate compared to the sector
Customers	• Customer Satisfaction • Win/Win relationships with distributors	**1.** the well-being of the targeted customers **2.** build win-win relationships with distributors	▪ Targeted market share ▪ Mystery shopper rating ▪ Distributors' profits ▪ Distributor Questionnaire Score
Internal processes	• Differentiation • Product Sure • Competitive Supplier • Quality	**1.** Innovative products and services **2.** Ranking in the most innovative **3.** Refining performance **4.** Stock management **5.** Low-cost leader **6.** Compliance and timeliness **7.** Social and environmental performance	▪ Benefits from new products ▪ Acceptability rate ▪ Supplier quality ▪ Performance and quality gap ▪ Unplanned downtime rate ▪ Stock level ▪ Cost of activity compared to competitors ▪ The rate of orders completed with excellence ▪ Number of ecological impacts ▪ Absenteeism rate
Development	• Ready and motivated employees	- Pleasant working environment - Individual dashboard - Access to strategic information	• Results of staff surveys • Availability of strategic skills • Availability of strategic information

1.2.2 - The Strategic Map

The roots of the strategic map

The roots of the strategy map or causal network or cause and effect diagram go back to Japan and the work of Professor Kaoru Ishikawa at the University of Tokyo in 1943 (K. Ishikawa, 2002, pp. 33-34), he used what is called the Ishikawa diagram to illustrate the causal relationship between the various factors influencing the quality of products grouped into four main factors which are machines, materials, methods and manpower.

Figure 7 - Ishikawa Diagram



The strategic map

The balanced scorecards is not only a set of independent indicators but rather a group of interconnected success factors and goals that are linked together across the four dimensions of performance in a way that reflects the strategic assumptions and approach. This network of goals and success factors is called **Strategy Maps** (F. Guerra, 2007, pp. 33-34).

The strategy map is built from the top down, starting with financial and business objectives and working down to internal process and learning objectives, the strategy represents the transformation of the state of the organization from the current state to a desired state that is more comfortable in a context of uncertainty, this movement is based on assumptions between them.

The strategic map describes these causal links and allows them to be understood and tested. The success of the strategy then depends then on the ability of each employee in the organization to understand and adopt these assumptions, and furthermore to direct his efforts toward improving strategic performance based on these assumptions (R.S. Kaplan & D.P. Nortan, 2000, p. 173).

One of the principles of successful strategy execution lies in each individual's understanding of the organization's strategy and how they can contribute to making it happen (F. Guerra, 2007, p. 163).

The strategy map represents the framework that allows the organization to clarify its strategy and communicate it to its employees and allow them to direct their efforts and resources in this direction, for example in the Mobile oil refining organization, one of the engineers noticed that the waiting time factor for the customers was an important factor of their satisfaction and then he developed an innovative device that allows customers to pay without needing to use a credit card or to enter numbers, this device allowed the organization to reduce considerably the waiting times which allowed the company to offer a fast service to millions of customers and to precede all the competitors of the market (R.S. Kaplan & D.P. Nortan, 2003, p. 104).

Strategy Map Model

The following figure shows a typical strategy map that describes the objectives related to results (customer and financial axis) and performance drivers (process and learning axis)

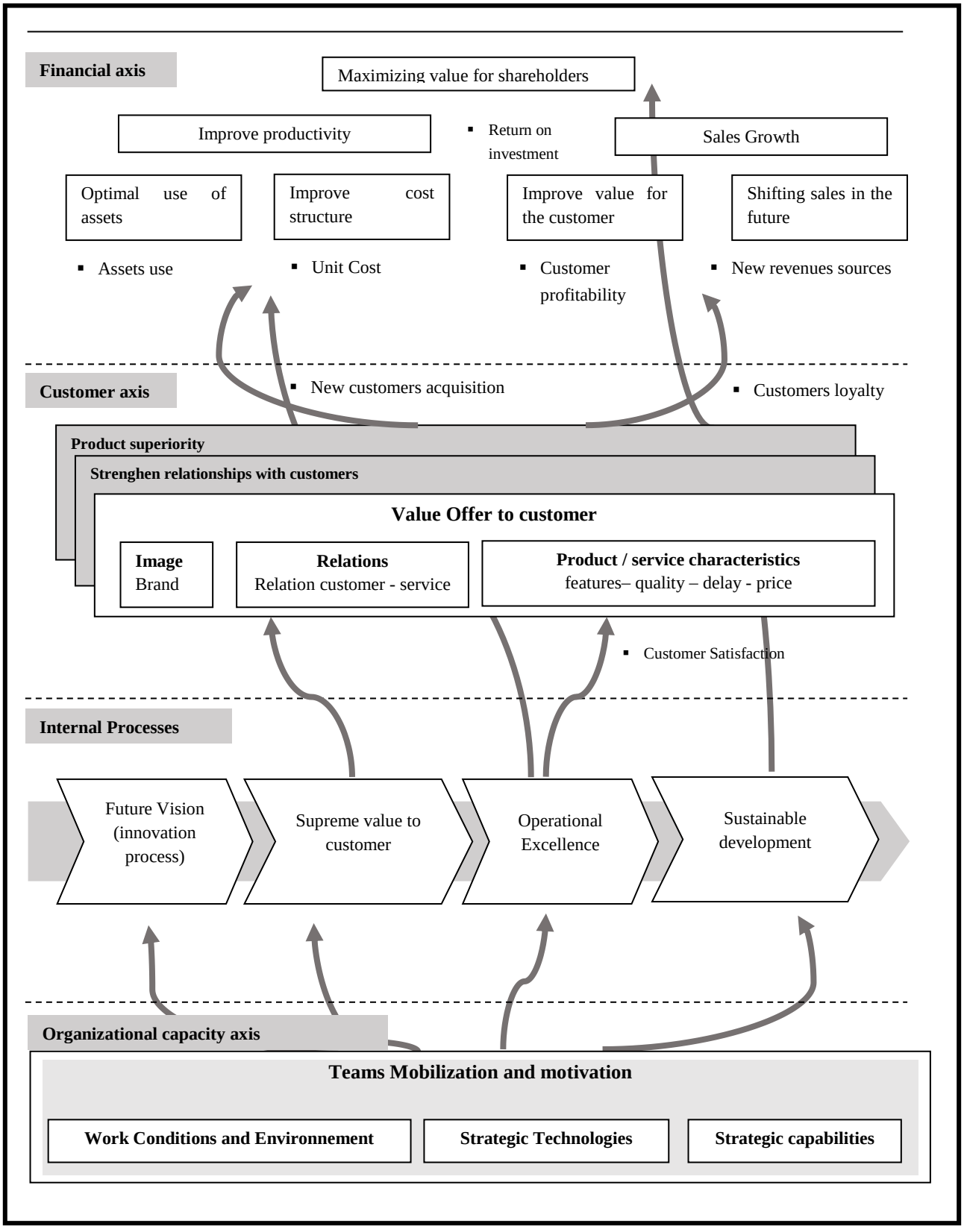
Shareholder value is created through the strategy of growth and expansion of revenues and the creation of new sources of revenue or the deepening of existing customer relationships, while the productivity strategy is achieved through improved cost structures and optimized use of assets. The customer focus, which is at the heart of the strategy, describes the strategic means by which the organization achieves growth and describes the drivers of the value proposition.

The internal process axis describes the development of internal processes, operations, and activities that support the value proposition (R.S. Kaplan & D.P. Nortan, 2003, p. 104). In this context, Michael Porter believes that activities are the essence and building blocks of any strategy and that competitive advantage is gained by adapting activities to be consistent with the value proposition to customers (M. E. Porter, 1996, p. 64) .

For the axis of organizational capacity, it determines the internal structure of knowledge, skills, technology and working conditions that contribute to motivating and mobilizing teams, which results in improved performance of internal processes.

The well-designed strategy map provides a clear, comprehensive, and logical picture of how to achieve the strategy The strategy map, when well designed, provides a clear, complete and logical picture of how the strategy can be achieved (R.S. Kaplan & D.P. Nortan, 2003, p. 104).

Figure 8 – Strategic map model



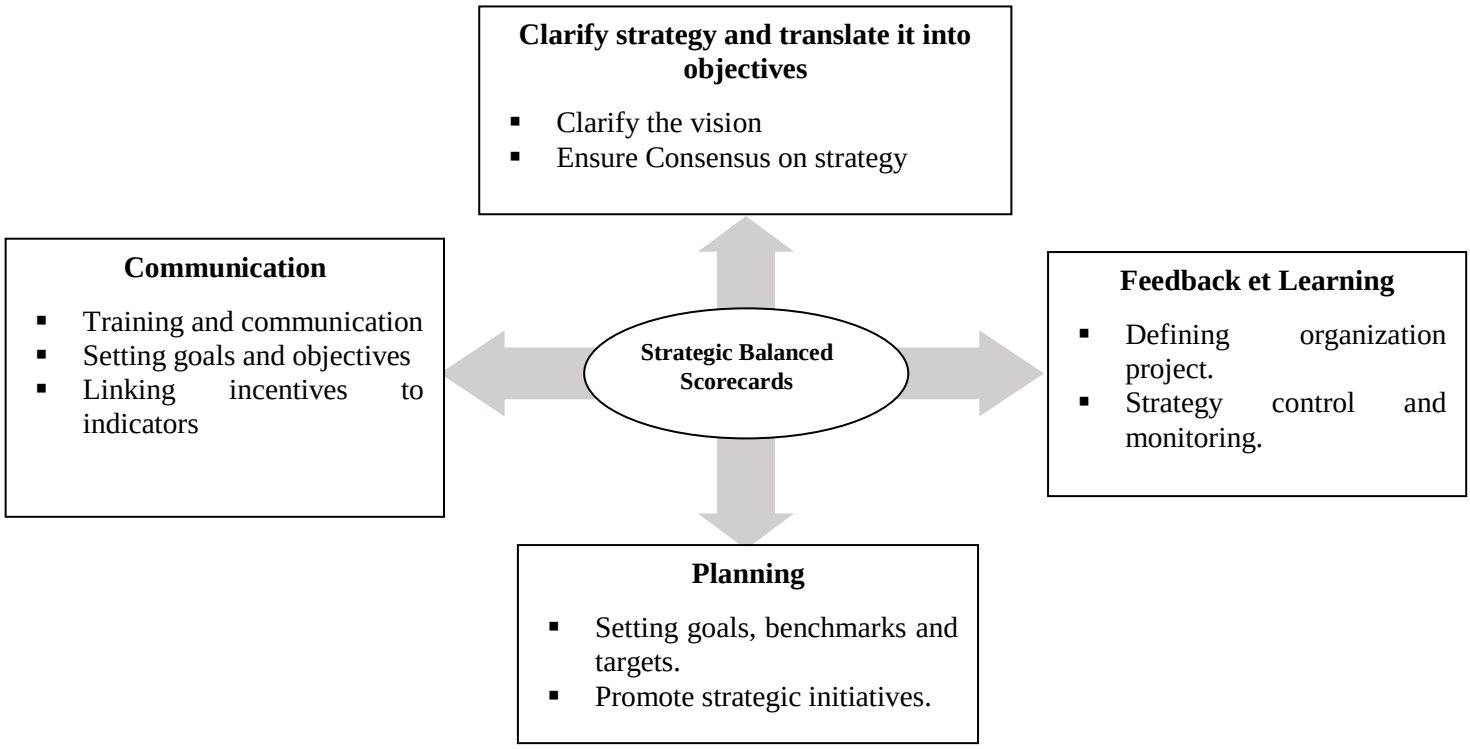
1.2.3 - The Role of the Balanced scorecards

The dashboard provides a practical framework for strategic implementation, tracking and monitoring the implementation of operational activities as an extension of a long-term strategic plan through (F. Guerra, 2007, p. 113).

- Clarify the strategy and translate it into objectives.
- Link strategic objectives to performance indicators.
- Planning and setting of strategic objectives and initiatives.
- Feedback and organizational learning.

In the following figure we illustrate the four axes of the balanced scorecards (R.S. Kaplan & D.P. Nortan, 2003, p. 76)

Figure 9 – Role of Balanced Scorecards



Clarify the strategy and translate it into objectives

In order to build a balanced scorecards, the organization's management must translate the strategy into objectives for each organizational unit in order to choose the relevant indicators for each objective, which requires a consensus on the content of the strategy and the objectives it aims to achieve, as well as the indicators that measure it (R.S. Kaplan & D.P. Nortan, 2003, p. 32)

Linking strategic objectives to performance indicators

The projection of the balanced scorecards on the different levels of the organization will function as a benchmark for the operational teams, allowing them to define their own

objectives and indicators within the framework of the organization's strategic vision (R.S. Kaplan & D.P. Nortan, 2003, p. 25).

Planning and setting of strategic objectives and initiatives

In order to define the target values, one should determine quantitative objectives on a long-term horizon, such as 2000% increase in revenues over the next five years, and to cascade these target values or benchmarks on the different indicators on the four axes.

The strategic objectives of the three axes: operations, customers and organizational learning do not represent objectives as such unless they are linked with each other in order to bring financial results in the medium and long term, on the other hand the balanced scorecards allows the strengthening of the strategic planning process (F. Guerra, 2007, p. 115) through:

- Identifying long-term outcomes.
- Identifying mechanisms to access these results and provide the necessary resources.
- Developing short-term benchmarks to track financial and non-financial indicators and ensure that the organization is on its correct strategic path.

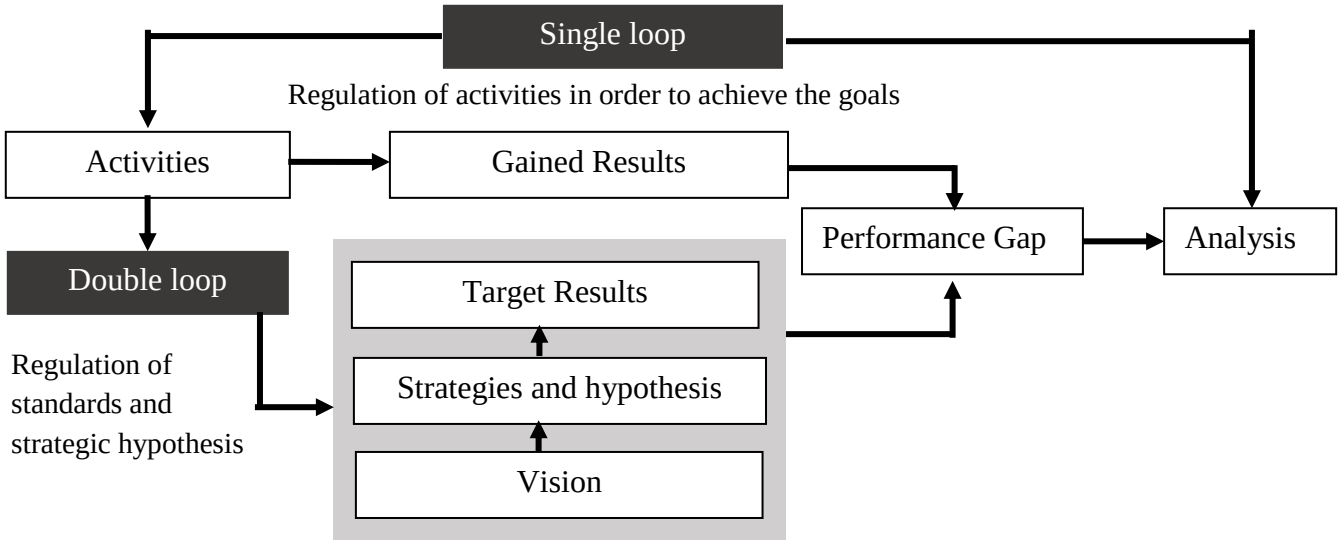
- **Feedback and organizational learning**

The balanced scorecards allows managers to learn from past experiences through feedback that reflects the quality of the implementation and success of the strategy (single loop) and the quality of the assumptions that were used to develop the strategy (double loop) as shown in next figure (R.S. Kaplan & D.P. Nortan, 2003, p. 167).

It can be said that the dashboard allows managers to answer the following questions: Is the strategy working? And if not, why is it not working? (R.S. Kaplan & D.P. Nortan, 2003, p. 2).

The balanced scorecards give a complete and exhaustive picture of the performance achieved in relation to the objectives and the strategic plans, on the other hand the strategic map helps to clarify the key success factors and performance levers which represents a decision support to the managers in order to lead the organization in its mission.

Figure 10 – The organizational learning double loop



leads us to ask the question about the role that the balanced scorecards should play and how it could fill these gaps in financial tools, and on what indicators it should be built?

CHAPTER 2 – STRATEGIC PERFORMANCE INDICATORS:

Indicators that are independent among themselves. If the dashboard is an integrated system of objectives and indicators linked to each other based on particular assumptions that draw the organization's strategy on four axes: customers, internal operations, financial, growth and organizational education, what are the KPIs for each axis? What is their relationship to each other and to other indicators?

2.1 - FINANCIAL AXIS:

The financial objectives and indicators have two main roles in the balanced scorecards, namely defining the target financial performance on one hand, and providing the appropriate basis for setting the indicators on the remaining axes on the other hand. What are the financial goals of the organization? What are their related indicators?

2.1.1 - The impact of product lifecycle on the financial strategy

The financial objectives change according to the period in which the product exists in its life cycle, as each stage calls for a specific strategy that is reflected in the financial objectives (R.S. Kaplan & D.P. Nortan, 1998, p. 62). The following table shows the characteristics of each period in the life of the product and the corresponding strategy (P. Kotler & Others, 2009, p. 363).

- **With regard to offering the product:** the growth strategy enables the organization to penetrate the market and take advantage of the potential growth opportunities through investing the organization in setting up structures and developing products and marketing activities, and installing the infrastructure of technologies and distribution networks, which is reflected in the financial profitability negatively, as the organization can operate in this development with negative cash expenditures and low rates of return on investment, the main financial objective of the organization is to raise the turnover and sales in all target markets.

Table 9 - Financial and marketing goals through different product life cycles

Element/lifecycle	Product launch	Growth	Maturity	Regression
the sales	Weak	Growing big	admiration	decreasing
price	High	Breakout price	competition price	prices drop
unit costs	High	Medium	low	low
profits	Negative	increasing	High	low
The competition	Limited	increasing	sharp	decreasing
Financial and marketing goals	Dissemination of the product and encourage the use of the product	forming a strong market share	Increase profits and maintain market share	pressure on costs

- **With regard to the period of growth:** the organization must make additional investments in order to improve the flow of products, expand production capacity and support continuous improvement projects, as high levels of returns on investment can be identified as financial goals, and the organization must maintain its market share and try to raise it.
- **With regard to the maturity period:** the maturity period represents the period of harvesting the fruits obtained by the organization in the previous periods for the distribution of the facilities that it obtained, and it does not require significant investments for the distribution of the facilities, but only what is necessary to maintain the production path in its operational state.

  For financial goals at this stage, cash flows must be maximized and working capital needs to be reduced, as in this phase, measurement indicators such as economic added value or return on investment lose their strength because the goal is not related to maximizing returns on investment (R.S. Kaplan & D.P. Nortan, 2003, pp. 61-64).

- **With regard to the period of decline:** since the organization is unable to achieve its strategic objectives or is unable to rise sales, the organization must maintain its current value as a priority in order to manage this decline in the best conditions, and the organization must follow up the indicators that would negatively affect the value of the organization: waste, pollution, customer frustration.

2.1.2 - Financial goals

The ultimate goal of the financial axis is to maximize shareholder value, and to achieve this, the organization must do the following (R.S. Kaplan & D.P. Nortan, 2000, p. 170):

- Raise and diversify sales and revenues.
- Reducing costs and improving productivity.
- Optimal utilization of assets.

The chart below the table shows the sources of value creation for shareholders, where the most important ways to raise the value of the organization can be summarized through achieving three goals, which are the increase in the revenues, the reduction of costs, the increase in productivity, and the third is the proper use of assets. We will discuss each of them in the following.

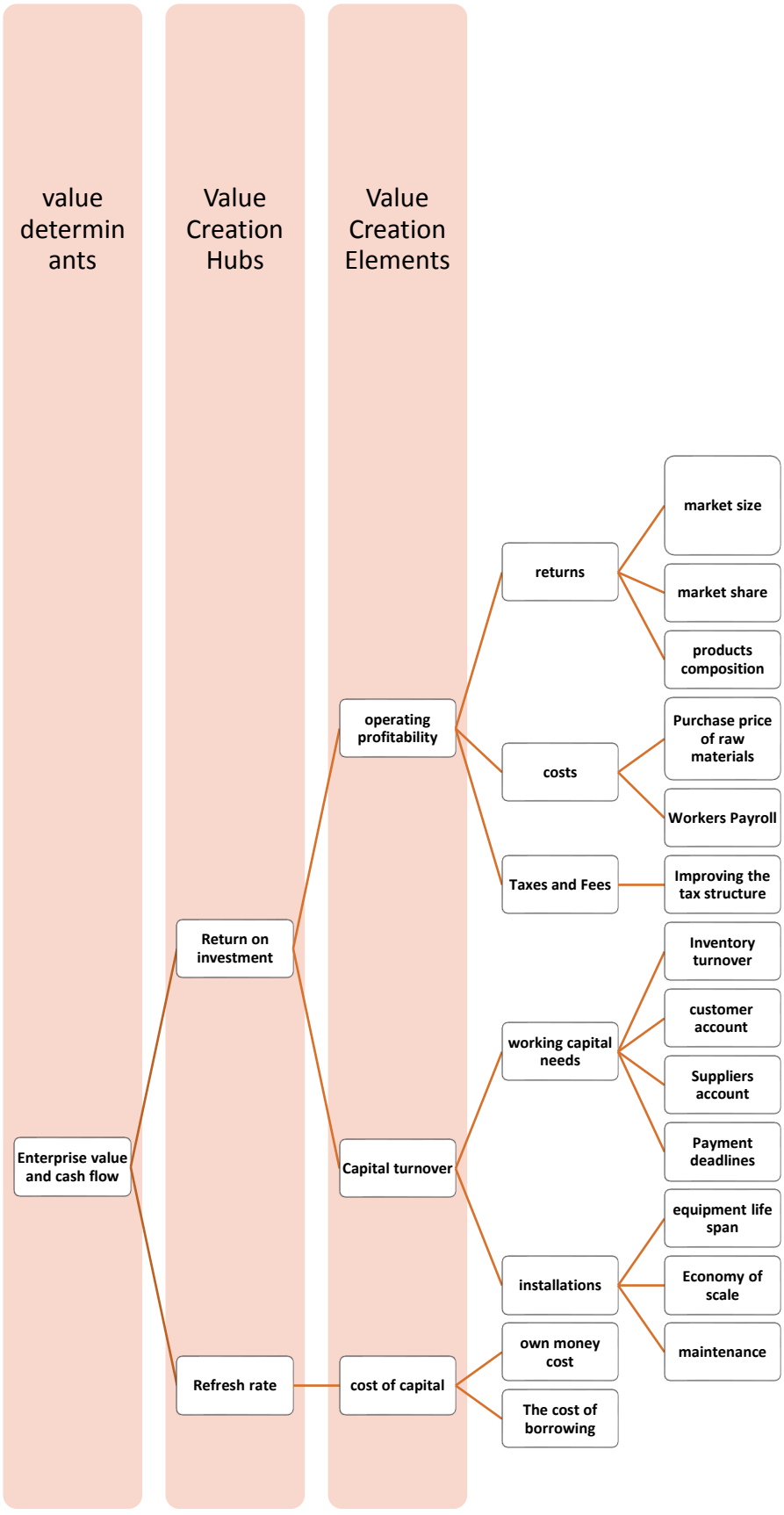
The chart below was made by the author adapted from (X. Bouin & F. Simon, 2009, p. 130) and (P. Lorino & Others, 2002, p. 74).

- **Raising and diversifying revenues:** Raising revenues can be done through several activities. The following table show the different ways for raising revenues and relating indicators (R.S. Kaplan & D.P. Nortan, 1998, p. 66):

Table 10 - Ways to raise revenues (the size of the organization's activity)

Objectives	**Indicators**
Introducing new products	Contribution of new products to turnover, raw margins of new products
New uses for existing products	The share of turnover Resulting from new applications of the product
New markets and customers	Increase in turnover of target markets, percentage of turnover from new customers, market share for each sub-market
Adjust the marketing mix	An increase in the turnover of the target markets, and the percentage of the turnover achieved

Figure 11 –Raising shareholders value (value tree)



- **Reducing costs and improving productivity :** In the growth phase, the organization's preoccupation is not limited to cost reduction programs as programs that aim to standardize operations in order to reduce costs are not compatible with the flexibility required for adapting new products in new markets (R.S. Kaplan & D.P. Nortan, 2003, pp. 66-69).

- **Reducing costs:** The organization can improve its profitability by reducing costs, whether are direct or indirect. In both cases, follow-up and control of costs requires the existence of a cost accounting system as a base for feeding the dashboard and calculating the indicators.

- **Diversifying sales channels:** The costs resulting from selling a product or providing a service change according to the sales channels, as dealing with customers through electronic channels enables saving part of the costs and shortening the sales deadlines. Therefore, the organization must direct customers towards the most profitable channels, and in this case, it can be relied upon on the ratios of ongoing operations between the various channels as indicators for measuring these goals.

- **Optimum utilization of assets:** the managers must efficiently utilize the funds and assets placed at their disposal by the shareholders. With regard to the funds invested in investments, the organization must maximize the exploitation of the asset, and it can be measured through:

  - The original usage ratio = $\frac{\text{Asset Used Time}}{\text{Asset Age}}$.

As for working capital and the treasury, the organization must shorten the treasury cycle and reduce the level of inventory to raise the efficiency of working capital. The treasury cycle (in days) and the level of inventory can be relied upon as indicators for measuring the performance of the proper utilization of the asset. As a summary of the above, the following table presents various financial goals and related indicators for different product life periods (R.S. Kaplan & D.P. Nortan, 1998, p. 67).

Table 11 –financial objectives and metrics through different product lifecycles

	Basic axes		
	Good use of assets	**Reducing costs and improving productivity**	**Growth and diversification of turnover**
The growth	▪ The ratio of assets to revenues ▪ Research and development (in percentage of revenues)	▪ Revenues / number of workers	▪ Revenues growth rate ▪ Share of revenues generated by new products and new customers
stability	▪ working capital ratio ▪ asset utilization rate	▪ Cost price compared to competitors ▪ cost reduction rate ▪ The ratio of indirect costs to sales	▪ Share customers and target markets ▪ cross sales[1] ▪ revenues share of new uses ▪ Profitability for each customer or product segment
maturity	▪ balance point ▪ margin	▪ unit costs	▪ The profitability of each category of customers and products ▪ Percentage of unprofitable customers

[1] Cross sales mean targeting and concentrating two complementary products in the same market, which raises the value of the service as a whole in the eyes of the customer.

2.1.3 - Financial indicators

Financial indicators enable tracking of the financial goals that helps increase the value of the business for shareholders. Below we present the most important financial indicators and the role of each of them.

- **Revenues and added value:**

Revenues and added value are indicators that reflect the size of the organization's activity. The rate in which revenues increase reflects the growth of the organization. The value added is equal to revenues minus consumptions.

- **profitability of private funds** (**Return On Equity -ROE)**:

The return on equity is calculated as follows: $\frac{Net\ profit}{\text{equity}} = \frac{\text{net profit}}{\text{revenues}} \text{x} \frac{revenues}{\text{equity}}$

- **Return on investment (Return on Investment-ROI):**

This indicator calculates the return released by the invested funds and is calculated as follows:

return on investment = $\frac{Net\ profit}{\text{invested capital}} = \frac{\text{net profit}}{\text{revenues}} \text{x} \frac{revenues}{\text{invested capital}}$.

- **Economic Value Added - EVA:**

It is based on matching the return on investment with the cost of financing it, and it can be calculated as follows (R. Brealey et autres, 2006, p. 330):

Economic value added = return - financing cost = return - average cost of capital % x capital.

- **Cash -flows:**

They are the net cash flows to the treasury, which enable the organization to pay dividends to shareholders, improve working capital, or fund new investments, and are calculated as follows:

Raw cash flows = net result + unpaid expenses (depreciation) (F. Guerra, 2007, p. 177) .

  - Net cash flow = raw cash flow - dividend.

Indicators can be calculated Especially depending on net cash flows such as:

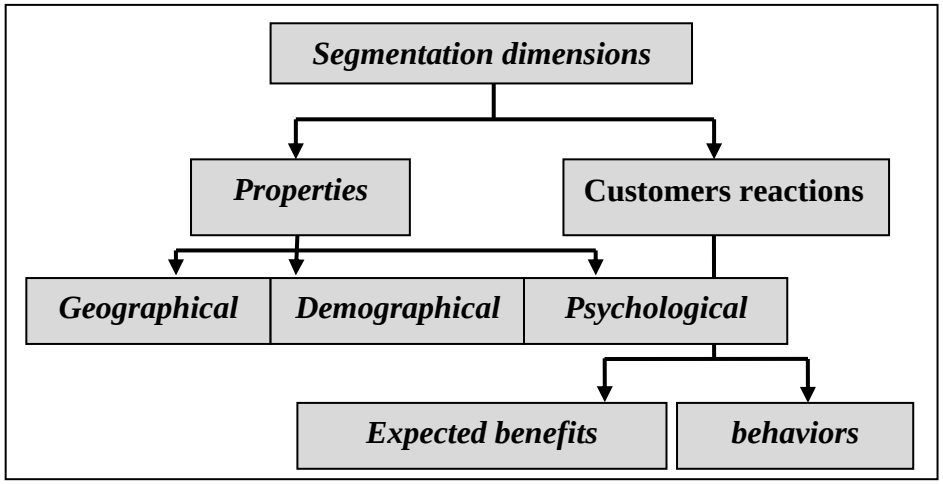
  - $\frac{\text{net cashflow}}{\text{equity}}, \frac{\text{net cashflow}}{debts}$.

2.2 - CUSTOMERS AXIS:

2.2.1 - Customer performance indicators

The market that the organization targets through its products is rarely homogeneous in view of the different tastes and contrasts. Consumers and their aspirations, and therefore, the organization must analyze the market to identify the partial homogeneous market segments and the characteristics of each of them in order to be able to provide appropriate offers for each target segment[1] , the segmentation criteria differ according to the market segment and the nature of the product or service. The following figure (F. Guerra, 2007, p. 123) shows the different marketing segmentation criteria [2].

Figure 12 – An illustrated model on market segmentation



The continuity of the organization is not possible except through commitment to customer loyalty by satisfying their needs and satisfying them.

After segmenting the market, the organization can set goals and indicators for each targeted segment. The customer axis indicators take two dimensions , The first dimension relates to the general indicators that we can find in most organizations such as market share, customer satisfaction, acquisition and retention..., The other dimension represents performance determinants and factors of distinction for the organization, and it answers the following question: "What do we do to provide products and services at the level of customer expectations To meet their desires and ensure their loyalty ?" And the indicators relate in general to Customer satisfaction and to their loyalty (maintaining them), the profitability of each sector, acquisition of new customers and market share.

In the following section we will show the Objectives and relating indicators for each dimension (R.S. Kaplan & D.P. Nortan, 1998, p. 82).

[1] Segmentation of a particular market means identifying consumer groups , segments and sub-markets that have homogeneous characteristics of their behavior and behavior towards the product.

[2] For further reading about market segmentation, please refer to P. Kotler & Others, Marketing Management, Pearson, 13 édition , Paris, 2009, Chapitre 8, page 271.

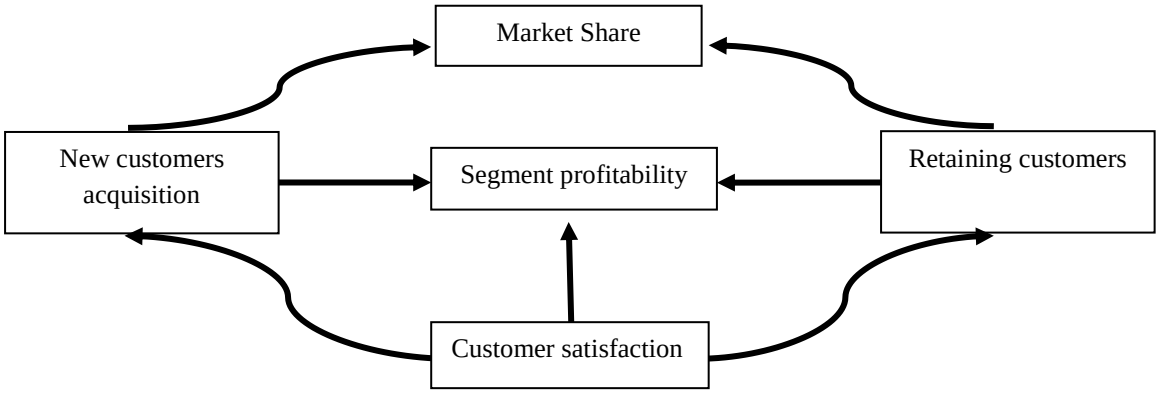
2.2.2 - Results Indicators (External Dimension)

Results indicators represent the objectives of the organization for customers axis which guarantee to them financial benefits (R.S. Kaplan & D.P. Nortan, 1998, p. 83):

- Acquisition of new customers.
- Achieving customer satisfaction.
- Maintaining customers and their loyalty.
- market share.
- profitability in each partial market (segment).

These measures can be linked to each other, as shown in the following figure (R.S. Kaplan & D.P. Nortan, 1998, p. 84):

Figure 13 – Results indicators for the customer axis



Customer satisfaction enables the organization to acquire new customers and to achieve the loyalty of current and former customers, which is reflected in increasing the profitability of each segment and increasing the market share of the organization.

- **Market share:**

We find the normal market share, which is the relative value calculated by the value or size of the organization 's business in relation to the size of the market that the organization is targeting, and this is for the products in which the organization is active only (Encyclopédie du marketing, 2004, p. 287).

And the relative market share, which is the ratio of the organization's sales to the sales of its main competitor in the market (market leader) for the same products.

It is also possible to rely on the ratios of the revenues of each segment to the total sales of the organization.

- **Customer satisfaction:**

Thomas Jones thinks that in order to achieve customer loyalty, it is not enough to satisfy customers only , but a high level of saturation to their needs must be achieved, and also their loyalty is not limited to one organization only, but to several organizations in the market (TO Jones & WE Sasser, 1995, pp. 88-99), and therefore, in order for the organization to acquire new customers and achieve the loyalty of existing customers , it must ensure to them a high degree of satisfaction.

Customer satisfaction can be measured by [1]:

- **Customer satisfaction surveys:** These studies enable an assessment of the degree of customer satisfaction based on a questionnaire about their own evaluation of the service or product.
- **Secret (virtual) customers:** Where the service provided is evaluated periodically by secret customers.
- **The rate of customer departure:** by contacting customers who decided to switch to other competitors, as this enables them to know the reasons for their dissatisfaction and the problems facing the quality of the product or service.

- **Acquisition of new customers:**
  It reflects the organization's ability to attract new customers, which can be measured by the number of new customers for a certain period or the turnover achieved thanks to new customers.
- **Maintaining customers and their loyalty:**
  Customer loyalty is defined as a firm commitment from the customer to request or purchase a service or product regardless of circumstantial changes and marketing efforts aimed at changing purchasing behavior (P. Kotler & Others, 2009, p. 185), and thus reflects the customer's willingness to purchase the product. Customer loyalty can be measured through the sales generated by customers. current or former, whereas in some organizations it is possible to accurately determine the number [2] of customers and the degree of their loyalty.

- **profitability of each sector:**
  The performance achieved in the previous indicators must ensure the financial profitability of the organization. For example, the organization can acquire very satisfied and loyal customers to the organization because it offers them very low prices that they cannot find with competitors.

  The method of calculating costs according to activities enables knowing the costs for each category of customers, and therefore enables calculating the profitability of each targeted subsector. Based on the profitability of each sector, the organization must follow the appropriate policy to increase the profitability of the sectors as shown in the following table.

[1] Element 2-2-1-1 deals with methods for measuring customer satisfaction in more detail

[2] Such as industrial establishments, distributors, wholesalers, automated information service establishments, banks

Table (6): The organization's policy towards customers and their profitability

Table 12 – The organization's strategy toward customers and profitability

Customers	High profitability	Low profitability
▪ targeted	▪ Governorate	▪ the transfer
▪ not targeted	▪ Follow-up	▪ exclusion

The organization must follow up on the profitability of each sector based on the indicators of profitability for each category. He organization cannot satisfy all the needs of customers and maintain profitability at the same time. To refuse to deal with the customer (exclusion) or to raise the price of the service or product to maintain sufficient profitability (conversion). To satisfy customers while maintaining profitability (R.S. Kaplan & D.P. Nortan, 1998, p. 88).

The corresponding table shows the various indicators related to the previous goals (R.S. Kaplan & D.P. Nortan, 1998, p. 1).

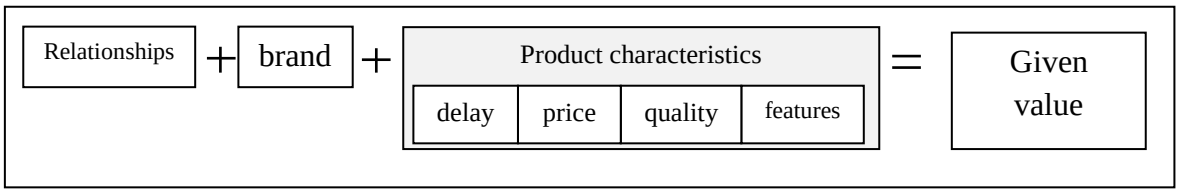
Table 13 – Customer pivot performance indicators (results)

▪ Market share	It translates the organization's market share (in terms of customers, sales or size of the business).
▪ Customer acquisition	Measuring the number of new customers acquired by the organization (in absolute or relative terms).
▪ Customer retention (loyalty)	Measuring whether the organization is building sustainable relationships with customers (in absolute or relative terms)
▪ Customer satisfaction	Evaluate the level of customer satisfaction in view of the performance criteria related to their preferences.
▪ Profitability of each sector	It measures the net profit generated by each category of customer by subtracting costs from the turnover

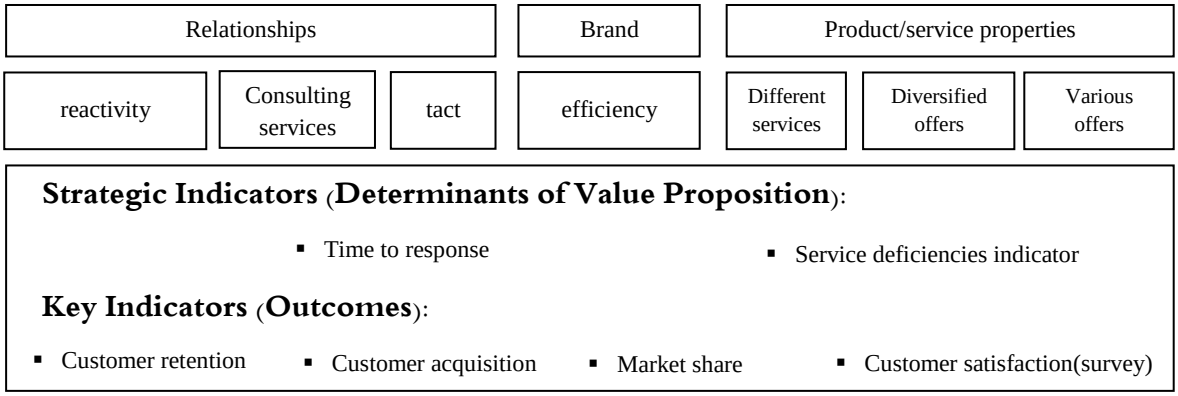
2.2.3 - Indicators related to the determinants of value proposition to customers

The organization must provide an offer that gives value to customers in line with their preferences. The elements of the offered value, which are the image of the organization, the characteristics of the product and the relationship with customers (purchasing experience), can be clarified through the general model of value in the following example (R.S. Kaplan & D.P. Nortan, 1998, p. 90).

Figure 14 – Customer Value proposition model



Example: the value offered by a bank



- **Product characteristics:**

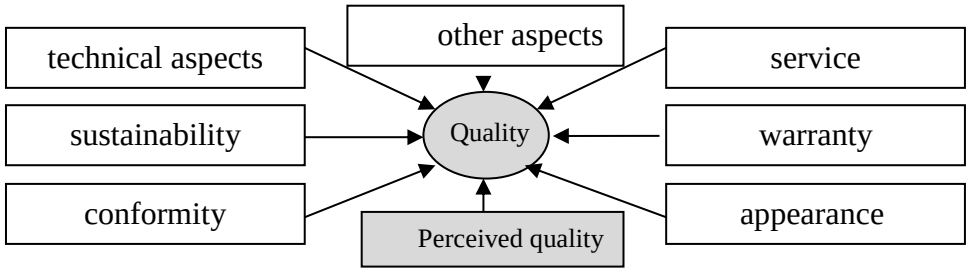
Product characteristics are divided into quality, Product availability, ease of use (functionality), delays and price.

- **Delays:** The organization's response time is considered as a competitive weapon for organizations at the present time, as the organization's ability to respond quickly and accurately to customer requests is necessary at the present time to achieve customer satisfaction and maintain them. Indicators related to response times and related delays are included Bal Tasleem in this axis.
- **the quality:** Quality, after being a competitive advantage in the past, has become a necessity for every organization. Therefore, organizations today must go beyond quality by providing highly satisfying products and services which enables the organization to stand out from other competitors (F. Guerra, 2007, p. 139).

  Measuring and tracking quality can be difficult for service organizations. In case that a physical product does not comply with quality standards, the customer returns the product, demanding that it be corrected or compensated. But In case the customer is not satisfied with a service, he does not find anything to return and simply turns to another organization which results in the decrease of revenues, and at will be too late to correct the situation , and for this reason, service organizations resort to providing guarantees to compensate the customer in case of dissatisfaction , which enables the organization to maintain customers on one hand and to know the problems facing the quality of its services and on the other to ensure feedback on customer satisfaction.

The following figure showed an example of the main determinants of the quality of physical products (F. Guerra, 2007, p. 139).

Figure 15 – Elements of quality of physical products



As for the quality of services, we present them through the following table (F. Guerra, 2007, p. 140) :

Table 14 – Determinants of service quality

Service availability	Availability of service easily and at all times (24/24 hours)
The information	The service should be described in detail and clearly enough for the customer to understand
Efficiency	Vendors must have the necessary competence and knowledge to provide the service
Dignity	Kindness, respect and attentiveness of the sellers
Confidence	That is, the behavior of the organization and the vendors makes customers feel confident about the organization and its services
Security	The service must be complete and meet the customer's needs from the first time
The ability to response	Sellers must act quickly and effectively with any customer request or problem
Safety	must take place in safe and respectful conditions for privacy and confidentiality of data
Spareparts and related materials	Materials related to the service must be available and of the required quality
Understand the customer	Sellers must be attentive and aware of customers' needs

Indicators such as: the number of non-conforming products in quality, the number of complaints ...

- **price:**

A distinction must be made here between the price and the cost of acquisition or use, as an organization may sell products at an attractive price, but its use leads the customer to incur additional costs greater than those of competitors, and therefore the organization must compare the prices and costs of using its products with its competitors in the market.

2.3 - INTERNAL PROCESSES AXIS:

The activities are the fuel of the competitive advantage so that the organization has to offer distinct value through distinct activities in view of the costs it consumes or the value it creates, and therefore the performance of the organization as a whole depends on the performance of its activities or operations.

The balanced scorecards focus on the vital operations of the organization[1] and Kaplan divides the internal operations into four processes: innovative operations, customer relationship management operations, operational process and processes related to environmental and social responsibility. The corresponding figure shows a model of the value chain that includes the internal processes in the organization (R.S. Kaplan & D.P. Nortan, 2003, p. 98).

Figure 16 – The value chain in the organization (internal processes)

The organization's superiority in the market depends on the organization's ability to develop superior products and services in a short time. As for consolidating relations with customers, it requires excellence. Activities that flow into the organization's relationship with its customers, such as reception quality. As for the operational excellence strategy, it is related to three indicators: quality, cost, and deadlines.

2.3.1 - Innovative processes

The performance of innovative operations is measured as since they are the source of future profitability for the organization, which is based on:

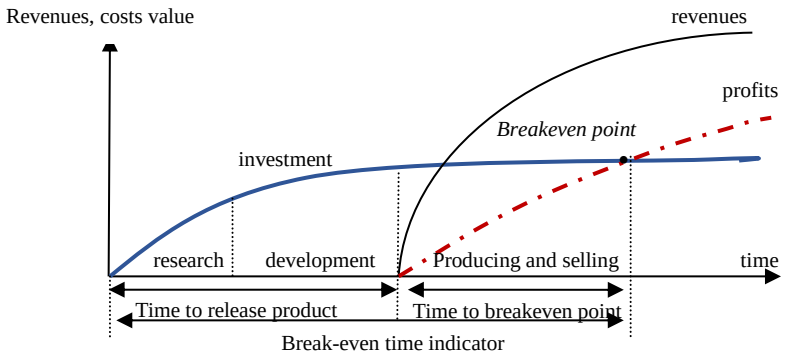
- The ability to amortize research and development costs, i.e. the realized profit is sufficient to offset the costs of product development.
- Profitability by designing and developing goods that meet the needs of customers at a price that guarantees sufficient profitability compared to the costs incurred by the organization.

[1] Critical processes are the processes that contribute significantly to the achievement of the strategic objectives of the organization.

- The speed of launching products in the market, which is the competitive factor in the performance of the innovative process. The organization must develop products and put them on the market before competitors.

The engineers of the electronic industries organization "Hewlett Packard" set an indicator of the performance of the innovative process that combines the profitability of new products and the timeframe for putting them on the market. (Profits achieved cover costs) as shown in the corresponding figure (R.S. Kaplan & D.P. Nortan, 1998, p. 117):

Figure 17 – Breakeven point for an electronic industry business

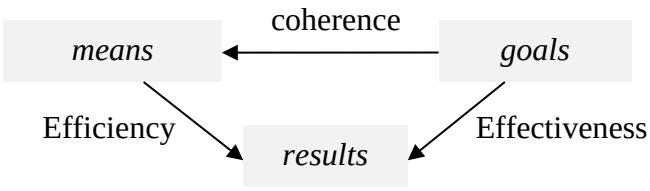


It is also possible to rely on the ratio of the revenues resulting from the new products to the total revenues of the organization as an indicator of the performance of the innovative process.

2.3.2 - operational processes

The performance of operational processes is measured through the following indicators: cost, quality, delays, quantity, effectiveness and efficiency. Measuring the performance of operations helps implementing continuous improvement processes (F. Guerra, 2007, p. 147). depending on the Deming wheel [1], as well as discontinuous improvement (process re-engineering [2]).

Figure 18 – Effectiveness vs efficiency



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- **Volume:** It is a measurement of the activity level of operations, such as the number of units produced in relation to production operations.

[1] Deming's continuous improvement wheel includes four stages: planning, execution, testing and improvement.

[2] Process re-engineering is a transformative project that aims to redesign and radically change processes, improve quality, reduce costs and shorten lead times.

- **Effectiveness:** It represents the ability of the process to achieve its goals, such as measuring the difference between the target quantity and the quantity actually produced.
- **Efficiency:** It aims to make good use of the organization's resources in order to achieve the goals such as the ratio of units produced to units consumed, the rate of loss «rate of defects».
- **Quality:** It can be measured by the rate of non-conforming products, the number of returned products, or the number of complaints.
- **Delays:**
  Where the deadlines for implementing the various activities are measured based on indicators such as: a time interval between receiving the order, its production and delivery.

  The organization usually uses the following indicator: $\frac{\text{transformation time}}{manufacturing\ time}$

  It is based on the assumption that the production time must be dedicated to transfer, and therefore this ratio must be raised to approach the value of 1. The delays indicators must be then completed with other explanatory indicators such as absenteeism, downtime rate, supply breakdowns.

  The appropriate indicators are chosen according to the nature of the activities and the targeted success factors.

- **Cost:** Activity and operations costs are calculated based on cost accounting methods, where the activity-based costing method enables the calculation of activity and operations costs in more detailed way.

2.3.3 - Social, environmental and customer relationship processes

- **Customer relationship management**[1] : the quality of the relationship with customers can be measured through the assessment of secret customers, the rate of product supply breakdowns, and questionnaires evaluating the purchasing experience of customers and the quality of their reception.
- **The environmental and social process**[2]: as a result of the emergence of sustainable development standards, it has become imperative for the organization to integrate the environmental and social dimensions into its objectives and activities, as it must protect the environment and reduce all forms of pollution. These objectives include:
  - Reducing the organization's consumption of energy and resources.
  - Recycle waste and dispose of it properly.
  - management and transportation.
  - Social development: respecting employment laws and standards, improving working conditions, and achieving social justice.

Indicators of environmental responsibility relate to [3]:

[1] *Customer relationship management is defined as collecting detailed information about customers and receiving them well during all moments of contact with them in order to maximize their loyalty.*
[2] *In some organizations, a special axis is added to include indicators related to environmental and social responsibility.*
[3] *Indicators related to the social dimension will be discussed in the axis of growth and organizational learning.*

- Energy consumption rates and waste recycling rate.
- The rate of waste, toxic and pollutant emission ...
- $\frac{\text{external costs}}{\text{internal costs}}$ is an indicator suggested by Henry Savall, external costs (H.Savall & V.Zardet, 2009) are the costs that the organization passes on to external parties to reduce the burden on its own costs .

2.4 - GROWTH AND DEVELOPMENT AXIS:

2.4.1 - The Organizational capacity performance

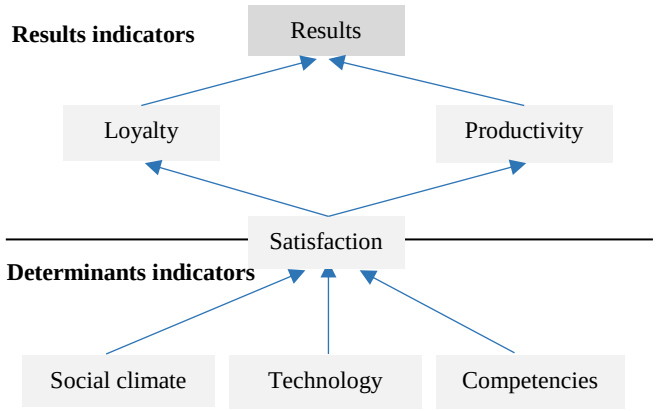
To improve performance in the previous three axes of financial, marketing and internal operations performance, the organization must work organizational performance by investing in infrastructure related to:

- Individual capabilities and competence.
- Motivating individuals, assigning responsibilities to them and achieving compatibility between their goals and those of the organization.
- Developing the efficiency and capacity of the information system.

These determinants contribute to achieving workers' satisfaction, loyalty and raising their productivity.

The relationship between performance determinants and worker productivity can be illustrated in the following figure (R.S. Kaplan & D.P. Nortan, 1998, p. 140).

Figure 19 – Measuring the performance of the organizational capacity axis



- **Achieve employee satisfaction**: The experiences of some organizations (R.S. Kaplan & D.P. Nortan, 1998, p. 140) showed the existence of a direct relationship between the satisfaction of the customers and employees who deal with them, and therefore the organization must achieve the satisfaction of all the parties.
- **Loyalty of individuals:** Loyalty of individuals is measured through the rate of turnover of workers for a certain period so that:
  - Work turnover rate $= \frac{number\ of\ departures}{\text{employees average number}}$

- **Worker productivity:** Worker productivity can be calculated by calculating indicators such as:
  - $\frac{revenues\ or\ added\ value}{employees\ number}$; $\frac{revenues}{payroll}$

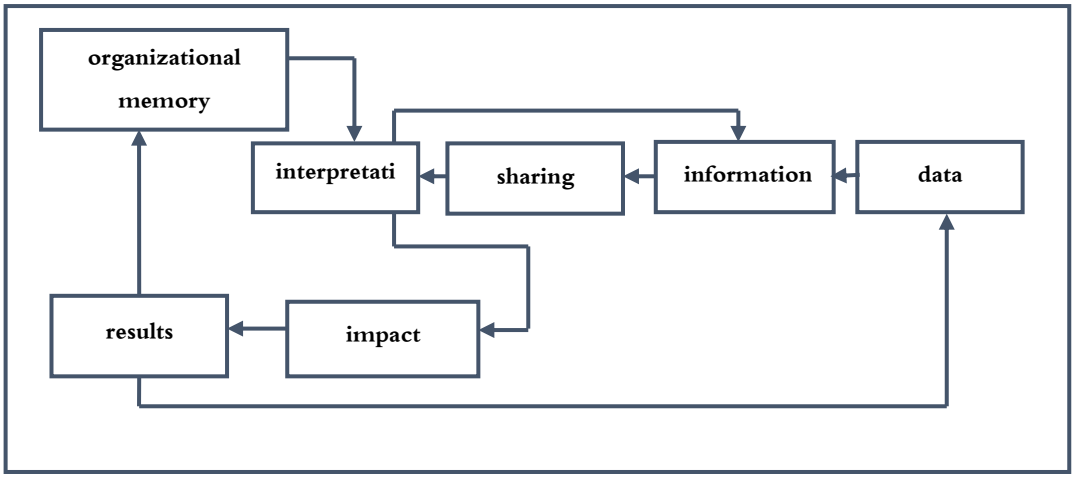
The hidden costs resulting from the deterioration of the social environment and working conditions can also be calculated based on:

- rates, work accidents, worker turnover, poor quality and productivity costs [1].

2.4.2 - Determinants of organizational capacity:

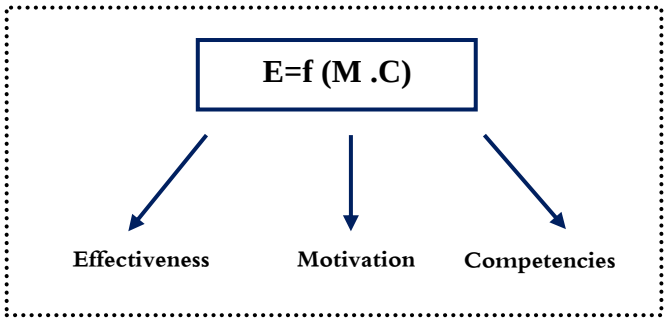
Organizational learning is defined as the acquisition of knowledge through a systematic search for the results of previous experiences in the organization, and therefore it is linked to the information system that supports the activities and results in a data called the memory of the organization, as shown in the following figure (F. Guerra, 2007, p. 59) :

Figure 20 – Organizational learning process



The focus of organizational learning is based on three main determinants: competencies, the technological base, the environment in which individuals work, and motivation . The effectiveness of individuals on the one hand relates to their competencies, and on the other hand, their ability to exploit these competencies, which is reflected in the degree of their motivation (F. Guerra, 2007, p. 157).

Figure 21 – Organizational learning determinants



[1] In order to see further more on how to assess hidden costs please refer to: H. Savall et V. Zardet, Maitriser les Coûts et les Performances Cachees, édition Economica, Paris, 1989, p105.

table shows the elements and determinants of the organizational capacity axis (R.S. Kaplan & D.P. Nortan, 1998, p. 144).

Table 15 – Organizational Capacity elements

Individual competencies	**Technological base**	**Work climate**
Strategic knowledge and skills	Strategic technologies	Decision making cycle
Qualification level	Databases	Assigning responsibilities to individuals
Capacity exploitation	Feedback and experiments	Objectives compatibility
_	Programs and applications	Stimulus
_	Patents	Teamwork

- **The general climate of work:**

It includes variables of the environment in which individuals work and may affect their performance, as well as the compatibility of goals. The environment is measured based on indicators of working conditions, temperature, noise level, absenteeism rate, work turnover rate, and work accidents.

As for the compatibility of goals, it can be measured, for example, by relying on the number of suggestions made by individuals regarding goals and ways to achieve them (F. Guerra, 2007, p. 163) .

- **Technology base:**

As for the use of information technology in management, it can be measured through two indicators:

  - Operations coverage rate: It can be calculated based on the ratio of activities that are carried out using automated programs to the number of activities.
  - Software utilization ratio: It is equal to the ratio of functions provided by software applications to the number of functions used in the organization.

- **Capabilities and competencies:**

The coverage indicator of strategic or total competencies can be used, which is expressed through the relationship:

Strategic competencies coverage indicator = $\frac{available\ competencies}{\text{competencies needs}}$

The organization must provide the competencies required by the implemented activities and operations, and therefore it must raise the value of the indicator and bring it closer to the value of 1 (R.S. Kaplan & D.P. Nortan, 1998, p. 145).

The dashboard indicators represent - among the various axes - a model of the organization's performance that links the indicators to each other and achieves a balance between them. It is a dynamic model that changes according to the organization's strategy. However, returning to the knowledge assets, despite its inclusion in the axis of growth and organizational learning, the performance model and the related indicators in this axis are not clear and are tainted by a lot of ambiguity, due to the difficulty of measuring socio-economic performance on one hand, and the difficulty of describing the existing relationships between intangible assets and performance on the other hand.

Based on the foregoing in this chapter, it can be said that the current environment of organizations requires directing their strategies towards exploiting and developing their knowledge assets and following up the changes taking place in the organization's environment, and at the same time adapting the leadership and performance measurement systems to enable them to measure and manage these assets. The dashboard provides a sufficient framework that allows through balanced indicators that reflect the organization's strategy, to monitor the implementation of the strategy, test hypotheses and track the active factors in the environment, and thus it contributes to the effective strategic performance measurement of the organization.

CHAPTER 3 - IMPLEMENTING BALANCED SCORECARDS

During the first chapter, we learned about the role of effective strategic performance measurement in the success of the strategy and how the balanced scorecards can play this role effectively, but the success of the dashboard as a tool for strategic performance measurement in the organization depends on the quality of design and depends on the way in which it is integrated into the organization's management system. If the organization Build a dashboard carefully: What are the stages of designing a balanced scorecard? What are the ways to integrate (operate) it into the organization's management system?

3.1 - BALANCED SCORECARD STRATEGIC FRAMEWORK

The general strategic framework: vision, mission, goals and values represent the reference for developing the strategic map, choosing appropriate indicators, setting targets and defining initiatives.

Developing a balanced scorecards assumes the presence of a strategic framework: vision, mission, values, goals, and strategy. The dashboard is a tool for applying and executing the strategy, and it contributes to clarifying the strategy and achieving agreement on its content and on how to achieve it among all members of the organization (W. Mohammed & S. Idris, 2009, p. 70).

Without going into the stages of formulating the vision, mission, and goals, in this requirement we will suffice with clarifying the concept of each of the previous elements and their characteristics. What is the vision, mission, values, goals, and strategy, and what are the conditions that must be met by each of them?

3.1.1 - Mission and values

- **First: the organization's mission:**

An organization's mission expresses the reason or reasons for its existence, and it does not only describe the organization's output or customers, but contains the organization's soul. The organization's mission is not just a document, but rather a deep feeling and conscious commitment to the greater goal for which the organization was established and which led to its emergence into existence (W. Mohammed & S. Idris, 2009, p. 63).

- **Second: Characteristics of an effective mission statement:**
  - The organization's message must be clear, understandable, expressive, and simple, and give unified and harmonious meanings to all parties, whether these parties are inside or outside the organization.
  - Possibility of converting them into plans policies and programs.
  - To reflect the organization's distinctive qualities, and represent its personality and thumbprint.

- To be oriented towards markets and customers, focusing on the distinctive characteristics that it uniquely offers to customers, And the possibility of enhancing it in the future.
- To be adaptive to what is happening in the surrounding environment.
- To be characterized by the speed of its delivery to various relevant parties and parties.
- It should be characterized by stimulating motivation among individuals and workers.
- It should be consistent with the rest of the components of the strategic direction and provide support and coherence to them.

- **Third: The concept of values**

Values have been defined as the commitments that the organization seeks to achieve. Therefore, they represent beliefs that have basic value for those committed to them and their contents, and thus guide behavior towards what is acceptable or unacceptable, or what is right or wrong. Therefore, values are characterized by relative stability compared to trends.

Values are also known as a group of beliefs and trends that direct the behavior of managers towards goals or means that these managers choose because they believe in their validity and determine the approach, they take in accomplishing their work, managing their organizations, and making their decisions.

- **Fourth: Characteristics of values**

Because values are the basis that organizational members use to evaluate actions and policies, as they play an important role in maintaining the organization's identity and influence the activities and behavior of employees, therefore values are supposed to have a set of characteristics that we define as follows (W. Mohammed & S. Idris, 2009, p. 70):

- It must be convincing and chosen from several alternatives so that it is adopted and committed to by employees at all levels.
- To be intellectually and behaviorally consistent with the values of the individuals working in the organization.
- It must be limited in number, clear in purpose, and can be understood by determining the behavior it includes.
- It should be a operational and constant in all conditions and situations so that it can be easily translated into reality, because values that are impossible to translate into reality are ideal values.
- To enhance performance that achieves the organization's goals and the employees' goals.
- It must be written so that it becomes clear enough and binding for the organization's employees.

3.1.2 - Vision and goals

- **First: vision**

The vision is what the organization aspires to be, to achieve or to create. Therefore, this matter requires making change and monitoring progress in order for the future that has been

depicted and imagined to be achieved, in addition to finding a balance between a clear understanding of the present and focusing on the future.

- **Second: Characteristics of effective vision**

Translating the potential power of vision into real perspective requires leaders of business organizations to recognize the basic characteristics of vision and how it works. Developing the organization's vision requires some kind of participation across its various units, departments, and employees, and this makes the vision generate excitement, enthusiasm, and commitment. Therefore, an effective vision has the following characteristics (W. Mohammed & S. Idris, 2009, p. 76) [1]:

- **Fantasy** (Imaginable): That is, the image through which the future appearance can be imagined.
- **gravity** (Desirable): Beautiful, it attracts the hearts and captivates the minds of customers through its expression of their ambitions and aspirations.
- **the focus** (Focused): Clear, towards which efforts and resources can be focused and decisions can be made on the basis of it without hesitation.
- **Flexibility** (Flexible): It is characterized by generality, comprehensiveness, and vitality, which allows it to be used as a basis for specific initiatives, and at the same time, it does not limit the possibility of using it when alternatives are needed.
- **the operation** (Feasible): Possible to achieve, regardless of its protection (from the perspective of current conditions), it can be bet on as a noble goal and mobilize categories of dealers to strive to achieve it in the long term.
- **Communicable:** It is characterized by linguistic ease, so that it can be explained and its meaning conveyed to the vast majority of people, and communicated with them through it.

- **Third: The concept of strategic objectives.**

Goals represent an interconnected series of desires to be achieved, starting with the general planning level and reaching the more detailed and specific levels. They are usually a guide to the results that must be achieved at shorter levels of time, such as achieving a 15 % growth rate. of sales during the next year, and so on.

Objectives are defined as those specific and measurable target levels in order to achieve the organization's goals (W. Mohammed & S. Idris, 2009, p. 82).

- **Fourth: Characteristics of strategic objectives.**

Many researchers have proposed the features and characteristics of good goals, and despite the variation in the arrangement of these features and characteristics, there is agreement on the set of characteristics and conditions that must be provided in effective goals that seem clear in most research and studies in this regard. The most important of which was expressed by Peter Drucker in the phrase “SMART”, and can be referred to as follows (W. Mohammed & S. Idris, 2009, p. 84):

- **Specific** (S = Specific): That is, the goals must reflect specific or desired achievements or data, and they must generate specific strategies or procedures, in addition to the

need for them to be precise and detailed to the extent that they are easy to understand and give a clear direction to others.

- **Measurable** (M = Measurable): That is, meaning that the goals should be measurable for the purpose of determining when they have been achieved, and a specific method for measuring the goal must be determined before the actual work begins.
- **Bold** (A = Audacious): That is, it aims to bring about moral change, and it represents a challenge to individuals, teams, and the organization itself.
- **Specific to a Result** (R = Written for Results): Here, each of the set goals is supposed to specify a final result that it wants to reach and describe the means of achieving this result.
- **Time-bound** (T = Time Bound): That is, each goal is specified with a specific time for completion.
- **Inclusion and relevance** (E = Encompassing): That is, each of the set goals is supposed to be comprehensive for a specific activity and linked to the overall goal at the organization level.
- **Possibility of reviewing it** (R = Reviewed): Here, the set goals are supposed to be evaluated and reviewed, to examine their suitability and the progress achieved in the final results.

3.2 - BALANCED SCORECARD DESIGN STAGE

This research answers the question related to dashboard design, which is represented in the following question:

What are the indicators? What performance should a balanced scorecards be based on? How are the target values for these indicators determined?

3.2.1 - Building the strategic map

- **First: strategy**

Porter defines strategy as: "The process of creating an organization's unique position, which is valuable to its customers by designing a set of activities different from those performed by competitors." (M. E. Porter, 1996) Porter confirms that every organization has a comprehensive competitive strategy that represents a mixture of goals used by the organization and its means to achieve these goals. He also confirms that the strategy is to find compatibility between the organization's activities and the environment. In the absence of compatibility, there is no distinct strategy because the success of the strategy is based on creating integration between the activities of the organization. The organization and its environment. Strategic alignment is necessary not only to achieve competitive advantage, but also for the sustainability of the organization, as it is difficult for competitors to imitate it, whether with products or all related activities (W. Mohammed & S. Idris, 2009, p. 89).

- **Second: Characteristics of the strategy**

There are a set of characteristics of effective strategies in business organizations, as follows (W. Mohammed & S. Idris, 2009, p. 91) :

- Attention and care for customers.
- Relationship with suppliers/suppliers.

- Stakeholder influences.
- Understanding capabilities and abilities.
- Interest in technological changes and creativity.
- Diversity of human resources experiences and skills.
- Understand and encourage senior management.
- Communicating results and feedback.

- **Third: The strategic map**

Porter describes strategy as the activities that an organization chooses in order to excel. In the end, the differences in costs and prices between organizations result from hundreds of activities necessary to design, produce, sell, and deliver goods and services. Excellence comes through the choice of activities and the way they are applied (M. E. Porter, 1996, p. 65).

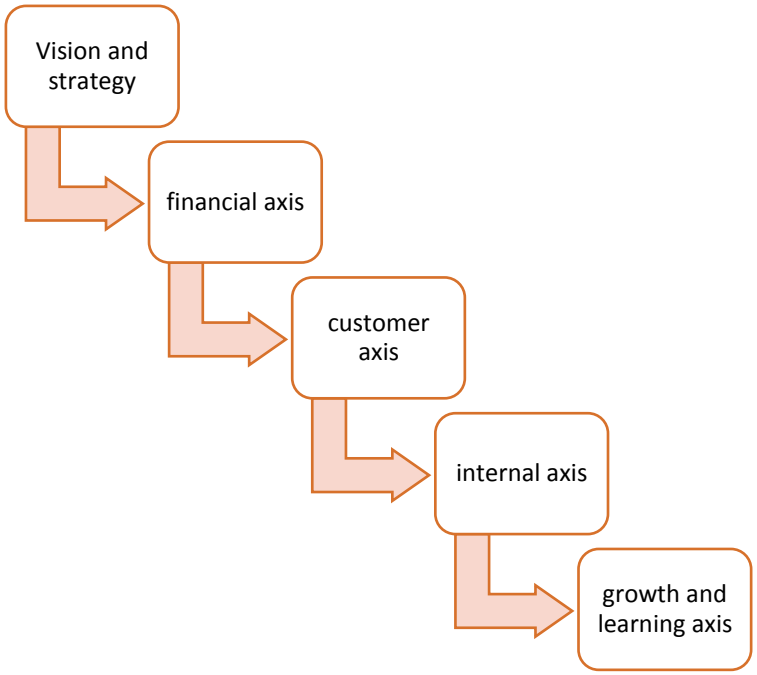
The dashboard contributes to developing the organization's vision in the sense that the design process of the strategic map begins by considering the strategy as a set of hypotheses.

The strategy changes the organization's movement from its current state to its uncertain future state, and therefore this transition is based on a set of hypotheses linked together to enable the strategic map to describe these hypotheses through a series of clear causal relationships whose validity can be verified. Strategic hypotheses also require identifying driving activities (development indicators) and desired results (result indicators) (R.S. Kaplan & D.P. Nortan, 2003, p. 104) .

Implementing the strategy requires that each member of the organization clearly understand these assumptions, direct his resources in accordance with them, and periodically verify the validity of these assumptions in order to adapt them if necessary.

The corresponding figure shows the process of building balanced scorecards strategic map, where the process goes from top to bottom by defining short-term goals, activities, and motivations that distinguish the organization and create value for its customers and shareholders in the long term - adapted from (R.S. Kaplan & D.P. Nortan, 2003, p. 83)

Figure 22 – Balanced scorecards Top-Down implementation stages



The process begins by identifying the viewpoints of shareholders and customers "(What are the financial goals for growth and productivity?), (What are the key growth resources?)"

After the financial goals are determined, we move on to the customers, so we ask the following questions (Who are the target customers who will achieve growth in revenues and a profitable combination of the products and services provided? What are their goals and how can their satisfaction be measured? The customer axis contains the determinants of values that enable them to attain excellence, to attract customers and to achieve their satisfaction and loyalty.

The financial and marketing goals for customers describe the desired results, not how to reach them, which go back to the focus of internal operations such as product design activities, developing brands and markets, selling, services, and supply, all of which contribute to identifying activities that enable the organization to create value and excel regarding the aspirations of customers and regarding the desired financial results.

The fourth axis relates to the organization's ability to implement internal operations in a new and distinct manner, and this depends on the organization's infrastructure, which consists of skills, technological competencies, and the motivational climate in which individuals work, which as a whole constitute the axis of organizational capacity.

The organization seeks to distinguish itself from its competitors who adopt operational excellence strategies (cost, quality, deadlines) by offering promotional offers and through a distinguished relationship with customers.

The financial axis shows how financial goals are based on achieving growth and productivity and at the same time growth is achieved through promotional activities and sustainable relationships with target customers whereas for productivity, it is achieved through increasing workers productivity and inventory turnover.

The organization seeks to achieve an ideal partnership experience with customers by eliminating waiting chains and entertaining customers

The internal operations axis relates to programs for improving relationships with customers on the one hand, and on the other hand, designing new and innovative programs. Also we focus here on inventory performance in order to raise productivity (the financial axis) .

In the growth, we aim to work on infrastructure and attain maximum individual and collective performance through ensuring employee satisfaction and promote high motivation team work.

We can conclude that the strategic map is a vertical logical sequence from top to bottom, starting from the organization's vision, the results to be achieved, passing through the value proposition in internal operations, and up to the infrastructure, which is the engine of change and its drivers and represents the relationship between the determinants and drivers of performance on the one hand, and the targeted results. On the other hand, the assumptions that determine the strategy (R.S. Kaplan & D.P. Nortan, 2003, p. 84) .

3.2.2 - Choosing appropriate indicators.

In this requirement, we discuss the stages of identifying indicators and the criteria upon which the appropriate indicator and types of indicators are chosen, in addition to proposing a set of general indicators.

- **Stages of determining indicators**

In order to monitor and follow up the strategy, managers need indicators that enable them to know the results achieved at the financial or competitive levels or the effectiveness of internal operations.

Selecting appropriate indicators depends on the indicator user's need and knowledge.

- **Suggest possible indicators:**
  Based on key success factors, we select indicators that we consider to be related directly to our goals: for example, for the cost reduction goal we may choose indicators such as.

  Suggested indicators: inventory level, defective product rate, loss rate

- **Choosing appropriate indicators:** The most appropriate indicator is chosen given the variable being monitored, and the balance of the indicators must be taken into account:
  - Development indicators (that visualize future performance) and results indicators (that reflect current performance).
  - Slow indicators (their adjustment period is slow) and fast indicators.
  - Indicators of causes, indicators of results and effects, to understand and simulate changes.
  - Behavior: Indicators should not conflict with the behavior they generate. Such as increasing worker efficiency (coverage rate) and reducing training costs (Iribarne, 2003, p. 70) .

- **Define indicator elements:**
  Once the indicator is defined, we need to set:

- the method by which the indicator is calculated (the formula)
- The necessary source data and information needed for calculation
- The subject variable that is measured with this indicator.

- **Selection of the user and the level of measurement for the indicator:** The user is determined based on the scope of his powers and authority, and he is the one who has the authority to take corrective measures to affect the indicator (F. Guerra, 2007, p. 92).

- **Criteria for selecting appropriate indicators**

The number of indicators should be limited because with large number of indicators it becomes difficult to follow them all. Before adopting any given indicator, it must meet the following conditions:

- Measuring a goal or several goals: The indicator is adopted taking into account the monitoring unit, the specific goals, and the needs of the decision maker.
- It can be built: that is, the data necessary for its calculation exist or can be calculated or obtained from external parties.
- It can be used at the moment: It is important that the indicators be sensitive to changes occurring in the phenomenon being monitored in order to translate them into information that is available in real time.
- It can be communicated: The way the indicator is represented can affect the way it is translated. Therefore, the indicator must be clear and easy to represent: to enable its users to understand and translate it easily, to enable users to make appropriate decisions based on the observed changes. Therefore, the indicator must allow for judgment. On the progress achieved by looking at the goals set and taking corrective measures if necessary.

- **Types of indicators.**

To choose appropriate indicators, you must know the different types of results indicators and activity indicators (development indicators). The indicator can reflect the level at which a particular activity or event is currently progressing (activities indicator) or reflect the results of activities or events that have previously been implemented (results indicator).

Example: In order to determine customer satisfaction, the organization seeks to repair products in less than two days. In this case, the activities indicator represents the number of repairs made in less than two days, and the results indicator represents customer satisfaction (P. Lorino & Others, 2002, p. 80).

- **Measurement indicators and reporting indicators:**
  The indicator can describe the results achieved to the highest level within the framework of contractual obligations (reporting indicator) and can also clarify activities and support decision-making (measurement indicator).

- **Financial indicators and non-financial indicators:**

The indicator can be based on financial accounting information (return on investment, cost price) or based on other operational information (volumes, deadlines).

- **General indicators and target indicators:**

  The indicator can summarize visible elements and information and describe them in general terms (such as cost price), and it can also focus on a precise field (such as the time required to change a machine).

  General indicators enable (indirect) judgment of the overall situation, but they are unable to translate it due to the multiplicity of its components, unlike targeted indicators for a specific field, which enable direct translation of the behavior of the indicator, but this assumes choosing the appropriate indicator. There are many indicators depending on the nature of the measurement. The following table explains the nature of the indicators and examples of each of them (F. Guerra, 2007, p. 9).

Table 16 – Types of measurement

Indicator	Definition	Example
Counting	It expresses a specific number of a specific unit of measurement	10 minutes the machine stops
Share	It is the enumeration of a specific group compared to society as a whole	50 % customers are satisfied
Ratio	It is a ratio between two quantities of the same unit and of a different nature	The number of units used is divided by the number of units produced
Composite Ratio	It is a ratio between two quantities of the same unit and of the same nature	The total turnover divided by the number of workers
Composite indicator	Algebraic synthesis of indicators of different nature	Working conditions index x Competency coverage index x Suggestion rate
Installment	An overall estimate for a set of criteria in a table	Customer satisfaction score based on arithmetic averages of customer satisfaction determinants

3.2.3 - Determine target values and strategic initiatives

The target values represent the performance levels that the organization should reach, and give reference level that allows to judge the indicator. As for the strategic initiatives, they are the programs that will raise the organization's performance and aimed to have positive impact on the indicator. Below we show the method and sources of defining target values and the role of benchmarking in this. We also show the importance of initiatives and possible improvement methods.

- **Determine the target values and their sources**

  In order to measure, it is necessary to determine the level upon which the indicator attains strong, weak, or acceptable performance.

  What level should the organization target, how is it determined and what are its sources?

  There are a group of sources used to determine the values used, which are (P. Lorino & Others, 2002, p. 84)

  - **On a historical basis:**

    What is the average level achieved in the past? Usually called the "standard" level.

    The shortcomings of this method are that it is not open to the outside and therefore does not encourage progress or change because it relies on performance achieved in the past.

    The example for this would be to use the maximum capacity achieved in the past as a target for the Manufacturing Quantity indicator.
  - **On technical basis:**

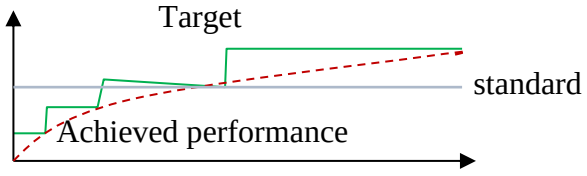
    Specialists analyze the activities and their precise pattern, and based on these technical standards, the optimal performance levels are determined.

    Example: In order to calculate the target production level, the theoretical capacity of the production chain can be calculated based on the flow rate of products and the theoretical time required to complete the activities.
  - **Based on customers' needs:**

    As a result of the heterogeneity of customers in view of their desires, quality standards, for example, change from one category of customers to another, and therefore the organization must determine the return values based on the category of customers and their aspirations.
  - **Based on the performance of another unit (benchmarking):**

    The optimal performance level is determined based on data about the performance of other competing organizations (external benchmarking) or from other units in the same organization (internal benchmarking). The next section deals with benchmarking as the most important method of determining target values.
  - **Based on a collective assessment of possible progress:**

Figure 23 – Standard benchmark vs target benchmark



Source: the author

This means collectively setting incremental targets that track continuous improvement in performance.

Noting here that their reference can be either a target value or standard value, the difference between them is that the standard value is relatively stable in time whereas the target is replaced with higher target once achieved as it is shown in the following figure.

- **Benchmarking**

  Benchmarking is defined as conducting a comparative analysis of performance with the aim of identifying possible improvement opportunities and knowing the status of the organization in comparison with other organizations or units or with its previous status.

  Through benchmarking, the organization seeks to find the best experiences and identify factors of excellence through the information collected with the aim of improving the organization's performance.

  The following table explains the types of benchmarking and the purpose of each (F. Guerra, 2007, p. 118):

Table 17 – Benchmarking types

Species	Objectives
Internal	An internal comparison in the organization between its business units
Competitive	Comparison with the product, service or specific comparison with competitors
Functional	Comparison with similar jobs in the same industry of a non-competing organization
General	Comparing work methods and operations with other industries

Changing target values may require a radical or partial change in work methods and activities, and this transformation must be followed up.

- **Developing initiatives to improve performance**

balanced scorecards, after the targets are determined for the perspectives mentioned in the card, managers and work teams must develop the necessary initiatives and programs to reach the target performance.

Noting that sometimes the existing initiatives in the organization may meet the requirements of some of the targets, whereas for the other objectives, new initiatives are required.

If the objectives set in the perspectives of the balanced scorecards do not appeal for an outstanding shift in performance, then new initiatives are required.

Existing initiatives are modified to meet the organization's performance management requirements. Examples of initiatives that can be adopted include comprehensive quality programs, employee empowerment programs, process re-engineering, competition programs based on excellence, many skills and competency development programs, programs related to marketing or accounting aspects, and others (W. Mohammed & S. Idris, 2009, pp. 130-131)

- **Definition of Initiatives:**

  Initiatives are considered to be the main projects that will facilitate implementation and completion processes at lower organizational levels. Traditional examples of initiatives include: Quality development programs, marketing initiatives, resource planning and distribution initiatives, customer relationship management, feedback programs, supply chain management, benchmarking programs, and others.

  There are four basic steps that lead to developing the desired initiatives, as follows:

  1. Taking an inventory of all current initiatives in the organization.
  1. Make a plan for these initiatives and align them with the organization's goals.
  2. Eliminate non-strategic initiatives and develop alternative initiatives that are strategic in nature.
  3. Choosing initiatives that are appropriate to the nature of the specific objectives.

- **Effective initiatives:** The most appropriate initiatives and programs are meeting the following specifications:
  - The feasibility of implementation in terms of fund and ability of the organization to provide all the necessary resources for it.
  - The ability to measure its progress during the various stages of implementation and to measure its impact on performance.
  - The ownership and returns of the project
  - The main responsible for the success of the project.
  - It works in harmony with the defined goal and has clear role in contributing to its achievement.
  - The need to invest in the efforts of organized working teams and good leaders.

Adopting specific initiatives and mobilizing resources for them for the purpose of improving overall performance and achieving targets are supposed to be creative processes (Creative Processes) In order for this creativity to be embodied, the stages of the planning process are supposed to be linked to the balanced scorecards system in order to form together an interconnected series of creative activities (W. Mohammed & S. Idris, 2009, p. 132).

Strategic initiatives are supposed to direct continuous improvement of performance so that the use of these initiatives is justified from a performance and organizational perspective. This approach is supposed to start from the presence of indicators in the light of which the credibility of these initiatives is measured by their positive impact on performance, given that these initiatives are the actual link between the goals. The strategy and how to transfer it to real achievement through targeted measurement indicators.

We have seen in this section the strategic framework in which the balanced scorecards is built, which is the mission, vision, values, goals, and how to build the strategic map, then the method of choosing appropriate indicators, defining the target values, and developing initiatives. Thus, all the necessary elements for designing the dashboard were fulfilled.

3.3 - BALANCED SCORECARD INTEGRATION.

The success of the balanced scorecards does not depend on the quality of its design only but also and like any administrative tools it depends on its integration within the organization's system. Will see in this section we will answer the following questions:

- What are the implementation stages and operation activities?
- How do we gather data and information?
- How do we calculate indicators?
- How do we communicate results and review performance?
- What are the implementation success factors and conditions?

The dashboard operating activities are (W. Mohammed & S. Idris, 2009, p. 115)

1. Identify and define the strategic measures and indicators. Here, measures are developed to clarify strategy. Therefore, it focuses on a few basic measures that are linked with other measures in a cause-and-effect manner and represent together the organization's strategy.
2. Integration of metrics with the management system: the balanced scorecards is supposed to integrate with the organization's formal structure, culture, and human resources applications. Thus, the balanced scorecards will give some meaning to the balanced metrics.
3. Examination (review) of measures and reproducibility of results.

In general, it can be said that operating a dashboard means collecting data and information to calculate indicators, publishing and communicating results, and periodic review of performance, each of which we discuss in the following sections.

3.3.1 - Collecting data and information and calculating indicators:

In most cases, after designing the dashboard, it is not possible to follow all the indicators due to the absence of the necessary information for that, which leads the organization to adopt indicators that can only be calculated. This is a big mistake because the inability of the information system to provide the necessary data is evidence of the absence of administrative processes of great importance. In the organization, therefore, the organization must change its procedures and update its information system to enable it to obtain the information necessary to calculate the indicators.

If calculating indicators depends on the presence of fundamental and strategic information, what is this information for each axis? How are they obtained and collected?

- **Financial axis and customers**

This element deals with the information necessary to calculate the indicators of the financial axis and the customer axis.

- **Financial axis:**

  Financial indicators are calculated based on the organization's financial and accounting statements (budget, results accounts table, and cash flow table). Therefore, the quality of the financial indicators is linked to the validity and reliability of the financial and accounting statements. The following example shows the method of calculating the profitability of an organization's private funds between 2009 to 2011.

  The following table shows the private funds held by the S Foundation (F. Guerra, 2007, p. 17).

Table 18 - Equity

Organization	**2009**	**2010**	**2011**
Capital	100 000	100 000	100 000
Reserve	30 000	35 000	40 000
Results	2000	2000	2000

The calculation of cost indicators is based on a table of results calculations provided by cost accounting as it is shown in the following table (F. Guerra, 2007, p. 177) :

Table 19 – Profit and Loss accounts

Organization	**2009**	**2010**	**2011**
Revenues	100 000	110 000	120 000
Material Consumptions	-40 000	-44 000	-48 000
Direct added value	60 000	66 000	72 000
Services	8 000	8 500	9 000
Value Added	52 000	57 500	63 000
Social expenses	36 000	36 100	36 200
Default expenses	3 000	3 200	3 400
Operational costs	47 000	47 800	48 600
Debt expenses	6 000	6 200	6 400
Result (before taxes)	7 000	12 000	17 000
Taxes (42 %)	2 940	5 040	7 140
Net result (after taxes)	4 060	6 960	9 860

The profitability of own funds is calculated as follows:

Profitability on equity = Money turnover * profitability rate = $\frac{revenues}{equity} * \frac{net\ result}{revenues}$.

The following table gives an example on profitability (F. Guerra, 2007, p. 178)

Table 20 – Financial profitability

Organization	Financial profitability	Profitability rate	Private money cycle
2009	0.05	0.04	1.22
2010	0.08	0.06	1.26
2011	0.11	0.08	1.30

For the indicators that relate to product cost or profitability by product or by customers segment we refer to the cost accounting system.

- **Customer axis:** Measuring the marketing performance for each segment assumes the existence of marketing segmentation in advance.

  Regarding the profitability of segments: The activity-based costing method provides an effective tool for measuring customer profitability, as it evaluates the returns achieved by the customer and subtracts from them the costs for manufacturing and distribution.

  - **Regarding customer satisfaction** (P. Kotler & Others, 2009, p. 172)
    - **Secret customers:** This is when someone plays the role of the customer and describes his feelings and impressions about the service, whether positive or negative. He can simulate critical situations in order to test the response and reaction of individuals (salesmen) to a specific situation.
    - **Customer departure rate:** This is done by contacting customers who are likely to go to competitors, where they are inquired about the reasons for their dissatisfaction and the defects affecting the product or service. These procedures are based on identifying critical events that could push the customer to switch to another supplier. After that, the events are classified according to their frequency and impact.

      The shortcomings of this method are its inability to measure overall customer satisfaction, but rather it focuses on the main problems and their consequences.

  - **Customer satisfaction survey:** In order to know and measure customer satisfaction over time, the organization periodically investigates a representative sample of its customers using a questionnaire to measure the various elements of customer satisfaction. The customer satisfaction questionnaire contains two elements:
    - The relative importance of different elements evaluated by the customer.
    - The level of satisfaction of each customer and his judgment on all elements.

This study is carried out based on three methods: face-to-face investigation, via telephone interview, or by sending a questionnaire via e-mail. The following table shows the characteristics of each method (F. Guerra, 2007, p. 128).

Table 21 – Customer Satisfaction Campaign

Method	Size	Cost	Effectiveness	Positives
E-mailing	OK for large sizes	The least expensive	Depends on the quality of the questionnaire, risks: boredom, partial answer and poor response rate	easy to use Low cost It can be done internally
Phone calls	OK for medium sizes	Dependent on sample size and techniques used	good Guarantees useful answers	Quality of information obtained An important number of questions and answers Get answers quickly
Face-to-face interview	A specific and targeted group	Internal: personnel cost Externally: according to the investigating party	Ideally, Risk: It takes a lot of time due to the distribution Geography of targeted individuals	Enables actual listening to custom ers Perceiving and identifying the opinions of strategic customers

After getting the results, the average customer satisfaction and the average weighting factor are calculated for each item, and based on that, the weighted customer satisfaction is calculated for each item. By summing these last values for all items, we obtain the customer satisfaction rate.

The following table shows an example of how to calculate the customer satisfaction rate (F. Guerra, 2007, p. 135).

Table 22 – Customer Satisfaction calculation

Elements	Medium importance sign	Weighting rate %	Average satisfaction score	Customer satisfaction likely
Site	9.4	13.70	9.2	1.26
Selection of goods	9.2	13.41	7.9	1.06
Price level	9.1	13.27	8.8	1.17
Quality of products	8.9	12.97	9.1	1.18
Wait when you pay	8.5	12.39	7.4	0.92
Kindness of sellers	8.3	12.10	7.7	0.93
Easy parking	7.9	11.52	8.6	0.99
Sellers Authority	7.3	10.64	8.5	0.90
	68.6			**8.41**

- **Operations and growth axis**
- **Operations axis:** Data on activities related to internal operations enable management of activities and measurement of the internal processes' performance.

  The necessary documents to calculate the indicators can be listed as follows: customer orders, operations planning data, production capacity and theoretical flows of machines, purchase orders, production orders.

  Production orders must contain: the order number, the commodity in question, the quantity produced, the start and consumption dates, the dates the order was issued and the date it was modified, and all of this applies to purchase and subcontracting orders.

  Calculating inventory levels requires entering data on inventory flows and movement into the computer to calculate the average inventory for all items.

  In order to know the quality, costs, deadlines and volumes of previous operations, the organization must maintain a summary of inventory movements, orders, purchase orders, production and handling in the records of the production function (A. Courtois, 2001, p. 201).

  The cost component is calculated based on cost accounting systems, activity-based costing provides more detailed and accurate data on costs of activities and operations.

- **The focus of organizational growth and education:**

  It includes the mobilization of individuals (satisfaction, motivation and communication), competence and strategic capabilities of information systems.

  Regarding worker satisfaction and motivation, an internal survey can be used by the organization for the purpose of assessing their satisfaction and motivation regarding the basic points affecting their motivation. In the investigation, we follow the same approach as the customer satisfaction survey. The following table (F. Guerra, 2007, p. 161) shows an example of the results of the Swiss Post Individual Satisfaction Survey for the years 2003, 2004, 2005.

Table 23 – Employee satisfaction indicator of Swiss post offices

Individual satisfaction			
Satisfaction elements	2003	2004	2005
▪ Questionnaire return rate	58.5%	63.8%	65.5%
▪ Individual satisfaction index	67	65	67
▪ Individual loyalty index towards the organization	79	77	78
▪ Customer satisfaction factors	78	78	79
▪ Work content	70	66	67
▪ The burden of work, the pressure of the group	74	74	75
▪ Working hours	73	72	73
▪ Composition	61	60	61
▪ Relationship with officials	72	72	74
▪ Decision making process	61	61	63
▪ Pay and benefits	63	63	64
▪ The method of work	71	71	72

- **Contribution of Enterprise Resource Planning.**

  In general, the enterprise resource planning enables:

  - Eliminate duplication of information;
  - Improving the process of analysis, collection and dissemination of information in terms of quality and timeliness.
  - Disseminating information securely.
  - Modifying activities above standards (e.g. accounting).

  Going back to the balanced scorecards, the ERP systems, or rather information technology, facilitates the process of collecting, analyzing data, calculating indicators, and publishing the results through:

  - Approving indicators and linking them to the database that contains all operational data about activities for all functions.
  - Real-time and automatic updating of indicators.
  - The possibility of linking the dashboard to another system or applications such as the cost accounting system.
  - Participation of individuals at all levels in information about performance and strategy.
  - Ease of viewing managers and managers on the dashboard.

We will speak more about ERP capabilities in performance measurement in the ERP chapter.

3.3.2 - Publishing results and reviewing performance

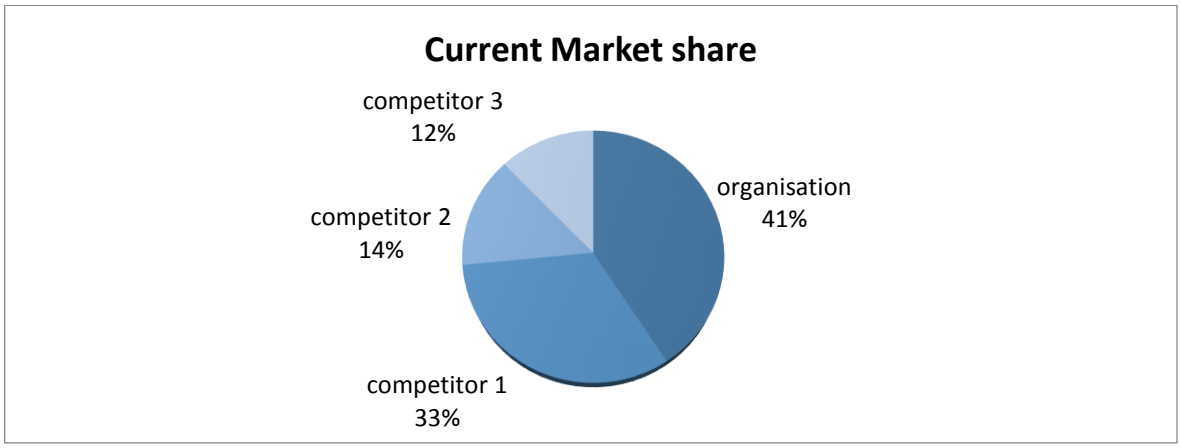
In this section, we will address how to display of indicators, communicating on them and periodic performance review.

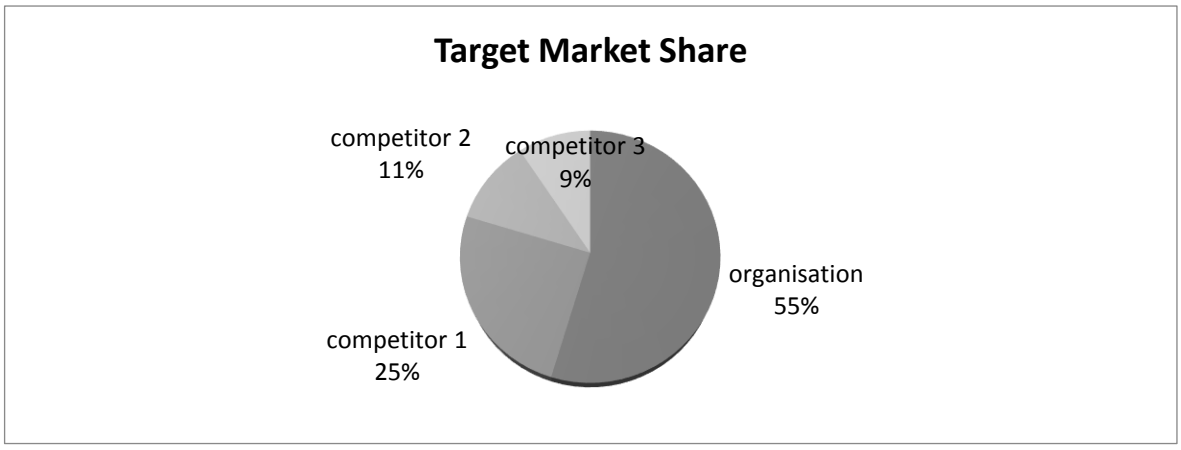
- **Displaying indicators**

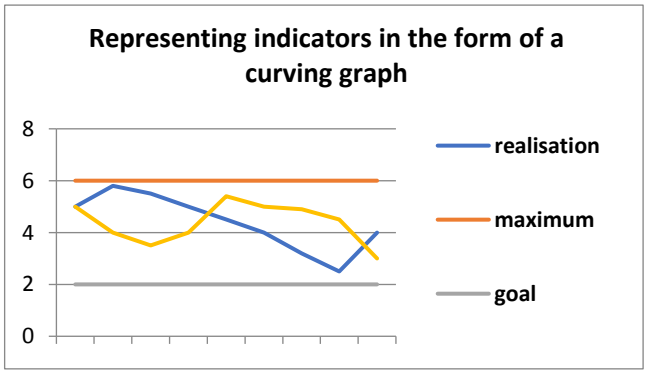
After collecting the information and calculating the indicators, the indicators are displayed in graphical charts that are easy to understand and to translate by the users. Therefore, the way of displaying indicators is linked to target message to be conveyed and to the need and requirements of the concerned user by this indicator.

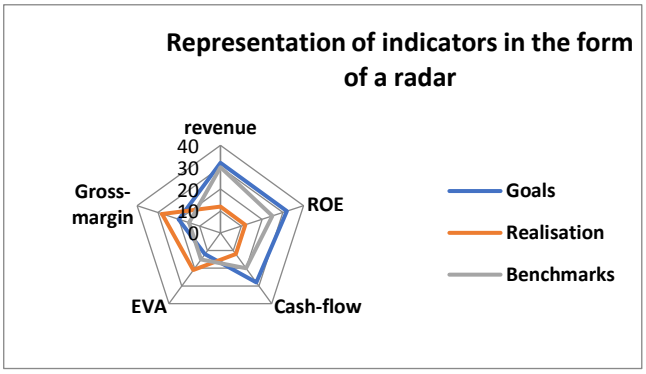
Indicators can be displayed in columns, curves, radars or circles depending on the nature of the indicator and the user. The following figures show examples of each type of chart (made by the author).

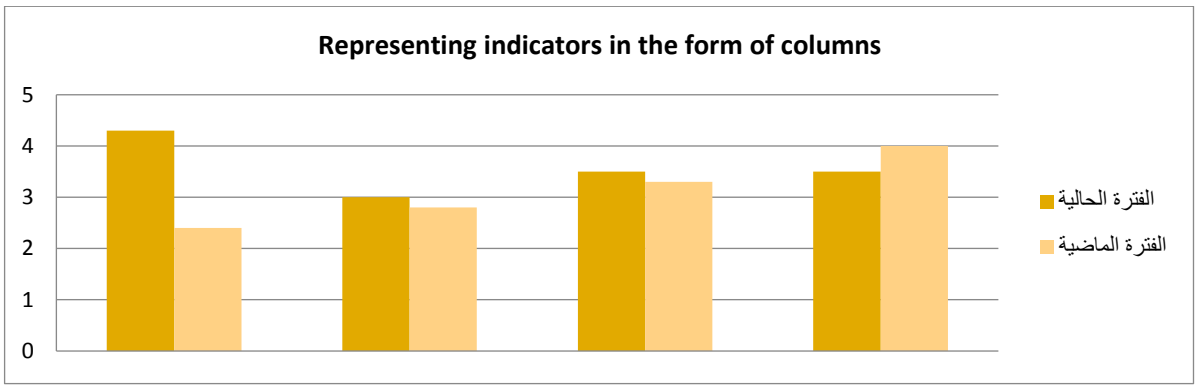
Figure 24 – Different graphical illustration of indicators











- **Communicate and clarify the balanced scorecards.**

Adopting a balanced scorecards contributes to the organization's efforts to make its strategy a success. In this context, establishing a dashboard is not enough. Rather, the organization must make its strategy a daily issue and the main concern of every individual concerned with its implementation in the organization, through:

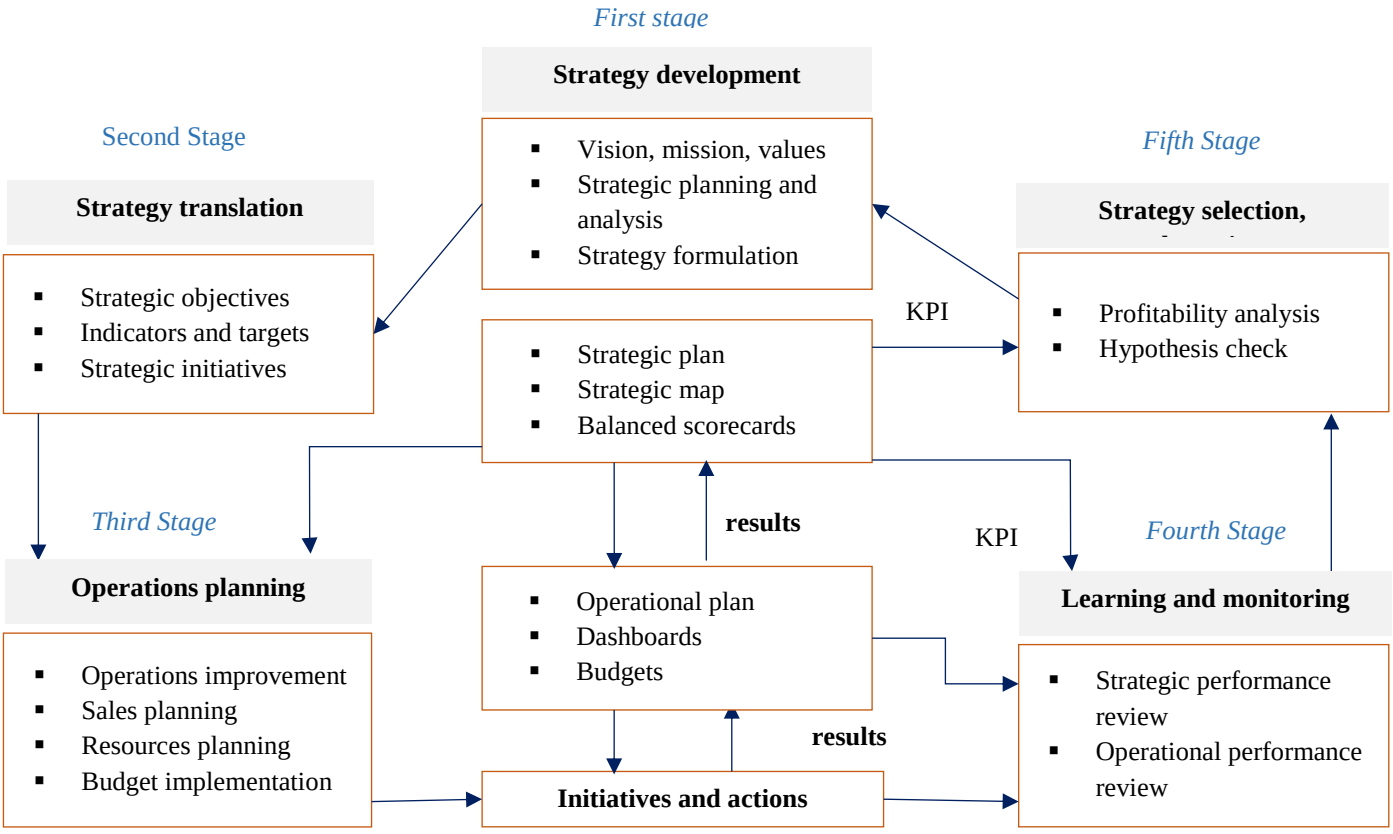
- **Training and communication:** Individuals must be introduced to the strategy and its challenges, and they must understand the balanced scorecards, its role, and the set goals and indicators through training programs and communication plans.
- **Setting individual and collective goals:** This means that individuals know how to influence the implementation of the strategy and its success, as managers must help workers and individuals set individual or collective goals in accordance with the strategic goals.
- **Motivation and reward systems:** This means that individuals receive rewards in the case of the organization's success, as the role of the motivation system is to link the organization's performance to the individual reward and incentives (R.S. Kaplan & D.P. Nortan, 2003, p. 229).

- **Periodic Performance review.**

  Many organizations fail due to the disconnection between strategy and operational activities. The corresponding figure shows the organization management system in five stages linking strategy to operations (R.S. Kaplan & D.P. Nortan, 2007, p. 65).

  - **The first stage:** The organization begins by developing the strategic framework (vision, mission and values).
  - **The second stage:** After that, the organization's vision is translated into specific goals and ambitious initiatives through the strategic plan.
  - **The third stage:** Based on the strategic plans, the organization draws up the operational plans and resources necessary to achieve the goals.
  - **The fourth stage:** Implementing activities and initiatives, where results are followed up and feedback on implementation is learned

Figure 25 – Linking operations to strategy.



The fifth stage: In order to monitor and lead the achieved results, managers must organize three types of periodic meetings

1. Periodically reviewing the performance of operational operations to confront urgent and intractable problems.
2. Strategic management meetings that review the development of strategic indicators and initiatives to assess the degree of progress.
3. Evaluating the performance of the strategy and modifying it: Here, the managers meet to evaluate the performance of the strategy itself and modify it if necessary.

Each type of meeting has its own topic, frequency, and type of individuals attending, as shown in the following table (R.S. Kaplan & D.P. Nortan, 2008, p. 73):

Table 24 – performance review meetings

–	Types of meeting		
	Operational review	***Strategic review***	***Test and modify the strategy***
Necessary Information	Operational dashboard (weekly and monthly reports)	Balanced scorecards and strategy maps	Strategic map: dashboard, profitability analysis, competitive analysis
Frequence	daily, twice weekly, monthly.	monthly	Annually or quarterly (every three months).
Attendees	Responsibility of functions and departments, middle management	Middle management, officials of strategic axes (initiatives and goals), strategic management official	Business unit manager, middle management, officials and strategic axes
Subjects	resolving practical problems (decline in sales) such as delays in delivery times, equipment failure or supply problems	Strategy implementation	Test and modify the strategy based on analysis of causal relationships, profitability of products and sales channels, change in the external environment, Upward strategies Modern technologies and development
Goals	Responding to problems faced in the short term and activating continuous improvement	Strategy adaptation	Gradual improvement or total transformation of strategy. Developing strategic and practical plans, defining target values. Allocating resources to strategic initiatives.

3.3.3 - Audit the dashboard.

- **Auditing the dashboard and performance monitoring system**

Strategic performance measurement is not limited to developing a dashboard that includes a set of indicators, as the dashboard is a tool for implementation and strategic performance measurement and a means for communicating goals and following up on achieved results. It must be ensured periodically that the approved indicators provide appropriate information to the needs of managers and decision makers. In other words, it must be ensured that the indicators provide A faithful and reliable picture of the organization's achieved performance.

It appears that it is necessary to periodically verify the effectiveness of the driving system by checking the following points (F. Guerra, 2007, p. 208).

- The dashboard is updated periodically.
- The selection of indicators is done systematically and accurately.
- Ensure that the approved indicators enable monitoring progress in achieving goals and reflect developments in the environment.
- Ensure that the information in the possession of managers is reliable and supports decisions.

External auditor may assess the quality of the dashboard by identifying weaknesses and suggest the necessary improvements.

- **Auditing the dashboard indicators:**

  Regarding indicators, the auditor must ensure that:

  - There is an identification card for each indicator that provides the needed information to understand and calculate it.
  - The existence of training and familiarization programs for all individuals with the indicators used.
  - Consistency and reliability in the content and quality of the data used in calculating the indicators.
  - The method of calculating the indicators is correct.
  - Matching target values and reference values to the indicators.

- **Reasons for the failure of the project to develop a balanced scorecard**

The failure of a balanced scorecards design is usually due to the quality of its design. Sometimes only few indicators are adopted in each axis or in some other cases many a large number of indicators are used or the fact that indicators are not balanced between outcome indicators and performance determinants. In general, it can be said that a successful design is reflected in the dashboard's ability to describe the strategy.

As for the process of operating the dashboard: The reasons for failure in this case are often due to the project management:

- Weak commitment from management.
- The project was limited to a small number of workers.
- Maintain a dashboard in senior management.
- The length and slowness of the project.
- Consider the dashboard as a system.
- Use the dashboard only for rewards.

- **Weak senior management commitment:**

  Management commitment is essential to the success of the dashboard for several reasons (R.S. Kaplan & D.P. Nortan, 2003, p. 390)

  - Top management needs to clarify the strategy for all parties concerned with its implementation.
  - Senior management is the only body that has the authority to make the crucial decisions required by an effective strategy.
  - Senior management includes the final arbiter in the event of disagreement on the necessary directions or options.
  - In addition to the authority of senior management, its commitment constitutes moral support and framing for the project of building the balanced scorecards.

- **Limiting the project to a small number of individual workers:**

The organization's commitment to the strategy and its implementation requires the commitment of the entire management team regarding the formulation of goals and indicators, otherwise no change in their behavior will occur. Periodic meetings are relied upon to discuss the dashboard design and integration project in order to ensure the commitment of all those responsible for the dashboard development process.

- **Maintain the dashboard only at the senior management level:**

In order for the dashboard to be successful, the organization must include and participate with all individuals in it, as this aims to enable every individual in the organization to understand the strategy and contribute to its achievement by disseminating the dashboard at all levels, which prompts individual and group projects and stimulates individuals' learning and familiarization with vital processes.

For the organization, therefore, an organization that does not simplify the dashboard throughout the organization misses opportunities for creativity, learning and innovation for individuals and fails to make strategy a daily issue for every individual.

- **Length and slowness of the project:**

This is the result of the management's endeavor to design a complete and ideal dashboard, and thus it focuses its efforts on collecting and correcting the necessary information for all indicators, which increases the weight of the project and leads the organization to abandon it.

The lack of necessary data for some indicators does not stop the dashboard from working, as the dashboard must be a dynamic system: the content and number of indicators change according to new needs.

- **Considering the dashboard as a system:**

This is due to the organization's adoption and integration into an automated system as part of its endeavor to collect all the necessary information for all indicators in an automated manner by providing a standard interface for review and follow-up by managers.

The automated collection of information does not solve the problem of the lack of information necessary to calculate indicators, and the large data provided by the system do not replace the strategic map of the causal relationships between the goals and the limited essential indicators that represent the strategy.

- **Using non-specialized consultants:**

The lack of expertise and experience of consulting offices leads to the development of traditional leadership boards under the name of a strategy leadership board as a framework for implementing and making the strategy successful.

- **Use the balanced scorecards only for rewards:**

This is when the organization relies on non-financial indicators in defining incentives and rewards, and while the relationship between financial and non-financial indicators is absent, managers' focus on non-financial indicators enables improvement in the non-financial performance, whereas the improvement is not reflected in the final financial performance of the organization.

The success of the balanced scorecards depends on the quality of its design, as well as the way it is integrated into the organization. The balanced scorecards is designed starting with drawing the organization's vision and strategy, building the strategic map, then choosing the appropriate indicators for each goal. After that, the dashboard is integrated by updating the information system to provide the necessary data to calculate and represent the indicators to be done afterwards. It is used by managers to review performance and communicated to all individuals in the organization.

CHAPTER 4 - ENTREPRISE RESSOURCE PLANNING:

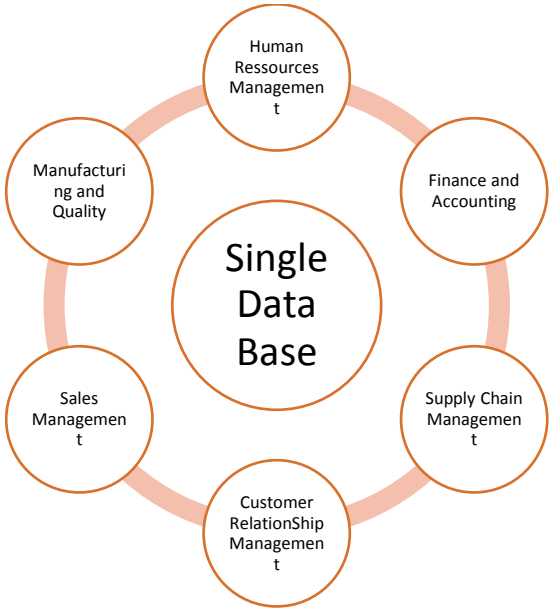
4.1 - INTRODUCTION TO ENTREPRISE RESSOURCES PLANNING

4.1.1 - Definition and evolution of ERP

The ERP acronym stands for Enterprise Resources Planning, the ERP is a software that allows you to manage all of the processes of an organization by integrating all the functions such as human resources management, finance and accounting management, CRM or SCM.

The following figure show the main ERP modules (Source: Made by the Author)

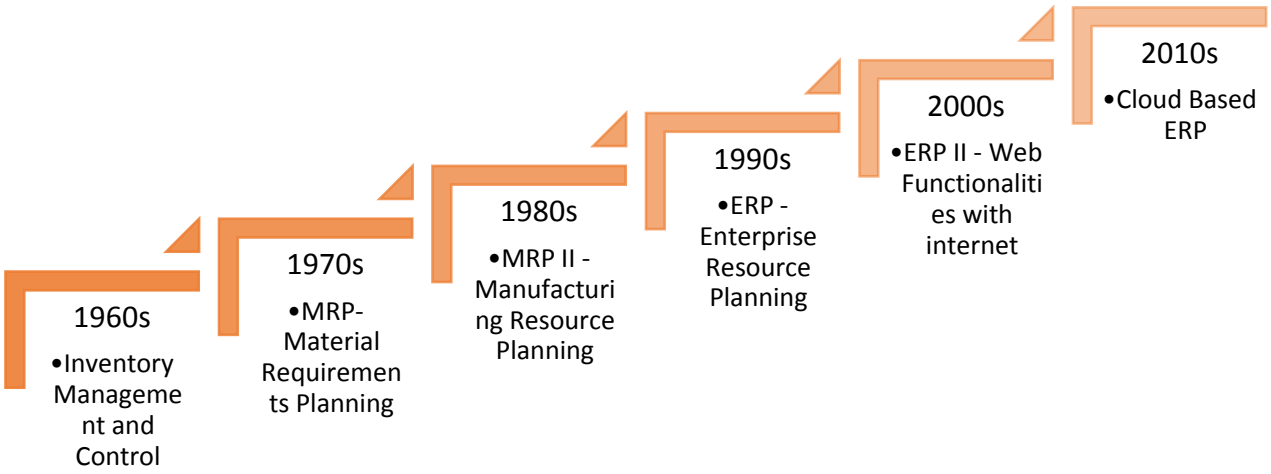
Figure 26 - ERP Modules



The ERP is based on the construction of computer applications for each of the functions of the organization in the form of independent modules that share a **common database** allowing the communication of data between these applications (Norigeon, 2010).

The following figure shows main ERP evolution stages (A Brief History of ERP – since 1960 and the future of ERP, 2023).

Figure 27 - ERP Evolution



In the early 1960s, American engineer Joseph Orlicky became interested in Toyota's production system and created what he called Material Requirement Planning (MRP). This system is developed for the planning of component or raw material requirements for production management. Two other American researchers have teamed up on the subject to create MRP0, MRP1 and MRP2. The MRP0 allowed the method of calculating the needs of materials and components, the MRP1 the first industrial application of the integrated management of production flows, and the MRP2 was able to allow the planning of manufacturing launches taking into account capacities and resources. available. In 1990, thanks to MRP and its evolutions, ERP for Enterprise resource planning was invented. Today, ERP is also known as PGI for Integrated Management Software.

"ERPs are computer applications whose purpose is to coordinate all of an organization's activities around a global information system"

Previously, companies were provided with heterogeneous applications for the various trades, consequently the data was managed in silo in isolated information systems. ERP removes data silos by creating a single database. Data is shared and information is unique for everyone.

The basis of ERP is to be able to manage everything functionally in such a way as to unite the whole of an organization around a single product, a so-called integrated product. For this, it is organized into modules, where a module concerns a key function in the organization (accounting, purchasing, marketing, trade, etc.). Thus, each function carries out its current activities in the module which concerns it, and the single database for all the modules "will allow the organization to work in a fluid way by an almost immediate repercussion of the work of a function on that from another" (Durand, 2020).

The name of ERP finds its origin in the consulting and research organization Gartner, however in one study (Klaus, Rosemann, & Gable, 2000, p. 21) it was found that the name

ERP-organization resources planning is misleading due to the facts that the software doesn't focus mainly on resources and often it's not planning oriented and it would be rather named Business Systems.

4.1.1 - Hierarchy and structure of ERP

- **Modular Structure**

For the modular structure the ERP is built upon several sub modules each deals with a specific need or function of the management Source (WHAT IS CUSTOM ERP SOFTWARE DEVELOPMENT?, 2019)

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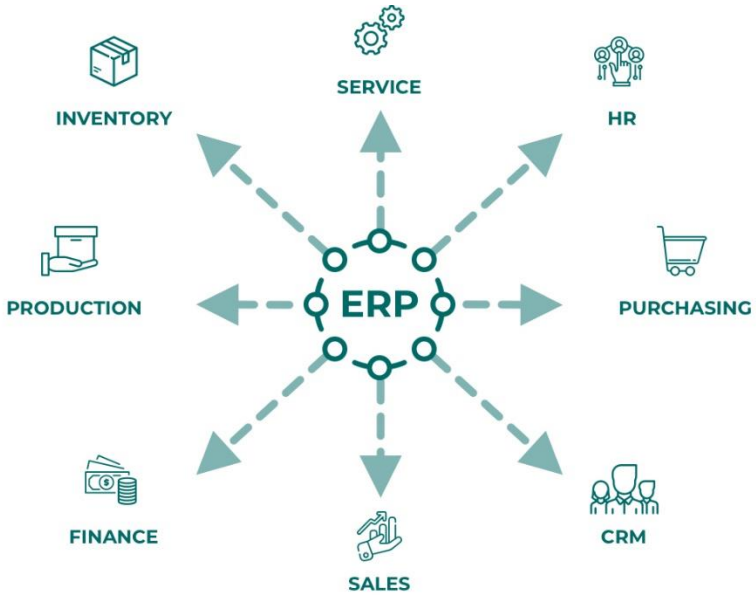
Figure 28 - ERP Modular Structure



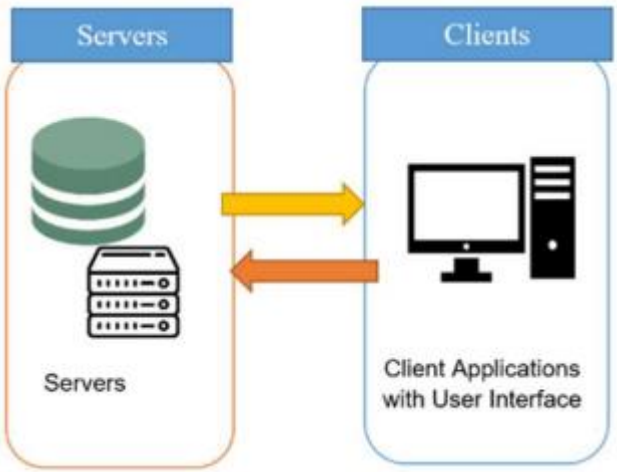
- **Technical Architecture**

The goal here is to show how the data flows technically through the system in a simple way to understand how ERP works so we will expose client server and web-based architecture and we will not get into technical details of complex technical networks

A client-server architecture represents the environment in which client machine applications communicate with server type machine applications.

The classic example is a client's web browser requesting (known as a "request") the content of a web page from a web server that sends back the result (known as a "response") (Qu'est-ce qu'une architecture client-serveur ?, 2023).

Figure 29 - Client Server Architecture (Amini Valashani & Mashud Abukari, 2020)

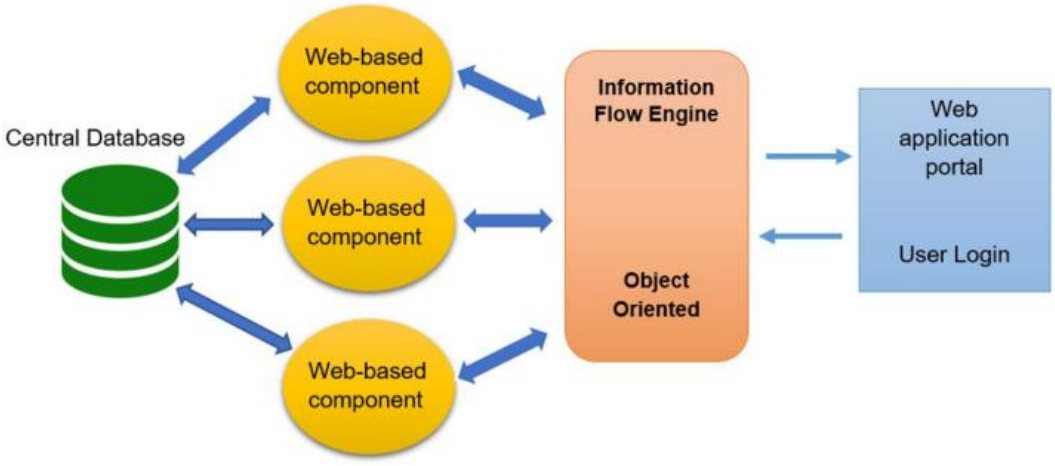


The tiered architecture also enables the designers to separate the resources into multiple layers providing security and reducing the risk of system failure.

The web service architectures make use of web technologies and concepts to deliver simple, pervasive and real-time access to ERP modules for the end users and streamline the flow of information between systems.

Web service technologies can offer many capabilities to organization software systems encouraging more and more ERP vendors to adapt and transfer their architecture in order to use the advantages of these technologies and provide powerful functionalities.

Figure 30 - Web based Architecture (Amini Valashani & Mashud Abukari, 2020)



So in summary we can the user communicates with the ERP application through a laptop or tablet or smartphone in which the application is either installed on its device or is web based, the application then communicates with the application server either locally or through internet and which processes the data from and into the database server.

4.1.1 - Benefits and challenges of implementing

- **Key Benefits**:

As seen in the following graph that shows key benefits according to consultancy group report, the key benefits of ERP are:

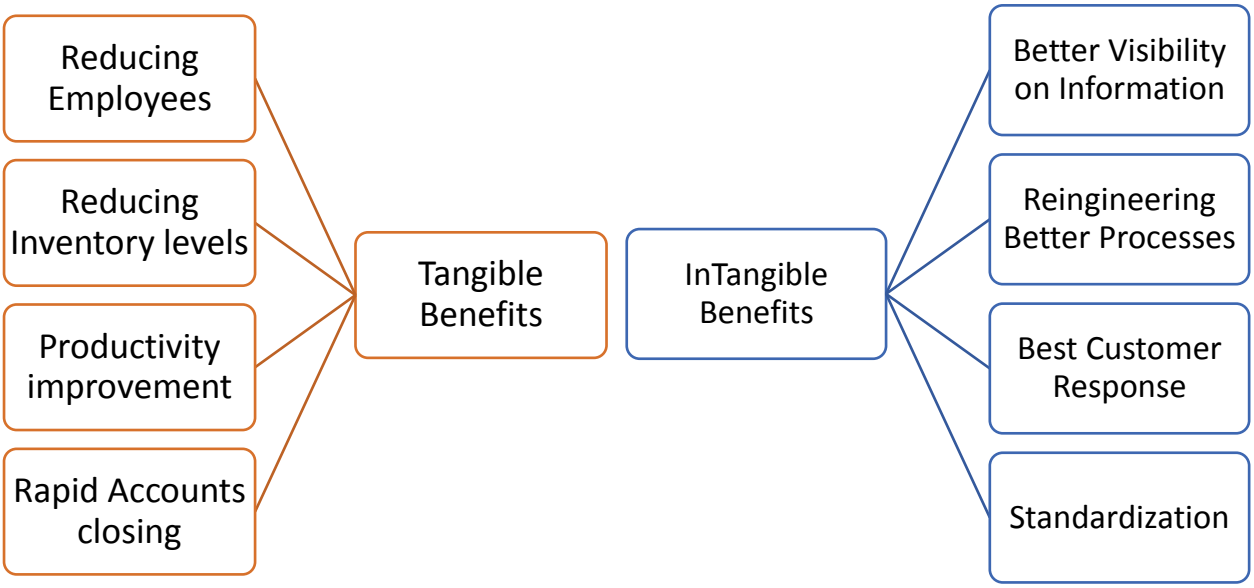
- Efficient supply chain management which results in the decrease of inventory levels
- Improving Customer Experience with CRM modules

Also, it was found that ERP implementation improved operational performance through reducing supply chain lead time which will have positive impact on inventory levels (Cotteleer, October 2002).

According to ERP trends study, the ERP implementation results in two categories of benefits: tangible and intangible

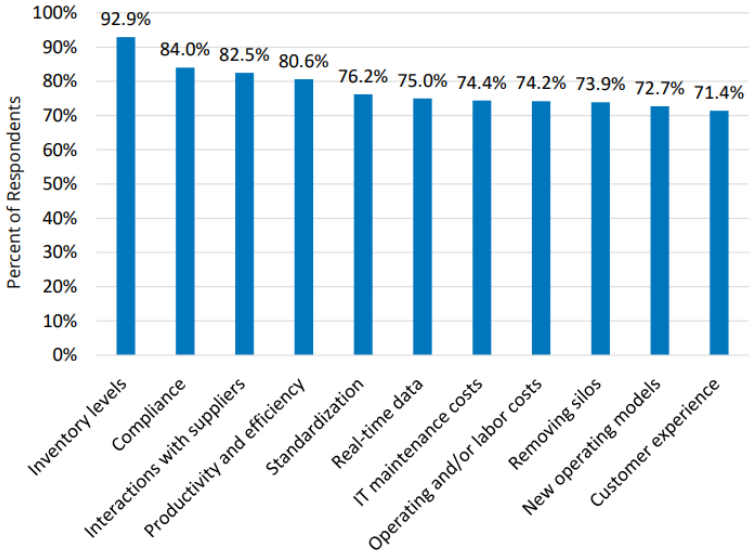
In the following Graph there are a list of key benefits from ERP implementation according to Panorama study adapted by the author based on (Tomas, 2007, p. 268)

Figure 31- Tangible and Intangible Benefits of ERP



As shown below the first ERP implementation is reducing inventory levels and improving therefore the working capital (Panorama-Consulting-Group, 2022).

Figure 32 - Benefits of ERP implementation

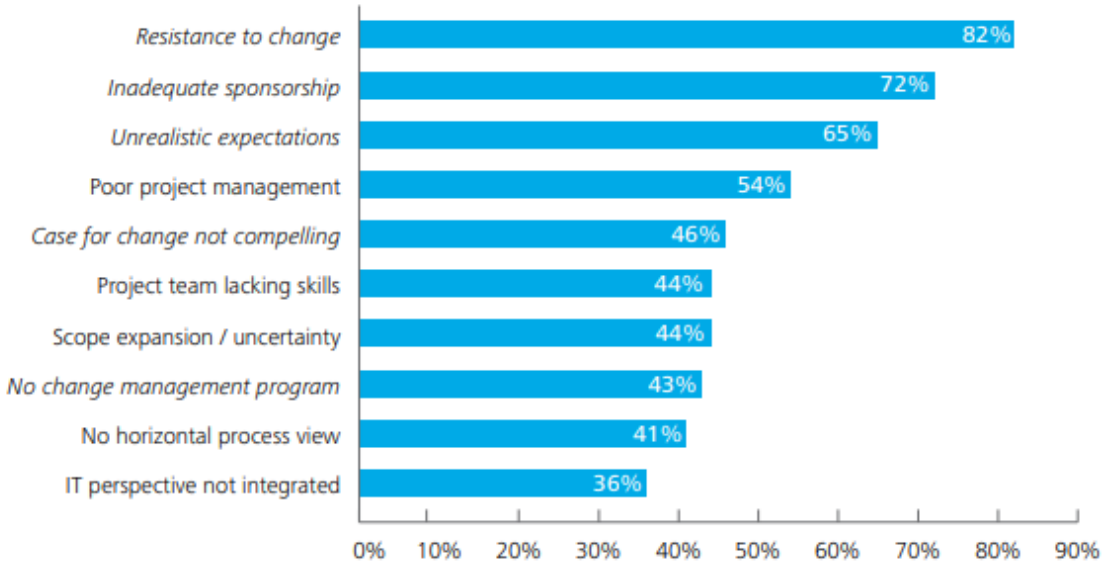


- **Challenges of implementations**

It was estimated that 55% to 75% of ERP projects fail to meet their goals, as every project the implementation of the ERP needs from the organization the total engagement from leadership, strong change management including having clear vision of the project and driving the organization to change its way of working.

According to Deloitte survey the two main challenges causing ERP implementation to fail are change resistance and inadequate sponsorship, so for any ERP project it is critical to define and articulate the need for change and have a clear vision on the resources and budget needed and the goals of the project, the following figure shows all the ten challenges (Deloitte, p. 10).

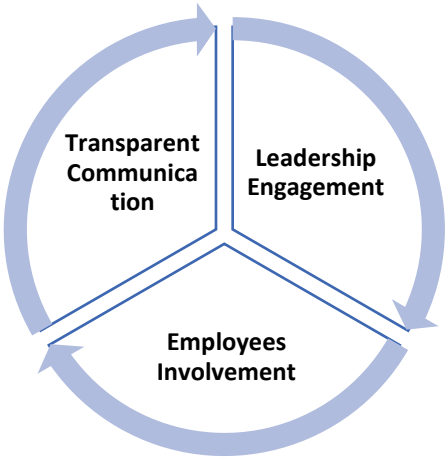
Figure 33 - Top 10 Challenges of implementing an ERP



In another study it was found that the most critical factor to the ERP project success was the Top Management support followed by change management and training (Faisal, Khan, & H.Boukhari, 2019).

For the change management, as the following graph shows the success of the change requires strong leadership engagement and employee's involvement in the other and transparent communication about the vision and expectation and the role of each one in the process (made by the author based on KPMG Article (Strijen, 2021)).

Figure 34 - Change success factors



4.2 - ERP MODULES AND FUNCTIONALITY

In this part we will discuss the main modules and functionalities of ERP and also, we will see the challenges and benefits of each of modules.

4.2.1 - Supply Chain and Customer Relationship Management

- **Supply Chain Management**

The part of ERP that deals with Supply chain management gives informative support about the flow of goods and services from supplier toward the customer which imply (Sagegg & Alfnes, 2020, p. 24):

- Sales Management module
- Inventory Management Module
- Manufacturing Module
- Purchasing Management
- Master Planning

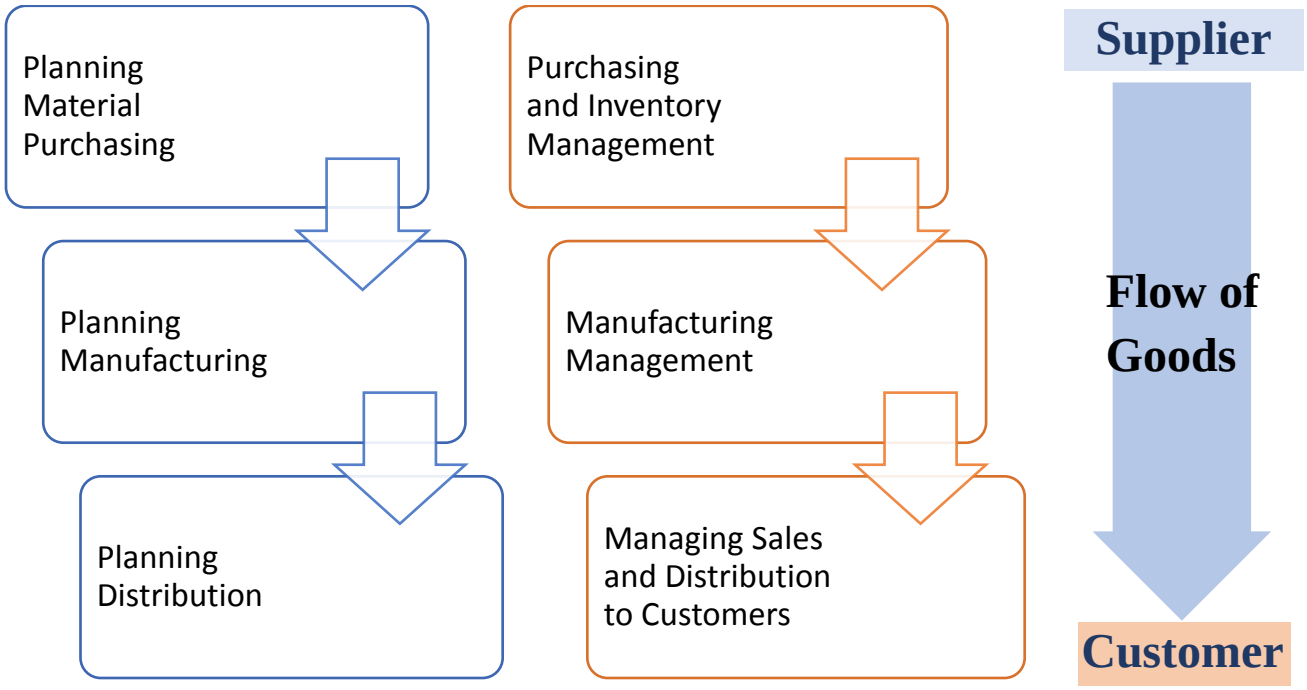
The sales module deals with managing the orders, quotations and delivery and also the customers master data that contains all contact and legal information about the customer and all the needed information in the process.

The Inventory manages the reception, Transferring and issuing of goods in the firm and it gives information about the inventory levels and allow to do transfers between different warehouses and it includes also the inventory control.

The Manufacturing module basically allows to manage the bill of material and plan the capacity and manufacturing orders in the different manufacturing workshops. And also, they could include the quality management and control.

The Master planning considered as the key component of supply chain management module allows the organization to set future scenarios of sold goods flows and projects these flows on the whole chain of supply including manufacturing plans and purchasing plans for raw material in order to harmonize the flows. efficient implementation of this module will result in optimizing costs and drop inventory levels as shown in the process chart below (Source: made by the author).

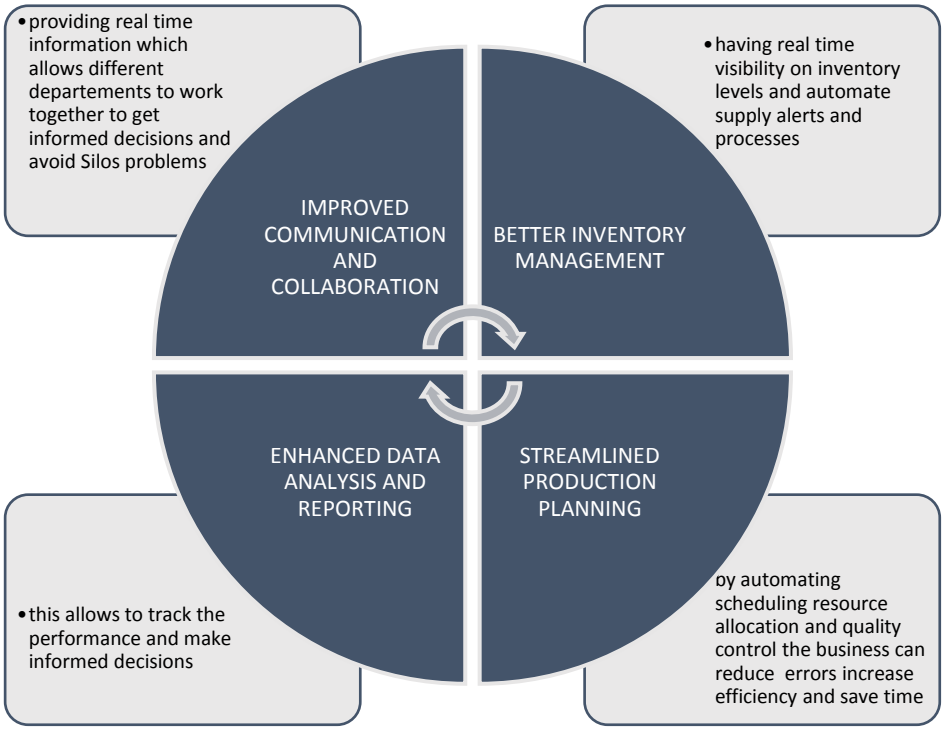
Figure 35 - The Supply Chain Management Flow



While some studies suggested that there is a link between CRM integration and firm higher performance (Huseyin Ince and Others, 2013) The main challenges of CRM module in an ERP are the lack of extended organization functionalities which is the inability to support operations across multiple organizations and the lack of flexibility in adapting to the changing needs or environment it was seen that the module could block continuous improvement efforts and lack of functionalities beyond transaction management such as decision support and efficient planning based on flow (Henk and Others, 2003).

The following figure shows the Benefits of Implementing ERP – SCM modules:

Figure 36 - ERP Implementation Benefits



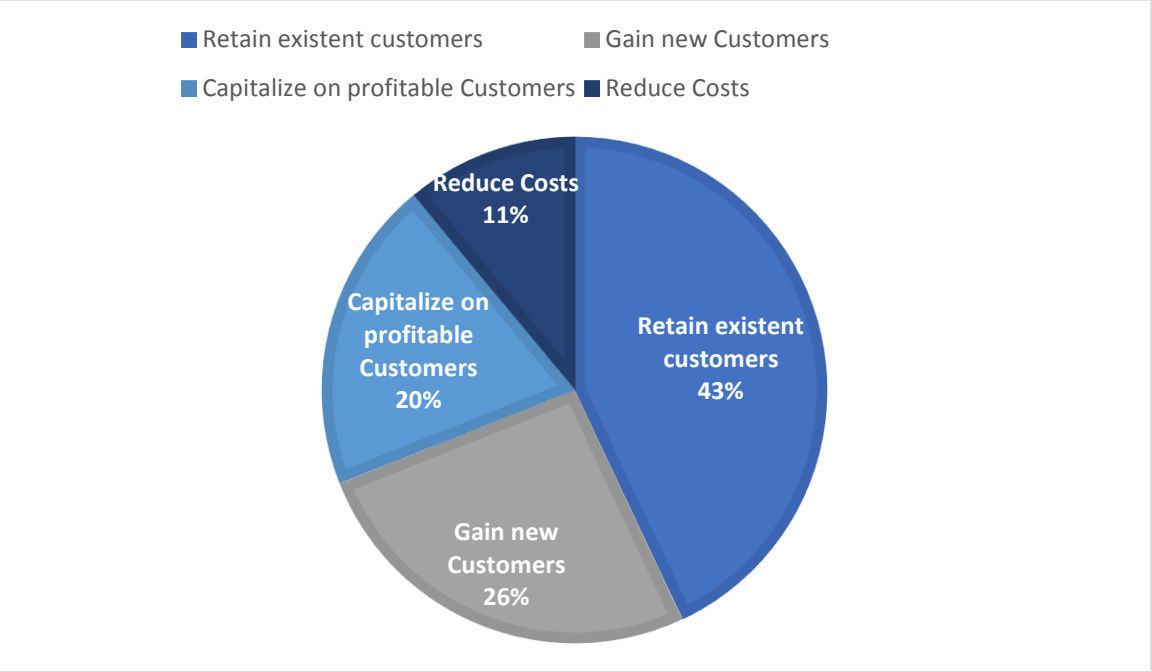
Source: by author adapted from various sources

- **Customer Relationship Management:**

The Customer relationship management – CRM is defined as the approach to identify, attract, retain best customers in order to generate more revenues and profits. It could be defined as well as the ability to build profitable relationship on long term with best customers on the base of different contact channels and with optimal allocation of resources (lefébure & Gilles Venturi, 2005, p. 33).

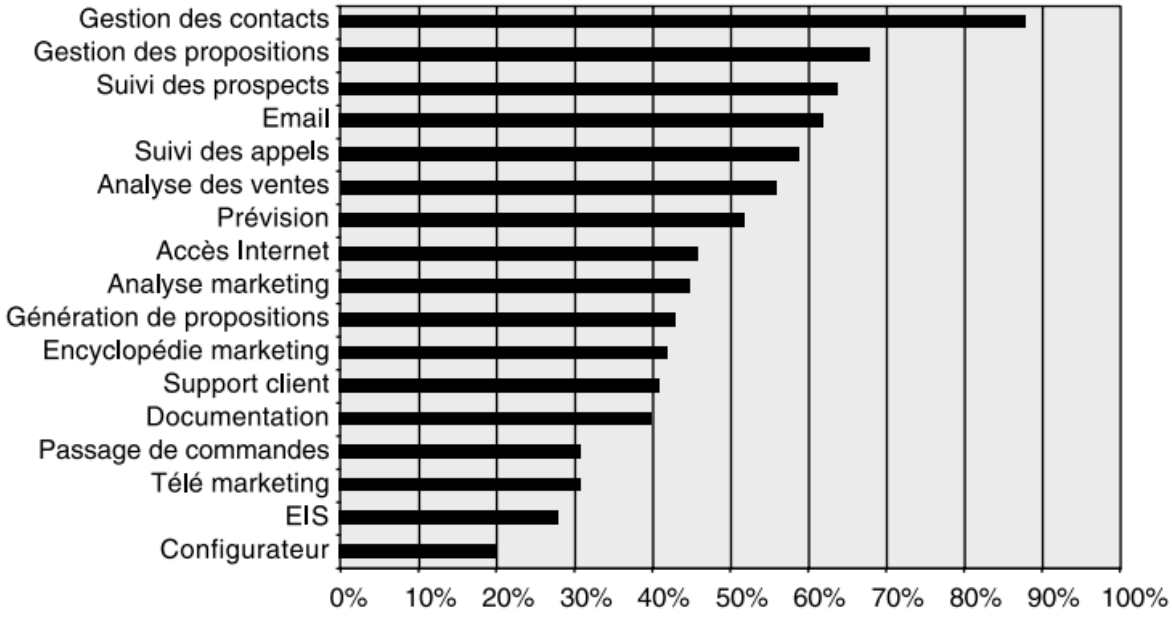
The organization invests in CRM for Marketing goals generally, the following chart shows four main reasons why organization invests in CRM the most important and common one is to retain existent customers (lefébure & Gilles Venturi, 2005, p. 39).

Figure 37 - Four Reasons Why to invest in CRM?



In order for the CRM to manage the relationship with customers and rise revenues it has to provide different features that we show in the following illustration (lefébure & Gilles Venturi, 2005, p. 40):

Figure 38 – The CRM Target features



The advantages of deploying CRM are mainly the improvement of customer satisfaction and retention and consequently the development of the customer portfolio and the increase in sales and profit rates as well as the reduction of commercial costs and sales cycle (made by the author adapted from (lefébure & Gilles Venturi, 2005, pp. 43-48))

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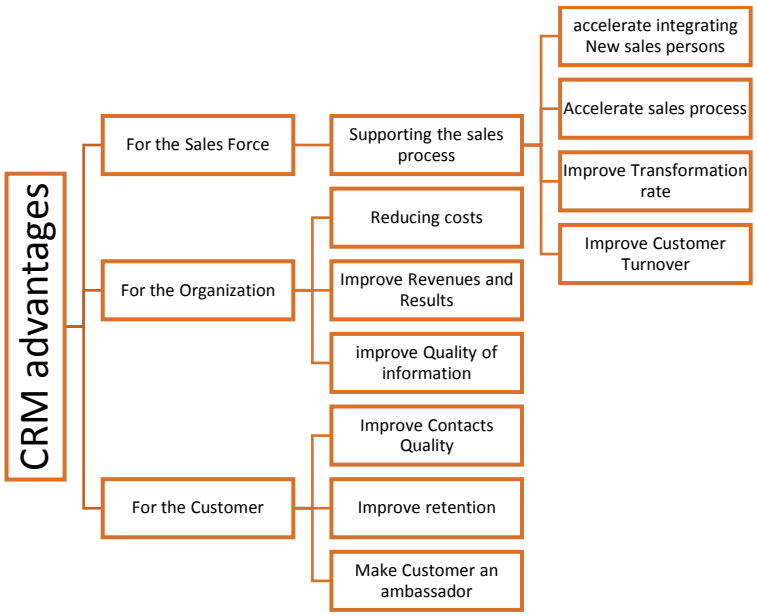
Figure 39 - The CRM advantages



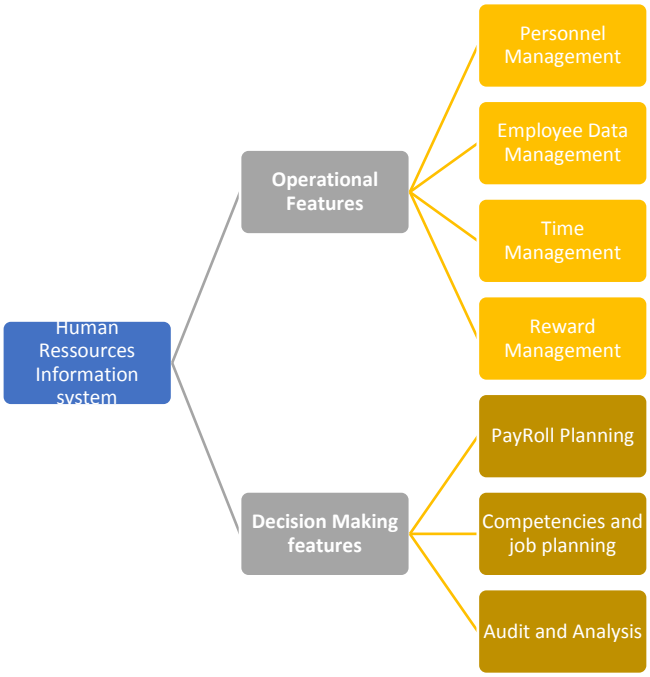
For the challenges of implementing CRM tools, a study in which respondents were asked to mention one single roadblock to the project of deploying CRM found three main issues (Timothy , Douglas, Steve LaValle, & Vikas Mittal, 2006):

- Lack of necessary resources (19%)
- Insufficient focus on change management (11%)
- Insufficient involvement of employees (9%)

4.2.3 - Human Resources, Finance and Accounting Management

- **Human Resources Management Module**
  In this module the organization has the different tools to ensure a good human resources management this includes personnel management, time management and all the different other components that will show separately in the following parts (Gillet & Gillet, 2010, pp. 90-190).

Figure 40 - Human Resources Module Features



Personnel Management:

The First Task of Personnel management is administrative management which has to ensure treating different matters for the employees in time and without any error such as holidays, medical visits, restaurant tickets, retirement, gifts, authorizations such driving permit for trucks...

The second one is Travel Orders which deals with means of transportation, accommodation, budget for that and needed papers.

The third activity is Training Management which includes collecting training needs from employees and making training plan, the administrative procedures with training centers and performing training and lastly evaluation and feedback.

Employee Data Management:

The first part of employees' data is employees file which deals with employee's main data such as birthdate, contact information; bank account, CV.

The second part deals with employee's contracts, every contract describes the status and relationship of the employee to employer including the nature of the job and reward so while an employees could have many contracts and changes through his work time in an organization, it is needed to manage these different contracts in the application.

Time Management:

In this part the application allows the organization to calculate working time, manage absence and overtime and holidays.

The first goal of time management is measuring the work time and presence time of employee in the organization and deduce the absence time and overtime.

The second goal is to know tasks done by employee in order to balance work time or analyze tasks cost or value.

Payroll Management:

In the reward management the system has to ensure the following features: transferring payroll to employee's bank accounts, insurance calculations and payment, payroll accounting, deposit, preparing legal registration and declarations relating to payroll.

Planning:

The decision-making parts include planning of the evolution of the activity of the organization and the impact on the human resources management jobs, competencies and payroll.

Audit and analysis:

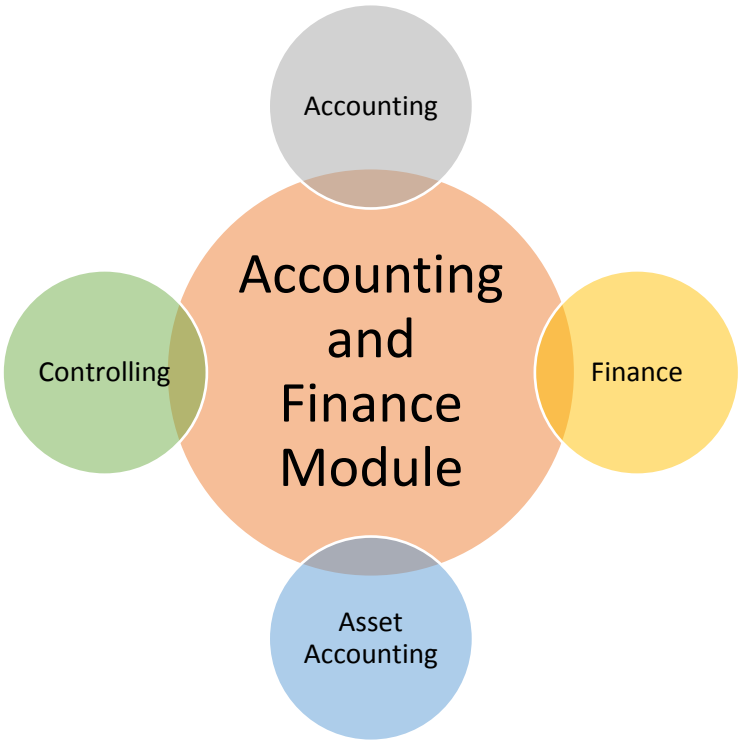
as in every other field the manager needs tools and reports to support his decision-making process.

The human resources module must allow managers to construct dashboard and keep an eye on key indicators such absenteeism, turnover, payroll or competencies covering rate.

- **Finance and Accounting:**

The following chart shows Finance & Accounting Modules components (Source**:** made by the author)

Figure 41 - Finance and Accounting Module Components



Source: made by the author

Finance:

This part deals with organization cash, which includes the following features: setting bank accounts, cash registers, register daily transaction, receipts and expenses, managing relationship with banks and also generate reports to give view on the organization's cash situation and also accounts payables and receivable reports.

Accounting:

this is the software component of an ERP system assisting businesses to manage the primary accounting and financial issues such as bookkeeping, general ledger, balance sheet, accounts payable, accounts receivable.

It assists the organization in meeting financial requirements and allows you to produce numerous financial reports (Magenest, 2023).

Asset Accounting:

The asset accounting provides the tools for monitoring and managing fixed assets and the relating accounting posts such as acquisitions, depreciation and sale of assets.

It is considered also as a subsidiary ledger to the general ledger which deals with all posting related to fixed assets (Okungbowa, 2016, p. xxi).

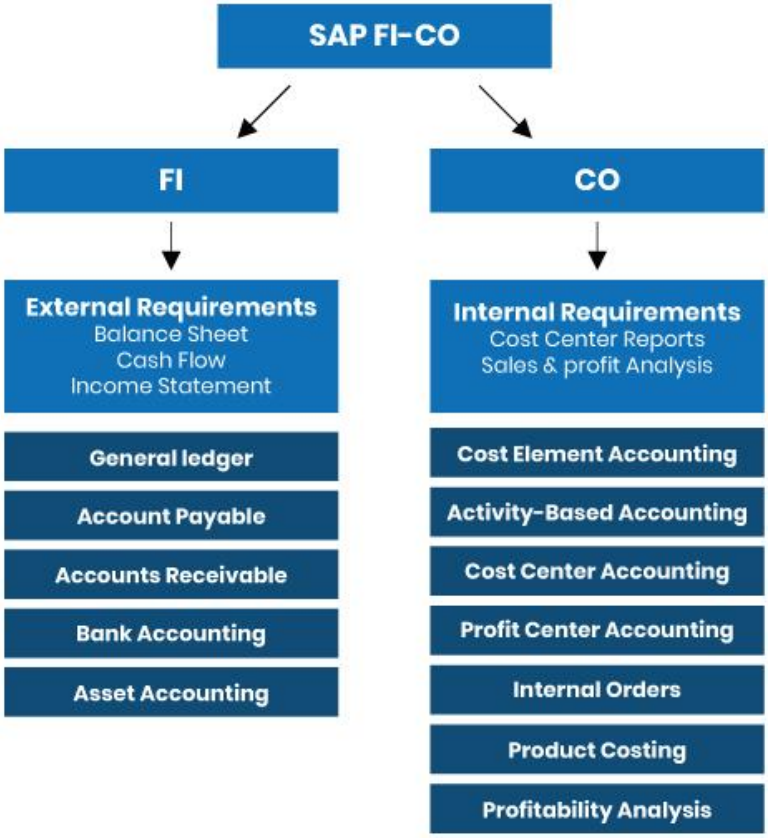
Controlling:

The first part is budget planning which means to set budget centers on the system by department or by account and then having ability to set amounts for each budget center and then the system gives ability to generate reports and analyses on Budget forecast, variances and so on.

the other part is cost accounting, in this sub module the user identifies the Cost centers and then for each cost/profit posting in the general ledger we affect the cost to a specific cost center, and once it's done for a period of time and for all accounting posting the submodule then gives ability to generate reports in order to control the data reliability and have different analysis on cost and profits.

The Following figure shows an example of SAP Financial and Controlling Module Architecture (HABART, 2023).

Figure 42 - SAP FI-CO Sub-modules



4.2.4 – Business Intelligence tools, Reporting and Performance measurement

As in any organization level or any field of management that organization in its decision-making process has to stand upon relevant reports and analysis such as production process status, sales statistics, cost reports ...

Most of ERP have pre-made reports that are often static and doesn't meet well the specific needs of the industry or the organization management setup therefore the organization has either develop its customized reports based on the tools provided by the ERP or it has to use new different reporting tool with are often called BI (business intelligence) tools that connect to the ERP database of the organization and unlike ERP reporting internal tools, the BI application allows you to connect with other data sources other than the ERP database and generate reports (Sagegg & Alfnes, 2020, p. 38).

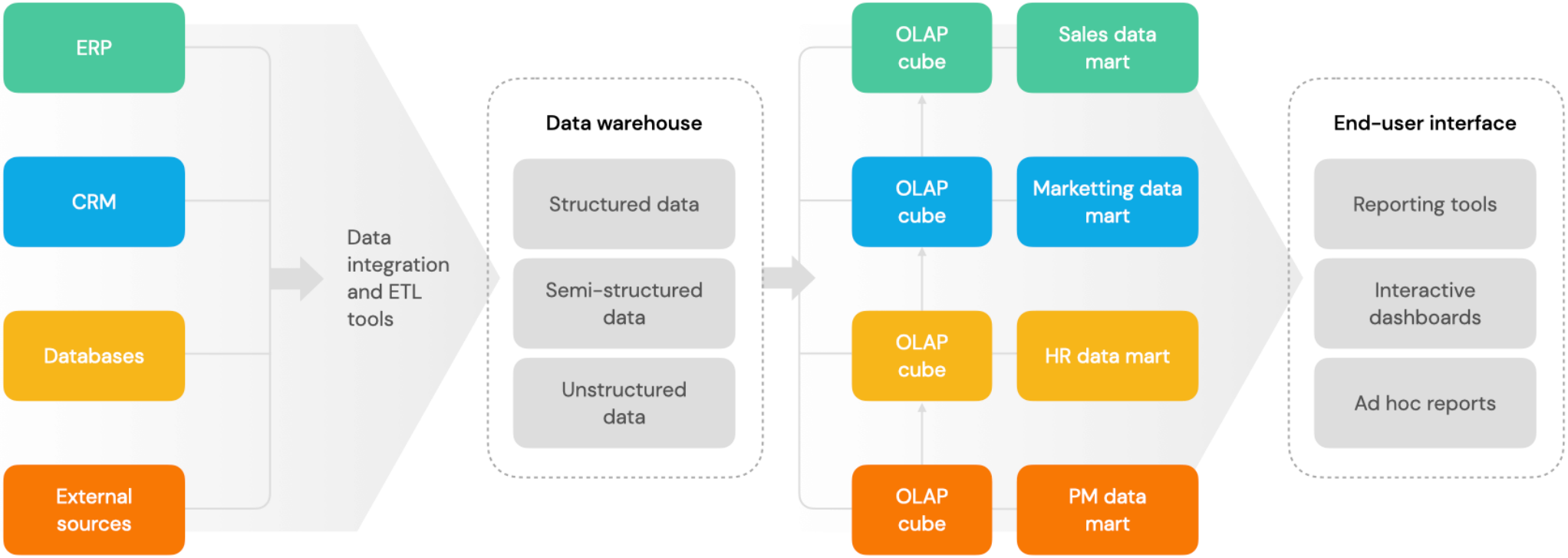
Business Intelligence designates the means, the tools and the methods that enables you to collect, consolidate, model and restore the material and immaterial data of an organization in order to support decision-making and allow a decision-maker to have an overall view of the processed activity (Girardot, 2015, p. 13).

In the following figure we show the Business Intelligence process, the OLAP stands for Online Analytical Processing, the OLAP Cube designates a simplified database better adapted for analysis that we call data warehouse (Girardot, 2015, p. 15).

While Datawarehouse speaks of organization wide database, data mart is about a specific function or process such HR or finance (Deepmala-and-Others, 2023, p. vii).

The ETL process stands for Extract-Transform-Load process, which are fundamental components of data processing which means to extract data from various sources and transform it for more consistent and more usable structure and format and lastly Load the data into the data warehouse (Deepmala-and-Others, 2023, p. 40).

Figure 43 - Business Intelligence Process



Source: (Fortum Themes, 2023, p. 3)

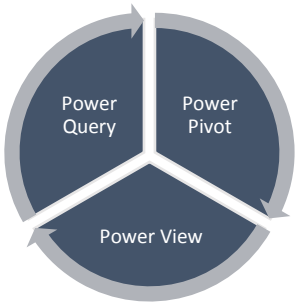
There are many Business Intelligence tools on the market, According to a recent study and as shows the following matrix, the most leading BI tools are Tableau previously named Salesforce and Power BI from Microsoft (Gartner(Kurt Schlegel, Julian Sun), 2023).

Figure 44 - BI tools market

According to another study (Gartner, 2022) the top three factors that trigger the investment in BI tools are the need for productivity improvement, competitive pressure and the intention to outgrow the current technology at the same time the top objectives for the software buyers are attracting new customers, maintaining relationship with existing customers and maintaining cashflow.

As for the user, Excel being one of most used tools for data analysis and reports production Microsoft wanted to push forward Excel performance and developed an integrated tool to excel that was named **Power BI** and is composed of three main Add-in Excel that are (Girardot, 2015, p. 18) :

- Power Query, for ETL process
- Power Pivot for data modeling
- Power View for data visualization



The Other Pioneering Tool is **Tableau** which is Business intelligence analytics software that helps users analyze data quickly, easily and usefully, Tableau let you connect to data in the cloud from a spreadsheet, SQL, google analytics or any other source and build calculations from existing data, create reference lines and forecasts, make trend analyses, regressions and correlations. With his statistical abilities the user can pivot, split, manage and optimize data (Salgador, 2018, p. 1).

In the following table we have made a comparison between Power BI and Tableau features (made by the author adapted from Power BI course (Yahiaoui, 2023, p. 19))

.

Table 25- Comparison Between PowerBI and Tableau

	PowerBI	**Tableau**
Users Number	200 million active users	86 000 customers in 180 countries in 2019
Organization size	Fits for small, mid-sized and big companies	Mid-sized and big companies
Data source types	100 types	90 types
Data preparation tool	Power Query	Tableau Prep
Data Modeling tool	Power Pivot	Tableau Desktop

Business Intelligence Benefits: in the following part we enlist ten key benefits from using BI tools (Deepmala-and-Others, 2023, pp. 40-44) :

- Improved speed of analysis and more understandable dashboards.
- Reliable and well managed data.
- Increases customer satisfaction.
- Higher level of employee satisfaction.
- Enhances Organizational Effectiveness.
- Decisions based on data.
- Competitive Advantage.
- Enhancing Market intelligence.
- Building a successful business model
- Composed and effective sales strategy

4.3 - ERP IMPLEMENTATION

4.3.1 - Selection and Vendor evaluation

Selecting the best ERP depends on various factors including organization's size, structure and industry. At this stage the organization has to define clearly its need and what outcomes it expects from the project.

In the following table we present some ERP product that meet with the organization size **(**made by the author adapted from Panorama Study (Panorama-Consulting-Group, 2022))

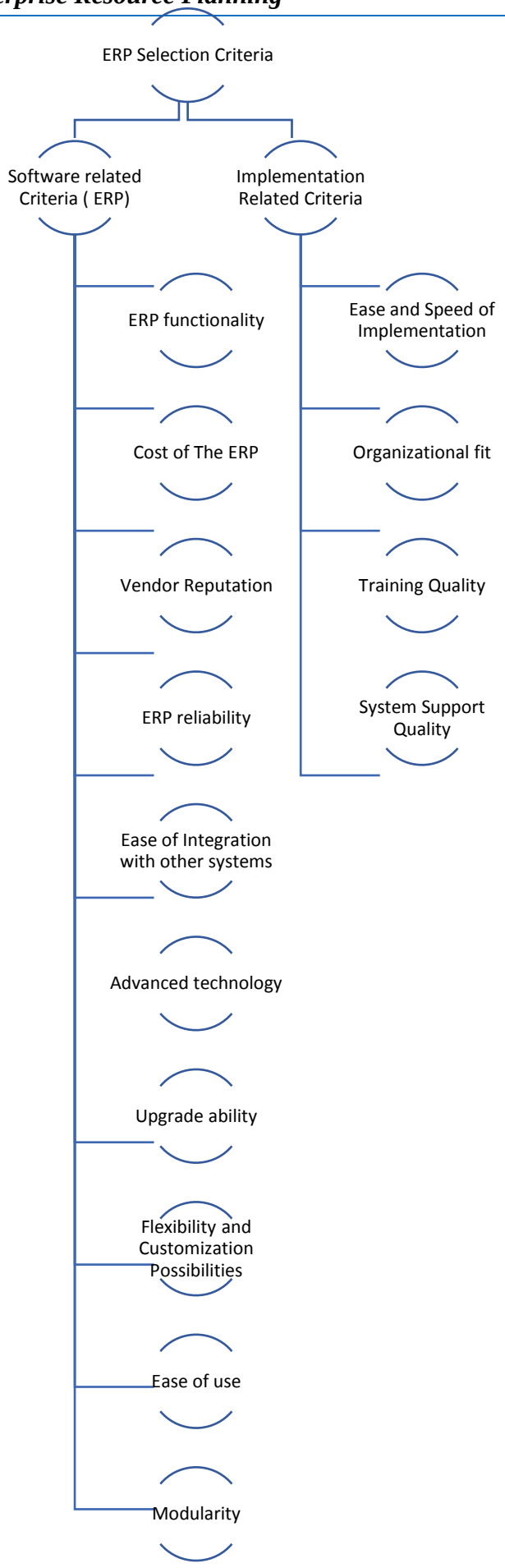
Table 26 - ERP vendors examples according to organization's size and industry

Category /Size	Structure/ Industry	Annual Revenues	ERP vendors
Small Organizations	Single Entity		Sage ERP 100, Sage ERP 300, Aptean, ECI, ASC
Small to Midsized Organizations	Single Entity	10 to 250 million $	NetSuite, abas, IQMS, Plex Systems, Microsoft Dynamics 365 Business Central, SYSPRO, Acumatica, Rootstock
Midsized companies	Multiple industries and multiple business units	250 to 750 million $	Microsoft Dynamics 365 Finance, IFS, Sage X3, Epicor E10, DELMIA works, SAP B1
Larger companies	Multiple industries and multiple business units	More than 750 million $	SAP S/4HANA, Oracle ERP Cloud, Infor Cloud Suite

The organization has also to select the Integrator of the ERP solution, and has to manage the relationship between the Organization, the software vendor and the integrator in order to harmonize the integration and maturing process of the ERP solution and work on communication channels toward the integrator and the software provider at once (Tomas, 2007, p. 98).

In the same Panorama study respondents were asked to select the best ERP, the most selected ERP software were SAP, Microsoft, Oracle and Info.

The selection criteria mainly are related to two major groups which are the ERP and implementation in the following the graph we describe the most common selection criteria:



The ERP functionality could be the most important factor and describes the suitability of the software capabilities to the needs of the organization.

Cost of the ERP: which is an important factor also and is about the cost of upgrading the technical infrastructure and ERP licenses and support

Vendor Reputation: as in every market the vendors reputation plays crucial role in buying options.

ERP reliability: this factor measures the ability to restore historical data after incidents.

Ease of Integration with Other systems: as is the case in many companies the information systems depend on many applications that work together and it is important for the organization to make sure that the new software is linked with other applications easily.

Advanced Technology: it is not crucial criterion but still important and enables to reduce list of vendors and describes the level of technologies used in the ERP system.

Upgrade ability: ability to upgrade the ERP to a newer version.

Customization capabilities and flexibility: which describes the ability to adjust the ERP parameters to the basic user needs.

Ease of use: and this element has to do often with the user interface and user experience, some ERP are easy to use and to learn while others are difficult and need much more focus.

Modularity: it is the ability for the customer to select the most useful modules to their organization which will reduce considerably the time and cost of the project.

Ease and speed of implementation: as in many cases the ERP project comes in strategic change framework, the leadership tend to do make the ERP project operational in short period of time and therefore the time of implementation becomes a critical factor for vendor selection.

Organizational fit: is the coherence of the system to the organization's strategy, structure, processes.

Training Quality: as the success of the project depends on change management and user training in particular it is very important that the user accesses high quality training during the implementation project.

System Support Quality: as the system in any organization goes through continuous development and maintenance it is very important factor in the post implementation stage to have good quality warranty services and reactive support from support providers.

In the following table we enlist the most known ERP vendors according to Panorama report, their location and year of launch and a short description of features and scope of the solution **(**adapted from Panorama ERP report (Panorama Consulting Group, 2023, pp. 5-14)).

Table 27- ERP Vendors

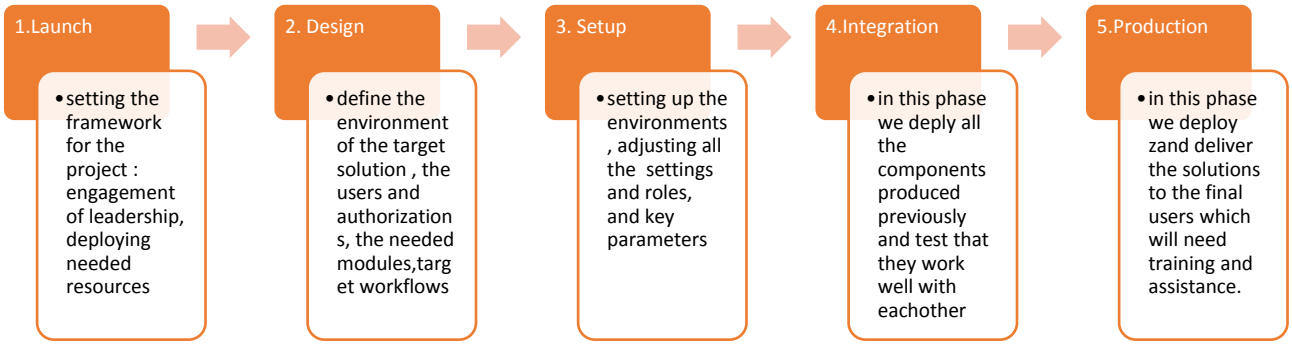
Brand	ERP products	Headquarters	Launch Year	Features
DELMIA WORKS	DELMIA Works ERP	Paso Robles, CA (USA)	1989	is a comprehensive manufacturing ERP and MES system specifically designed for mid-market manufacturers, both discrete and batch process. It provides end-to-end manufacturing visibility and control in a single, scalable solution.
EPICOR	Epicor	Austin, TX (USA)	1972	Epicor Eagle for Retail, Epicor Kinetic for Manufacturing, Epicor Prophet 21 for Distribution, Epicor BisTrack for Lumber & Building Material: provides cloud and on-premise solutions for a variety of industries
IFS	IFS Cloud	Linköping, Sweden	1983	has industry expertise in aerospace & defense, construction & engineering, energy, utilities & resources, manufacturing, and service. The vendor's core organization solution is designed for large organizations as well as mid-sized organizations
infor	Infor	New York, NY (USA)	2002	provides industry-specific cloud ERP solutions that are designed for both the organization level and small and medium-sized businesses (SMBs). Infor delivers its industry CloudSuites as a service in a multi-tenant cloud, securely hosted through Amazon Web Services.
Microsoft	Dynamics 365	Redmond, WA (USA)	1975	is continually developing new data centers to support its cloud capabilities across its solution set. Microsoft's D365 solutions include a variety of pre-configured processes

ORACLE NETSUITE	Oracle NetSuite ERP	Austin, TX (USA)	1998	provides solutions for businesses of all sizes and industries. NetSuite is an integrated cloud business management solution
ORACLE	Oracle Fusion Cloud Supply Chain & Manufacturing	Redwood City, CA (USA)	1977	provides a set of core applications and industry-specific applications. The vendor has a comprehensive set of cloud options, including public cloud, cloud at customer, and on-premises.
sage	Sage X3, Sage intaact	Newcastle upon Tyne, England	1981	Sage is known for its integrated accounting, payroll, and payment systems. The vendor provides software for startup, scale-up, and organization companies across all industries.
SAP	SAP S/4HANA, SAP Business ByDesign,	Waldorf, Germany	1972	SAP provides business solutions to organizations of all sizes, in all industries. The vendor is continuing to invest in innovations like IoT, AI, RPA, and cloud delivery
SYSPRO Say Yes to Next	Manufacturing ERP, Distribution ERP	Castle Donnington, UK	1978	SYSPRO is a global ERP software provider specializing in key manufacturing and distribution industries across a variety of sectors.

4.3.2 - Implementation, customizations and data migrations

The ERP implementation project goes through several stages that we present in the following process (made by the author adapted from (Deixonne, 2003, pp. 62-67)).

Figure 45 - ERP Implementation Process

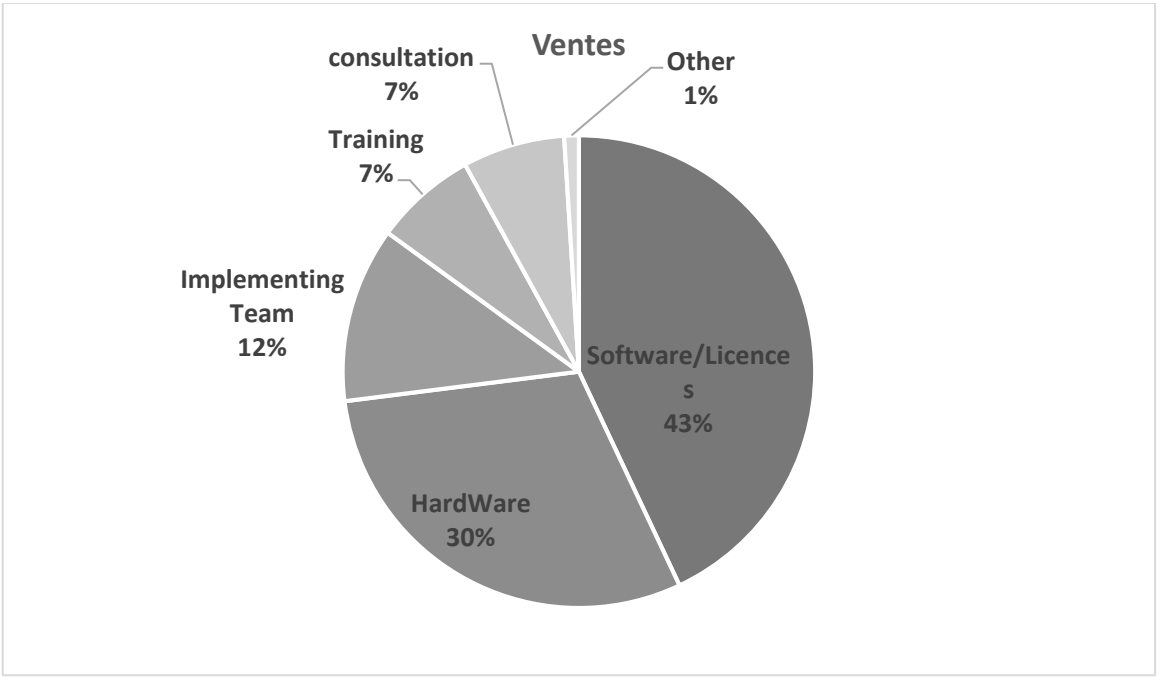


Implementation Costs:

It is important to know that the ERP implementation cost isn't limited to the cost of licenses (cost of software) it includes all the other related resources such as hardware upgrade, implementation consulting services and training...

In the following graph we illustrate an example of ERP cost structure in Saudi healthcare organization (**based** on research paper (Abukhader, 2015)**)**

Figure 46 - ERP cost structure



- **Getting an idea about implementation challenges:**

In a study conducted by The Conference Board on 117 companies that deployed or are deploying ERP they underlined the following facts (Tomas, 2007, p. 267):

- Most of users declare being globally satisfied about the results of implementation
- There is no stopping to the implementation project. The ERP must continue to evolve and improve in order to meet the current needs.
- One year or more after the implementation, around 40% of firms still didn't attain their operational goals.
- Around 75% of companies have faced a severe or moderate drop in productivity for six months.
- Most of deployments conducted as a system project have failed, the best approach is to be conducted by operational units.
- Quantified operational objectives are prerequisite for high level of satisfaction.
- The best companies use a model based on excellence centers or skills center for the maintenance and support of ERP environment.
- The Costs is crucial issue, many companies have seen support costs rising in the Pre-ERP phase.
- Around 20% of companies have aborted their ERP project for operational reasons such as fusions, strategic changes or for ERP itself such as stability and features.

- **Implementations success factors** (Tomas, 2007, p. 266)**:**

- Focusing on benefits and possibilities of the ERP and not only on its implementation
- Align the organization on real goals.
- Balance the change efforts among employees, processes and technology in all domains.
- Apply management and planning techniques all along the ERP life cycle
- Exceed the ERP capacities and features

4.3.4 - Training, change management and continuous improvement

- **User training**

Users training is considered already to be a mini project, since we have to ensure training for many users across the organization with different subjects on different organizational levels, this training often is critical in the project tasks and needs to respect stressed deadlines and needs effective logistics which is not the case many times. In this context it seems very useful to nominate a training manager who has the following tasks (Tomas, 2007, p. 237) :

- Identifying training sessions in number and content.
- Identifying the user's role and profile for each session.
- Preparing training sites and rooms
- Setup of workstations and required material
- Preparing exercises, workshops and demonstrations
- Preparing database and system environment
- Registration of training attendees
- Execution of Training and collecting feedback for future sessions improvement.

Noting here that the training efforts should be before manufacturing stage of the ERP. The training team selects the appropriate media and material for the training (CD. presentations, flyers...). Papers documents remain very effective for the ERP training.

The training should discuss all the required subjects for the ease of the user we mention below the main axis upon which the training should go (Tomas, 2007, p. 238) :

- Navigation in ERP: through keyboard shortcuts, cursor moving, connection process, icons, different view choices, and the way to navigate between pages, views or fields.
- General Concepts: explaining the new operational process going with new ERP and the difference with current processing and how they are handled with the ERP through the different modules.
- ERP theoretical presentation: modules, components, processes and workflows, using real case studies will help better communication and understanding from users.
- Practical cases and exercises: in order to deepen the acquired knowledge

Finally in addition to the received training material, it is essential for the users to get check-lists for the ERP first use. With an ordered sequence of steps that should be taken in order to accomplish a given task.

The training should not be limited to ERP, it is also important to train users on operation system, navigation, office tools suite.

The user's training plays crucial in role in the ERP implementation success, if the final users are well trained their productivity will be high and vice-versa and therefore the failing of training can have heavy consequences on the project, we list below the main risks for the training projects:

- Unsuitable or incomplete Training plan.
- Incompatible Users or instructors' profiles.
- Inadequate training environment.
- Very short sessions
- Absence of training material (logistics)
- Lack of practical exercises and case studies.
- Very early training
- Long time gap between training and use (due to leaves for example)
- Users' unavailability for the duration of sessions.

- **Communication and change management:**

The goal of communication here is to initiate and reinforce the process of adopting ERP by future users where it is needed to prepare communication plan targeting project teams and ERP users. There communication plan should (Deixonne, 2003, p. 157):

- Identifying targets and communication means.
- Participation of key users
- The obstacles and engines regarding adherence in the project.
- The deployment of resources to be put in place.

The two fundamental sources of resistance to ERP implementation are (Adel M. Aladwani, 2001) **:**

- **Perceived Risk**: which is the risk associated with the risk to adopt the decision to adopt the new innovation
- **Habit**: current practices that employees are routinely doing

In order to manage the change challenge related to the ERP implementation project the top management has to:

- Study the structure of needs of the users and potential sources of resistance
- Deal with them by using appropriate strategies and techniques in order to introduce ERP successfully.
- get feedback on change management efforts and success.

The following table shows a proposed model for addressing the change management for a successful ERP implementation (Adel M. Aladwani, 2001)

Table 28 – Change Management Model for successful ERP implementation

ERP Adoption	favorable awareness response	communicating ERP benefits
		communicating ERP general operations
	favorable emotional response	minimizing adoption costs
		involving inviduals and groups in the project
		enhancing ERP interface quality
		hands-on training
	favorable adoption intention response	Securing support of opinion leaders
		Timing ERP introduction

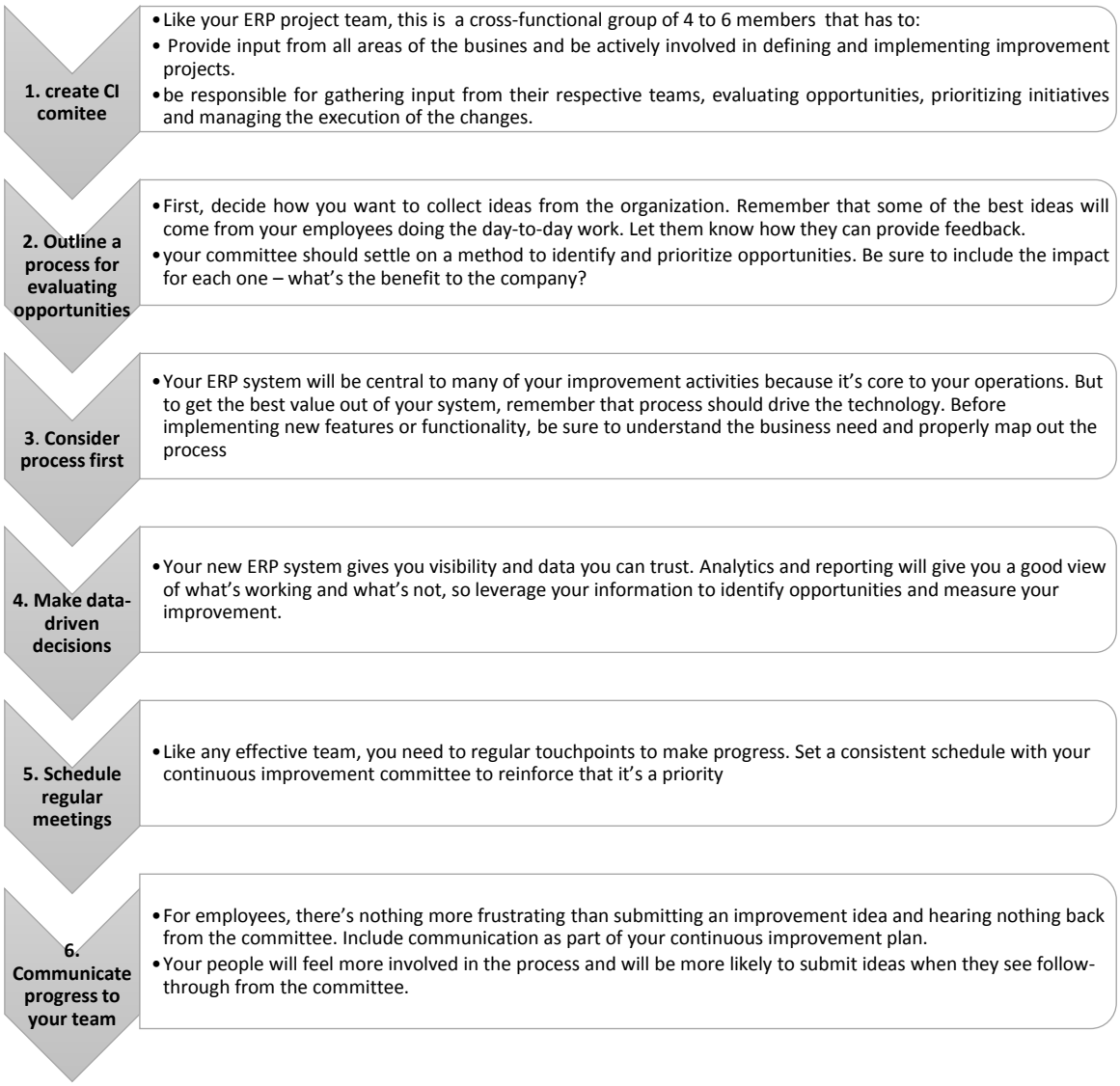
- **Continuous development and post-implementation:**

It is important to involve the end-user in the ERP development and continuous improvement of it since it increases the end-user satisfaction (T. Natalia & Others, 2022), The main reasons why continuous improvement is important are:

- In General, developing a continuous improvement strategy enhances the ERP value and increase its ROI.
- A continuous improvement strategy gives you a way to manage post implementation activities and continue implementing value-adding features and helps you stay on track.
- It makes process improvement a priority. As the business challenges and environment change, it is always needed to update your system and operations. And therefore, there is always need for improvement of the ERP with new functionalities.
- It helps control maintenance costs, continuous improvement allows you to plan and allocate resources for system upgrading, implementation of new features.
- It contributes to sharpening organization strategy and promotes continuous improvement in other process and not only in ERP.

The following figure shows the process: stages of continuous improvement and what to focus on in every stage - source: adapted from (Jalene Ippolito, 2020):

Figure 47 – ERP continuous improvement stages



4.4 ERP EFFECTIVENESS - RESEARCH METHODOLOGY

5.1.1 – Adjusting Research Methodology

This study is descriptive since we do not influence any variables of the study.

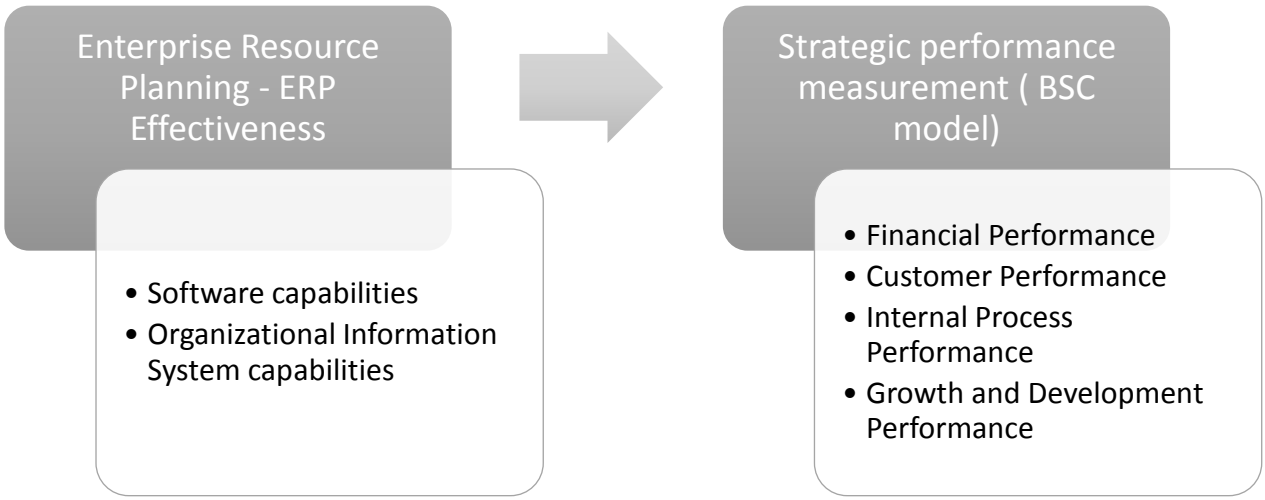
As we have started working in the first study case, we have found that there are actually two variables that relate to ERP effectiveness:

- the first is about the primary features of the software independently from the organization which reflects the **software capability** to provide the necessary tools and data for performance measurement. This variable is expressed through the question of how effective is the software in providing the tools for strategic performance measurement and reporting?

- the second variable that has to do with the **organization ability** to use these software capabilities in order to build strategic performance measurement dashboards and therefore it reflects the current flow of reports and indicators in the organization. how effective is the current information system of the organization in using ERP capabilities to measure and report financial strategic performance indicators?

Adding these two variables to the ERP effectiveness now the study model now is as follows:

Figure 48 – The adjusted Study Model



Because we have two dimensions of the study, we need to assess the link between the sub-variables in every organization of the sample.

The following matrix shows the different variables and sub variables of the study.

Table 29 – Study model variables

		Strategic Performance Dimensions			
		Financial	Customer	Int Process	Growth
ERP Effectiveness	Software Capabilities	L1	L2	L3	L4
	Organization IS	L5	L6	L7	L8

For each organization in the sample, we will examine the 8 links (L1 to L8) of each sub variable from ERP effectiveness with Strategic performance dimension.

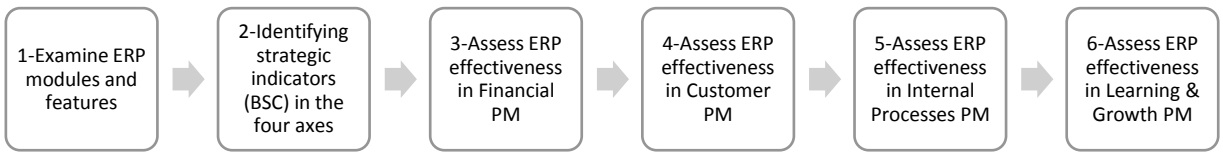
As is shown in the network below the software capability is about the ability of ERP to handle the needed data for the indicator calculations and allows displaying it in graphical material to the user (decision maker) and the organization information system capability is about the degree of use of these resources in order to articulate indicator calculation based upon reliable data and displays the results.

Figure 49 – Software Capabilities and Organization information system components

5.1.2 - Research Stages

For each of companies in the sample we will proceed our research as follows:

Figure 50 – Practical research stages



A. (Stage 1) First we explore the organization information system including ERP modules, features and applications. To do this we need to have sessions to have full access to the system in order to observe and we may also use documentation on the ERP in the organization or in internet (provided by the ERP vendor) the goal is to have a general idea about the ERP, its capabilities and its use by employees in the organization and how far the data contained is made reliable.
B. (Stage 2) then we conduct interviews with the top management in order to build the strategic balanced scorecards and select the key performance indicators for each of the four axes on it.
C. (Stage 3 to 6) at this stage we will assess the ERP effectiveness through both sub variables (software capabilities and organization information system capability) with each of the indicators in the current axis.

For this need we have built a scoring table that allows us to give a score to each variable based on the level of maturity of the ERP regarding performance measure on both dimensions.

Table 30 – Fives levels scale

Appreciation	Score
Very poor	0%
Poor	25%
Average	50%
Good	75%
Very good (excellent)	100%

Source: made by the author

The given scores enable us to measure the parent variables such as overall effectiveness by performance dimensions using the average of indicators in each dimension.

Figure 51 - Variables Network of the study

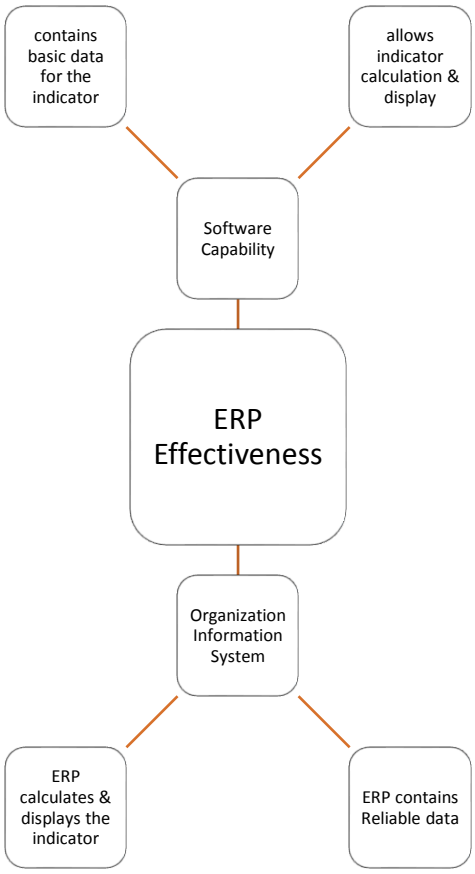


Table 31 – Assessment Grid for the study variables

SOFTWARE Capabilities	**Level A**	**Level B**	**Level C**	**Level D**	**Level E**
ERP Maturity	0%	25%	50%	75%	100%
1-saving Indicator basic DATA	ERP doesnt support modules that saves data related to the indicator				ERP modules is able to save Basic Data
2-calculating & displaying the Indicator	ERP doesn't have ability to calculate the indicator in anyway	may be calculated & displayed using other apps (like Excel & PowerPoint)	may calculate & display it using BI external tools outside ERP	may calculate & display it using ERP reporting tools to build customized dashboards in ERP	may be calculated & displayed using ERP integrated tools designed for this indicator inside ERP
Organisational Effectiveness	**Level A**	**Level B**	**Level C**	**Level D**	**Level E**
ERP Maturity	0%	25%	50%	75%	100%
1-saving Indicator basic DATA	ERP doesnt contain any data related to the indicator		Teams uses ERP modules that contain indicator Data	Teams keep data updated on real time	Teams keep Data reliable : systematic check
2-calculating & displaying the Indicator	Teams don't calculate indicator	Teams calculate and display it using other apps (like Excel, PowerPoint)	Teams calculate & display it using BI external tools outside ERP	Teams calculate and display it using ERP reporting tools to build customized dashboards in ERP	Teams calculate & display it using ERP integrated tools designed for this indicator inside ERP

Source: made by the author

Using this grid, it allows us to assess each variable of the study in order to build the overall assessment, each we give a note based on the maturity level of the variable.

For The software capability we examine how far the ERP can provide data models and have tools to build indicators and display indicators, whereas for organizational effectiveness we examine how far the organization managed to use ERP in the process of performance measurement.

The indicators calculation and displaying grid was done from the perspective of the ERP, as far as we move out from ERP to another applications that are external to ERP solutions, we consider ERP incapable of measuring performance and vice-versa.

CHAPTER 5 – CASE STUDY 1 - SAP BUSINESS ONE AT SARL GRAFIL

5.1 – SARL GRAFIL ORGANIZATION OVERVIEW

5.1.1 - Introduction and historical background

Brief History of the company

The company started in 2005, with small welded mesh later in 2006 it started manufacturing larger size welded mesh, in 2019 the company acquired SAP Business One ERP in order to enhance company management.

In 2021, the company was subject to a private share transfer it resulted in reducing shareholders to only two persons.

In 2022 the company made a big contract for manufacturing and installing welded mesh for Beraki Stadium.

We can notice that the company keeps growing at a rate of 10% each year, the company reached pick levels on in 2018 reaching 548 MDA, due to several public projects including highway big projects. To recede after it due to the global Covid pandemic.

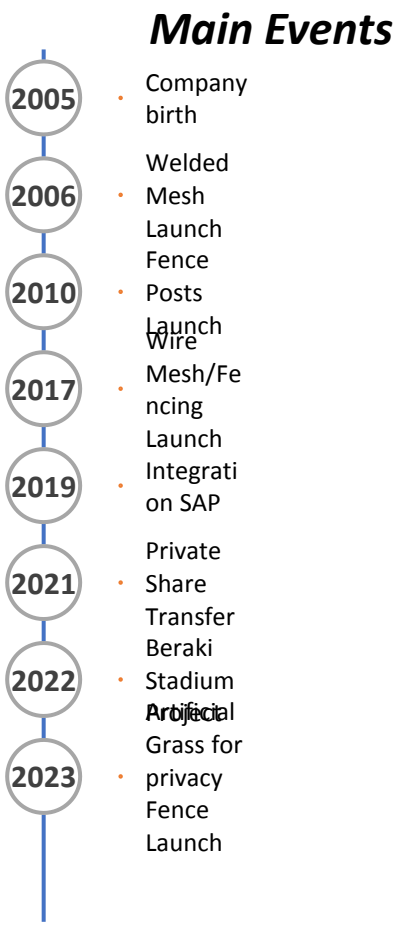
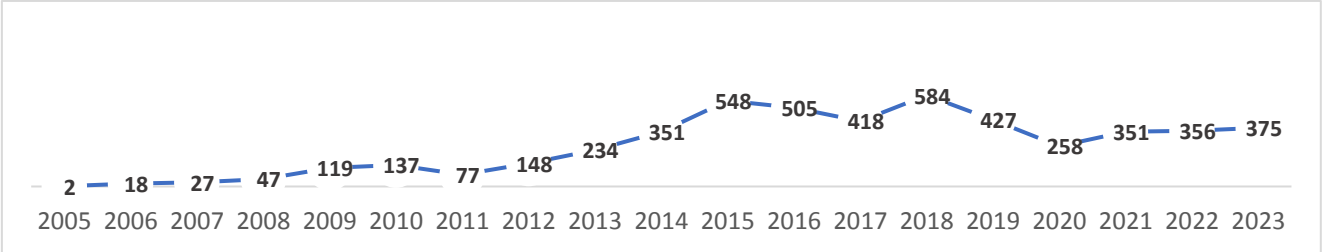


Figure 52 – Sarl Grafil Sales Evolution (MDA)



Source: made by the author based on financial statements provided by the company

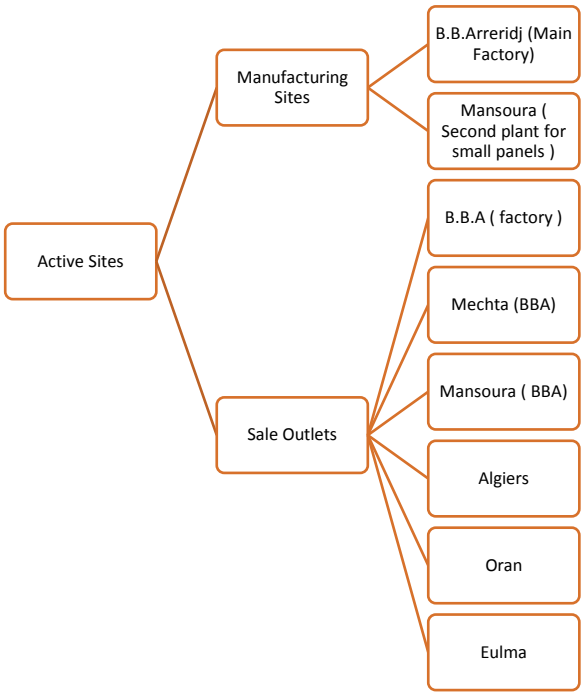
Figure 53 – Sarl Grafil working sites

SARL GRAFIL is mid-sized business that is active many places in Algeria.

The first and main plant is located in the industrial zone in the city of B.B. Arreridj, at the same time there is another smaller plant in Mansoura.

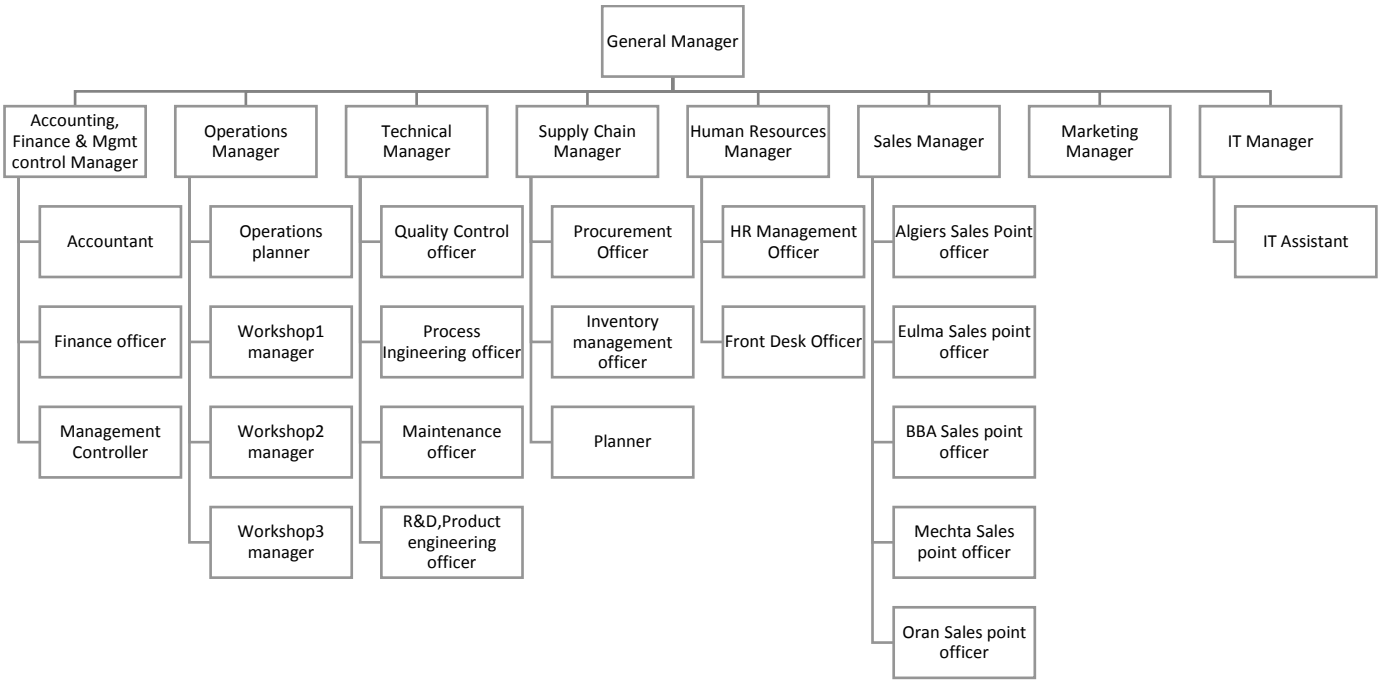
For Sales, Sarl Grafil counts six points of sales across the north of Algeria.

the site of El-Eulma was acquired in April 2024.



5.1.2 - Organization and workforce

Figure 54 – Sarl Grafil Organizational Chart

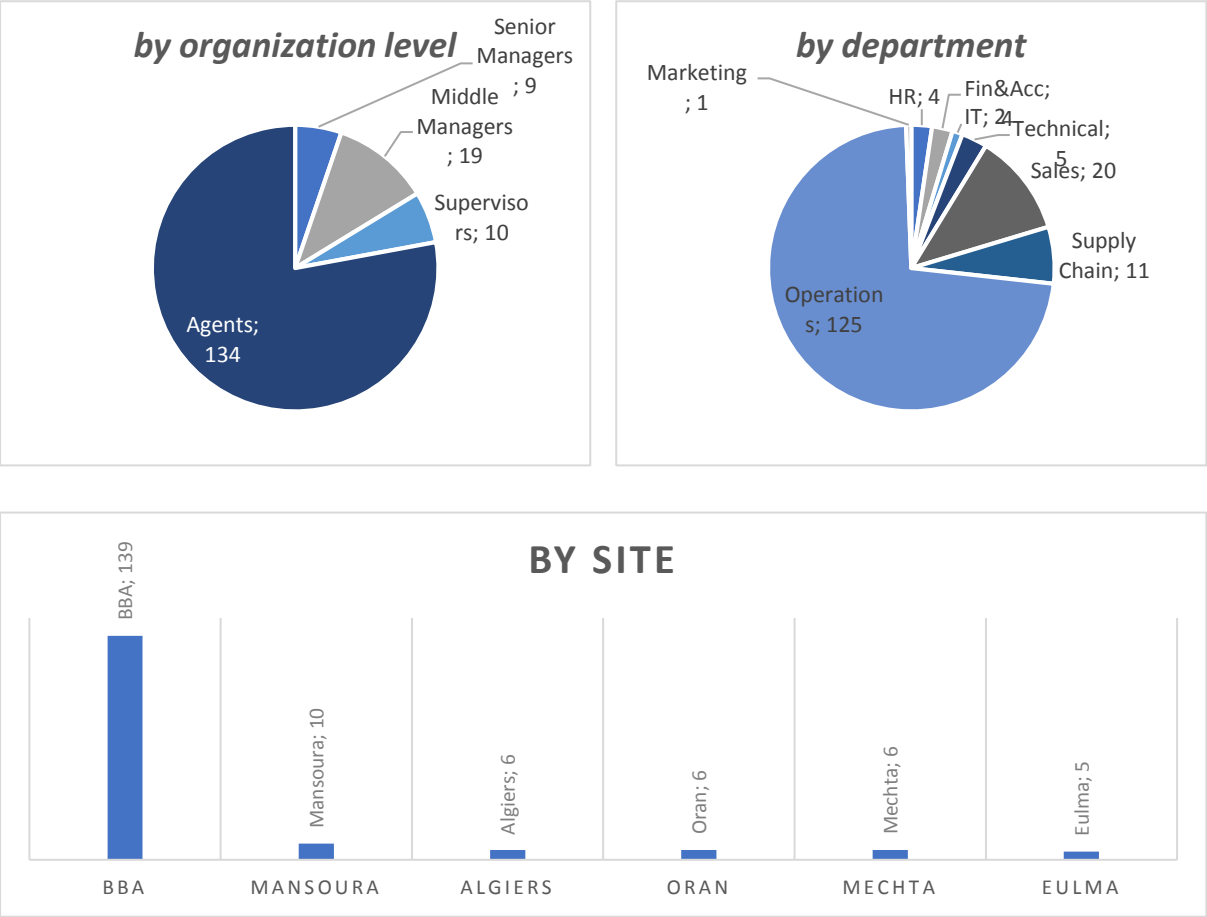


Source: made by the author

As it appears in the organizational charts the company is governed through eight different departments.

- **Workforce.**

Figure 55 – Sarl Grafil - Workforce distribution by Level and by department



Source: made by the author

We can observe from the figures above that operations department holds most of the workforce employees who are mainly agents as is shown in the other graph, the main site of BBA has most of employees. As it has headquarters and main plant.

The second department is sales due to the fact of having different sales points across the country, each sales point has a middle manager and sales representative.

The company intends to enhance the competencies of its staff by investing more in training however the HRM is still facing many challenges in matter of payroll accuracy and personal management due to the migration from MMM Paie system to BIG and high turnover in HR managers.

5.1.3 - Products, activity and value model:

Table 32 - Sarl Grafil - Value Offering

Providing Fencing Solutions	Providing Products	Manufacturing Panels
		Manufacturing Posts
		Other Products and Accessories
	Providing Technical Consulting	special team for product ingineering
		high experience in fencing
	Installation	Internal Highly skillful Installation teams
		External Installation subcontractors

Source: made by the author

As is shown in the table above, the company value is based on the knowledge and experise in fencing, this allows the company to gain many projects since it helps the public and private customers with establishing technical requirements of the project which Is not the case for most of the competitors.

Manufacturing is not the only activity of the company; in fact, the company has many sites to distribute and sell the products across the country.

The other distinguishing activity is the installation that is delivered by highly skillful installation team who has a deep experience in the industry.

The products of the company are divided into four main categories:

- Welded Mesh
- Fence Posts
- Wire Mesh
- Artificial Grass Privacy Fence

The following table shows the target market, use, raw material and the process for each category:

Table 33 – Sarl Grafil - Products

Product	Target Markets	Usage	Raw Material	Process
Welded Mesh	Industrial, agricultural, and commercial sectors	security fencing, animal enclosures, construction reinforcement, and garden fencing due to its strength and durability.	Galvanized steel wire + paint	Straightening, welding, cutting, folding. Painting.
Fence Posts	Residential, agricultural, and commercial property owners.	Serve as the vertical supports for fencing panels, gates, and wire mesh, providing stability and structure to various types of fences.	Galvanized steel coils + paint	Profiling, cutting, drilling, painting
Wire Mesh/Fencing	Homeowners, farmers, industrial sites, and security facilities	Utilized for creating boundaries, securing properties, animal pens, and garden fencing. It's valued for its versatility and ease of installation	Galvanized steel wire	Welding, cutting
Artificial Grass Privacy Fence	Residential property owners, event planners, and commercial spaces	Provides privacy and aesthetic appeal by mimicking natural grass. Often used for backyard fences, patios, balconies, and temporary event barriers.	Galvanized steel wire + pvc coils	Coiling , weaving.

Source: made by the author

5.1.4 - Performance Measurement at SARL GRAFIL

As is shown in the table below performance measurement maturity depends on the function / department:

Table 34 – Sarl Grafil - Performance Measurement and Review

Departments	Existing Objectives	Existing KPI	Existing Targets	Dep Performance Review	Operational Performance Review	Strategic Performance Review
Finance & Acc Dep	Yes	Yes	/	Monthly	Monthly	/
HR Dep	/	/	/	/	Monthly	/
Production Dep	Yes	Yes	Yes	/	Monthly	/
Sales Dep	Yes	Yes	Yes	/	Monthly	/
Technical Dep	/	/	/	/	Monthly	/
Marketing Dep	/	/	/	/	Monthly	/
Supply Chain Dep	Yes	Yes	Yes	/	Monthly	/
IT Dep	Yes	Yes	Yes	/	Monthly	/

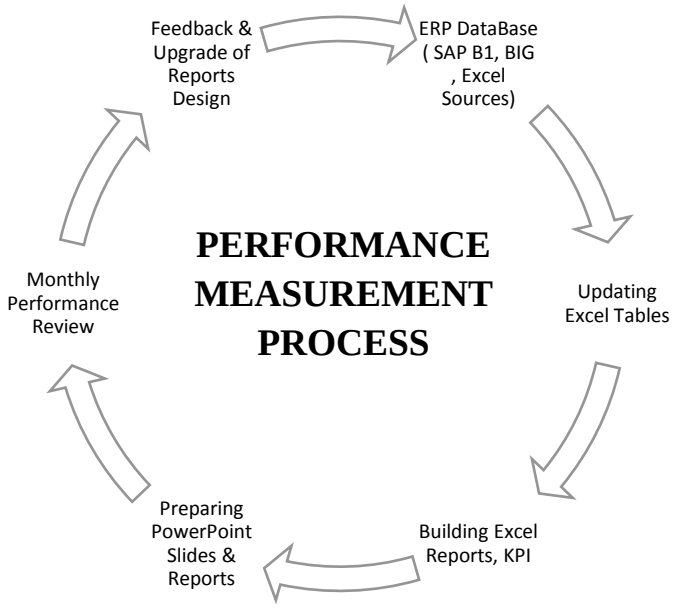
Source: made by the author

We noticed the following observations:

- Absence of Performance review at the level of the department: associates meeting with department managers reviewing associate's performance.
- The main performance review process is the monthly business review that gathers department managers with the general manager.
- Strategic Performance reviews are absent due to the absence of strategic vision for department managers and also due to overwhelming operational activities.
- Performance Monitoring through KPI is not systematic, in many cases the reporting is just plain activity numbers or reporting without references or targets that allows to track any improvement or deterioration in the subject performance.

For the Performance Measurement Process and data Sources it is illustrated through the following cycle.

Table 35 - Sarl Grafil - Performance Measurement Process.



Source: made by the author

As it is shown in the graph most reports are based on excel reports that extracts data from the ERP or other solutions such as BIG RH using SQL Queries.

We have noticed also on the organizational level that beside cost calculations that are needed for pricing the management control process is absent in the organization, there is no unit or individual among management stuff that is working on management control which resulted in the absence of Budget Management and has weakened the reliability of the data in the system.

5.2 - SAP BUSINESS ONE (ERP OVERVIEW

5.2.1 - The Software Solution of SAP Business One

SAP Business one is an ERP solution that is designed for small companies and midsized businesses. It is implemented in more than 75 000 companies across the world.

In the following we will show the main SAP Business One Modules that we have seen through exploring the SAP B1 interface

- **The Financial Module:** Includes all functions and reports required for the accounting

  - General Accounting
  - Financial Reporting
  - Cost Control
  - Budget Management

- **Sales Module:** covers the entire sales process, from creating quotations for customers and interested parties, to invoicing, creating document drafts, and printing. SAP Business One provides an extensive range of sales documents, each of which pertains to a different stage of the sales process. General Accounting

  - Quotations
  - Invoices
  - Deliveries
  - Orders
  - Payment
  - Return
  -

- **Purchasing Module:** to manage the entire purchasing process from purchase orders through processing A/P invoices. Furthermore, you can create various reports to analyze purchasing information such as purchase volume analysis, pricing information, vendor liabilities aging, and so on.

  - Quotations Request
  - Goods Receipts
  - Invoices
  - Orders
  - Return
  - Payments

- **Inventory Module** to optimize the Inventory management

  - Goods receipts
  - Transfers
  - Goods issues
  - Inventory counts

- **Production Module** along with the Resources module, provides a base platform for managing light manufacturing processes in SAP Business One. This module helps businesses streamline the production process, enabling better control and visibility into the entire production cycle.

  - Bill of materials
  - Receipt from production
  - Production Cost Calculations.
  - Production order
  - Issue for production

- **MRP Module** The Material Requirements Planning (MRP) module enables you to

plan material requirements for a manufacturing or procurement process based on the re-evaluation of existing inventories, demands, and supplies on changing planning parameters (such as lead time determination, make or buy decisions, and holiday planning)..

- Forecast management
- Production Order suggestions - Purchase Order suggestions

- **Other Modules:** Including support modules such as :

  - **Opportunities:** lets you track and analyze pending opportunities according to the progress of activities such as meetings, negotiations, and other proceedings in the sales and purchasing pipelines.
  - **Business Partners**: lets you manage customers, suppliers and have their contacts or legal information.
  - **Banking**: it uses this component to perform all monetary transactions that involve bank accounts: incoming, outgoing …
  - **Resources**: this module serves as an extension to the Production module; together they provide a base platform for managing light manufacturing processes in SAP Business One. A resource can be a machine, human workforce or workshop. Resources allows us to manage production capacity as well as standard production costing.
  - **Reporting**: we will deal about it in more detailed way in the performance measurement section next.

5.2.2 - SAP B1 in SARL GRAFIL

- History of implementation in GRAFIL

The idea of acquiring SAP Business one came from the intention to improve the workflow and upgrading of the management system. The project to acquire an ERP led to the selection of two main alternatives which is SAP B1 and SAGE, and finally the company opted for SAP B1 it was integrated through three stages.

- Modules Integration:

The following table shows the current management activities and modules from the information systems (including SAP Business One ERP) that are used to support these activities using an utilization rate.

The Utilization rate was calculated mainly using the number of functionalities or features that are used in the module or directly from interviewing teams that are using the module. It shows how far the ERP capabilities and resources are exploited.

Table 36 – Sarl Grafil - Information System Matrix

Department / Team	ERP Modules ===>	Finance	Banking	Sales Processing	Production	Purchasing	MRP	Inventory	Business Partners	ressources	Opportunities	CRM	Reporting	BIG GT	BIG RH	BIG PAIE	MMM PAIE	Ms Excel
Global		90%	80%	80%	60%	80%	30%	80%	100%	30%	0%	0%	0%		50%	50%	30%	80%	100%
Departements	**- Activities Titles**	**SAP BUSINESS ONE MODULES - OVERALL USE% = % 52,50**													**BIG RH & PAIE**		**MMM PAIE**	**Excel**
Finance and Accounting	General Accounting	80%																
	Cost Control	0%																
	Prices, Margins Management				10%													100%
	Budget Management	0%																
	Banking & Cash		80%															
	Fin & Acc Reporting	10%																100%
Supply Chain Team	Managing Suppliers info									50%								
	Purchase Processing						80%											
	Inventory transactions								80%									
	Supply Chain Reporting							30%										100%
Production Team	Production transactions					30%												
	Production Reporting																	100%
Sales Team	Managing Customers Info									50%								
	Sales Processing				70%													
	Sales Reporting																	100%
Technical Team	BOM elaboration					30%					30%							100%
	Quality Control																	100%
	Process Ingineering																	100%
	Maintenance																	
	Technical Process Reporting																	100%
HRM Team	Time & WorkForce Management														50%	50%		
	Payroll Processing																30%	80%
	HR Reporting																	100%
	Media & Digital Mrkt Compaigns																	100%

Source: made by the author

we calculated the ERP utilization rate based on existing processes, for example we didn't mention training because the process doesn't exist already in the organization's HRM processes, based on the analysis of the Information system matrix we noticed that:

- Some key functions don't have supporting platforms such as quality control, process engineering and maintenance.

- ERP is best used for operational activities that have good utilization rate such as purchasing, inventory management, selling or accounting, whereas for more strategic modules such as Material Resources Planning - MRP, Costing, CRM … the utilization of the ERP capabilities seems to be weak or totally absent.

- The SAP B1 reporting module is not used at all, rather than that teams use Microsoft Excel for reporting needs. The reports are built in Excel using data that are retrieved from SQL queries that are linked to SAP Business One Database.

  - **Benefits:**

    The SAP Business One certainly has brought many benefits to the company:

    - Reinforced internal control since the sales, inventory and payments are integrated in one database.
    - Accounting Saved time, in fact the SAP B1 writes automatically posting in the general ledger once the user approves an operation.
    - Improved products structures since the system supports multi-level BOM

  - **Challenges and difficulties:**

    - The IT team turnover made it difficult to keep continuous improvement.
    - The system first was taken for the price argument but later, the cost appeared to be higher than other systems when licenses and maintenance costs are taken into consideration. Which made it difficult to have licenses for the whole staff team.
    - Due to the fact that the company didn't pay maintenance subscription fees, it was difficult to find solutions for some issues with the system.
    - The system interface and user experience is difficult which makes it necessary to have training.
    - The team lacking knowledge and training in management advanced approaches such as CRM or MRP which made it difficult to use these modules.

5.2.3 - Performance Measurement

For the Reporting Capabilities SAP B1 has many features that allows the user to generate high quality reports (Niefert, 2009, p. 71) through Query Wizard or Query Generator, Drag and Relate features the user can design queries and develop reports even without deep knowledge in SQL.

The Other two powerful Features are the XL reports which allows to automate reports in Microsoft Excel and benefit from Excel powerful capabilities whereas Crystal Reports offers graphical illustrations that are accessible on crystal viewer or web dashboard where the disadvantage is that you can't process the data further in Excel.

Other modern SAP Business One reporting Tools are not available in our studied organization:

- Pervasive analytics that allow you to visualize data, dashboards and KPI without leaving SAP.
- Interactive Analysis Designer that allows you to analyze your business information interactively using MS Excel pivot table and discover new business insights

5.3 - BUILDING STRATEGY AND BALANCED SCORECARDS INDICATORS

5.3.1 - Strategic Framework

- Context of the company

The company is facing many challenges on many levels: the first and most important challenge is that competitivity is growing, there are many actors in the market now. The company has much more experience and knowledge of the industry and the product but the competitors are closing the gap rapidly, and as far as the competitiveness rises the profit margins get reduced which pushes the company and requires from it to be much more efficient in matter of operational excellence (costs, quality, delays and productivity) in order to maintain comfortable level of profitability.

The company has to do many efforts in order to keep excellent operational performance, and keep continuous improvement, in this context, performance measurement system has to give necessary visibility on these actions and impacts in order to sustain these efforts.

- Strategic Framework:

- **Vision**: the company has no clear written vision but according to the shareholders, the company sees itself in the future as an outstanding quality fence supplier in the market".
- Mission: to provide fencing and mesh solutions.

- **Goals** : the company has to ensure comfortable Profitability (net profit of 20 to 30%

of revenues) for the shareholders.

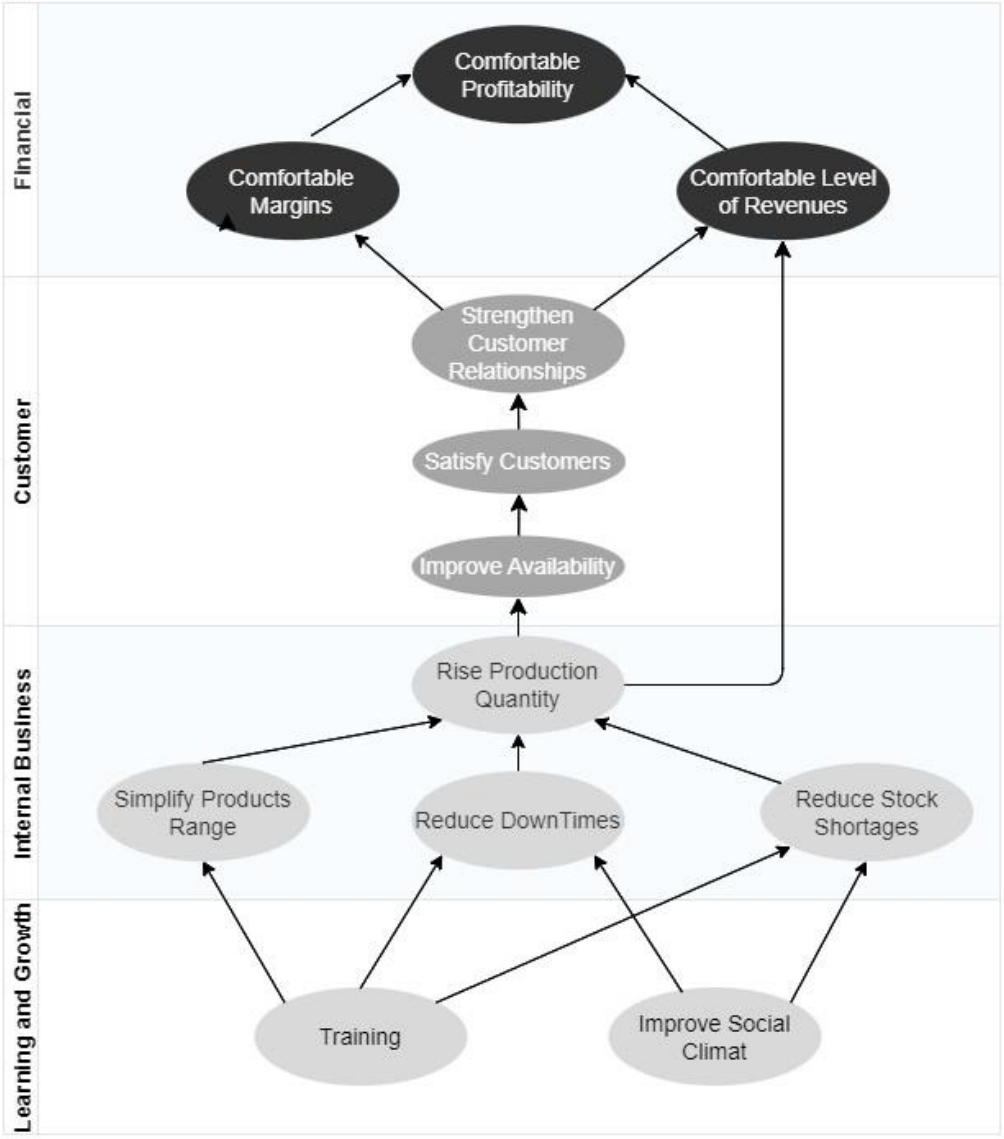
- **Strategy**: in order to attain that level, the strategy is mainly operational excellence, reduce costs and maximize production quantity.

5.3.2 - Strategic Map:

The strategy is based on raising production in order to ensure comfortable level of revenues in regard to gross profit margins and cost overhead. This is achieved with reducing downtimes and stock shortages.

Due to the fact that changing products requires machines adjustment, the wide range of products rises complexity for the manufacturing teams and consumes much of the production capacity that is wasted of the adjustment time. And therefore, simplifying product ranges will result in improving productivity. And also, will make it easy to maintain raw material supply as the number of raw materials decreases in a significant way, the following chart shows the Strategy Map of the company (Source: made by the author)

Figure 56 – Sarl Grafil - Strategy Map



Source: made by the author

5.3.3 - Balanced Scorecards:

Table 37 – Sarl Grafil - Balanced Scorecards

	Strategic Objectives	**Strategic Indicators and Targets**	**Initiatives**
Financial	- Comfortable Profitability - Comfortable Margins - Comfortable Level of Revenues	▪ Cashflow ▪ Average Margins ▪ Sales	▪ Price Management ▪ Margins Control ▪ Rise productivity
Customers	- Strengthen customer relationships - Satisfy Customers - Improve Availability	▪ Revenues by old customers ▪ Customer Satisfaction Survey ▪ Salesforce assessment report	▪ Enhance Marketing Activities ▪ Improve products availability
Internal processes	- Rise Product Quantity - Reduce Downtime - Simplify Products Range - Reduce Stock shortages	▪ Monthly Production Value. ▪ Downtime Cost & Frequency ▪ Machines Adjustment Time Cost ▪ Stock Shortages Cost.	▪ Enhance Marketing. ▪ Increase Workforce ▪ Preventive Maintenance ▪ Review Products Range ▪ Implement MRP
Development	- Enhance Training - Improve Social Climate	▪ Achieved Training Time /Planned Training Time ▪ Employee Satisfaction ▪ Turnover	▪ Enhance Training ▪ Improve transportation and Cantine, and reduce payroll errors.

Source: made by the author

For particular considerations to the company's privacy, we have chosen not to include target values of the indicators.

5.3.4 - Key Performance Indicators: (explaining choice and reflection behind choosing KPI)

- Financial Axis

For the profitability we base upon monthly cashflow indicator which is the net profit without amortizations and depreciations. We use the monthly sales value in order to assess revenues and gross margin% in order to monitor sales prices and discounts.

- Customers Axis:

For the customer axis we have chosen to use revenues of old customers to track customers loyalty, and Customer Satisfaction Note from Customer Satisfaction survey.

For the Stock Shortages, sales front-office team every month gives a note about how far satisfied they are on the availability of products in their warehouses. This indicator is used to assess product availability in sales outlets.

- Internal Processes:

For the Product Quantity we use the monthly production value which is the 72 accounts of finished products minus deliveries.

For the goal of reducing Downtime, we use Downtime Cost indicator based on Frequency and total downtime. Same for simplifying product range, we use the cost of lost machine adjustment time as an indicator. Noting here that the cost of lost time either for downtime or for machine adjustment is calculated either based on fixed cost or margin on variable cost.

For the Shortages Cost, we use the Shortage Cost that calculates the cost of shortage based on the product price and total quantity need to maintain consumption during the shortage period.

- Organizational Capacity:

In order to track training efforts, we use the indicator of percentage of realized training time to the planned training time. It shows how far we have accomplished training programs regarding the plan that is supposed to reflect the training needs of the organization.

For Work Climate, we use employee's satisfaction survey and turn over as indicators, the initiatives would be to improve transportation for employees and the Cantine.

5.4 - ERP EFFECTIVENESS IN PERFORMANCE MEASUREMENT

5.4.1 - Financial Axis:

As it is shown in the table below, we can say the ERP software capabilities (100%) are at best: the SAP B1 allows to save basic data and may calculate and display the financial indicators using its integrated modules. For the Organizational effectiveness (54%). For the data it is Often not checked and is not quite reliable for articulating strategic decisions, for the calculations the organization teams tend more to use excel sheets rather than exploiting the SAP B1 tools.

Table 38 – Sarl Grafil - ERP Financial Effectiveness

ERP Maturity in Measuring Performance	Financial	Cashflow	Average Margins	Sales
1-saving Indicator basic DATA	100%	100%	100%	100%
2-calculating the Indicator	100%	100%	100%	100%
ERP Software Capabilities	100%	***100%***	***100%***	***100%***
1-saving Indicator basic DATA	83%	75%	75%	100%
2-calculating the Indicator	25%	25%	25%	25%
Organisational Effectiveness	54%	***50%***	***50%***	***63%***
1-saving Indicator basic DATA	92%	88%	88%	100%
2-calculating the Indicator	63%	63%	63%	63%
Overall Effectiveness	77%	***75%***	***75%***	***81%***

Source: made by the author

5.4.2 - Customers Axis:

It was noticed that for Customer Satisfaction and Availability that is measured by salesforce there is no framework in the system to collect data or articulate the relating indicators. For the revenues of old customers in order to track customers loyalty, there is reliable data in the system of revenues and it could be expressed using SAP reports tools but the teams choose to use Excel reports in order to calculate and illustrate the indicator.

Table 39 – Sarl Grafil - ERP Customer effectiveness

ERP Maturity in Measuring Performance	Customer	Revenues Old Customers	Customer Satisfaction	SalesForce Assessment
1-saving Indicator basic DATA	33%	100%	0%	0%
2-calculating the Indicator	25%	75%	0%	0%
ERP Software Capabilities	29%	***88%***	***0%***	***0%***
1-saving Indicator basic DATA	33%	100%	0%	0%
2-calculating the Indicator	8%	25%	0%	0%
Organisational Effectiveness	21%	***63%***	***0%***	***0%***
1-saving Indicator basic DATA	33%	100%	0%	0%
2-calculating the Indicator	17%	50%	0%	0%
Overall Effectiveness	25%	***75%***	***0%***	***0%***

Source: made by the author

5.4.3 - Internal Processes:

The data for both indicators: manufacturing cost and machines adjustment cost are unavailable, in fact teams use excel both for maintenance and for production, except from the input of inventory movement of finished products the manufacturing modules doesn't have the feature of saving downtimes and time loss. And the Sap B1 also lacks the module of computerized maintenance management system (CMMS) which could keep accounts of machines downtimes and working times.

For the production value, that takes data from accountancy posting that are related to inventories transactions, the SAP gives the capability to calculate and display the indicator using SAP reports tools but again for the organization side, the data is not always reliable, there are some problems that they encounter which causes disturbances in the production indicator:

- Physical Inventory Quantity doesn't fit with the quantity on the system due to automatic issuing.
- discrepancy in billing months compared to delivery.

Again, for reporting, teams choose to use excel sheets and reports rather than SAP reporting tools.

Table 40 – Sarl Grafil - ERP Internal Processes effectiveness

ERP Maturity in Measuring Performance	Internal Processes	Production Value	DownTime Cost	Machines Adjust cost	Shortages Cost
1-saving Indicator basic DATA	50%	100%	0%	0%	100%
2-calculating the Indicator	38%	75%	0%	0%	75%
ERP Software Capabilities	44%	***88%***	***0%***	***0%***	***88%***
1-saving Indicator basic DATA	38%	75%	0%	0%	75%
2-calculating the Indicator	6%	25%	0%	0%	0%
Organisational Effectiveness	22%	***50%***	***0%***	***0%***	***38%***
1-saving Indicator basic DATA	44%	88%	0%	0%	88%
2-calculating the Indicator	22%	50%	0%	0%	38%
Overall Effectiveness	33%	***69%***	***0%***	***0%***	***63%***

Source: made by the author

5.4.4 - Organizational Capacity

For the development axis, the ERP doesn't contain the necessary data in order to calculate the indicators, in fact the Human Resources Management module is absent in the SAP B1 solution as far as we could check in the vendor's support website.

Table 41 – Sarl Grafil - ERP Development effectiveness

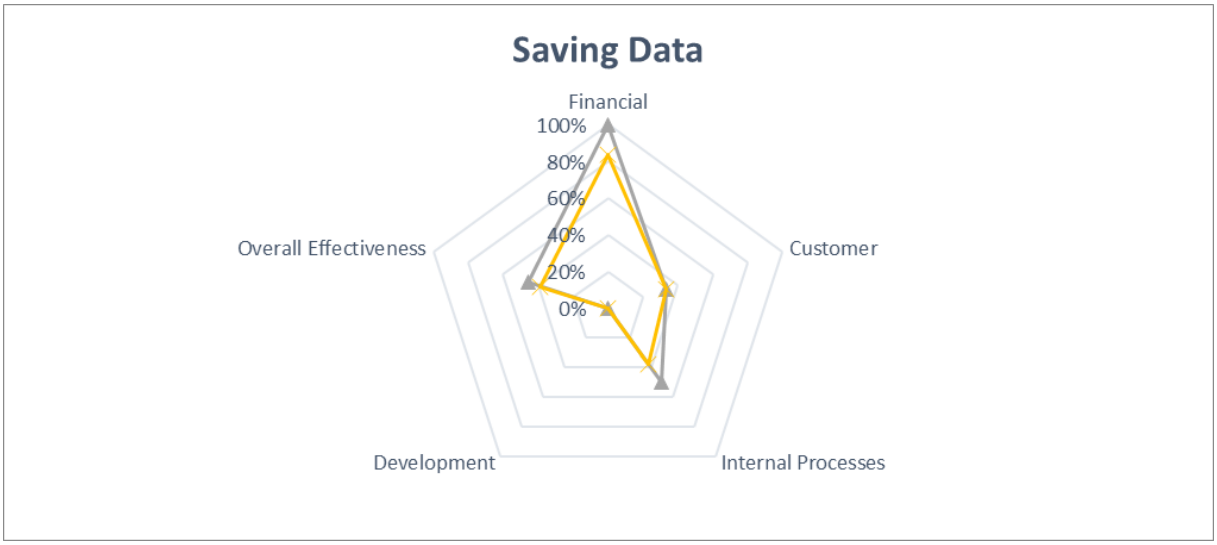
ERP Maturity in Measuring Performance	*Development*	*Training Ratio*	*Employee Satisfaction*	*TurnOver*
1-saving Indicator basic DATA	0%	0%	0%	0%
2-calculating the Indicator	0%	0%	0%	0%
ERP Software Capabilities	0%	***0%***	***0%***	***0%***
1-saving Indicator basic DATA	0%	0%	0%	0%
2-calculating the Indicator	0%	0%	0%	0%
Organisational Effectiveness	0%	***0%***	***0%***	***0%***
1-saving Indicator basic DATA	0%	0%	0%	0%
2-calculating the Indicator	0%	0%	0%	0%
Overall Effectiveness	0%	***0%***	***0%***	***0%***

Source: made by the author

5.5 - CONCLUSION ABOUT SARL GRAFIL:

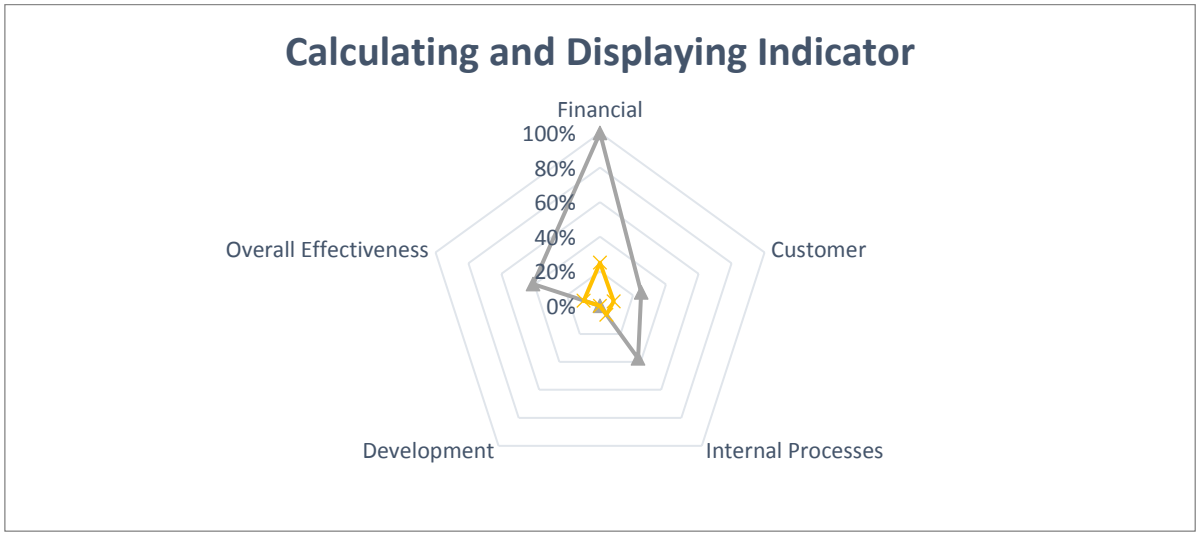
Based on the graph below, the organizational effectiveness is close to the software capabilities across the four dimensions of performance.

Figure 57 – Sarl Grafil - Software Capabilities Vs Organizational Effectiveness in Data saving.



Source: made by the author

Figure 58 – Sarl Grafil - Software Capabilities Vs Organizational Effectiveness in Calculation and Display of the indicator.



Source: made by the author

For the calculation and display of the indicator the organizational effectiveness is quite lower which is due to the fact that teams choose to work with excel rather than SAP reporting tools, in fact after interviewing teams and IT manager, we found out that both operational teams and IT team never had a training on using such tools which could possibly be the reason why it is not used.

Table 42 – Sarl Grafil - ERP effectiveness in Strategic Performance Measurement.

ERP Maturity in Measuring Performance	*Financial*	*Customer*	*Internal Processes*	*Development*	*Overall Effectiveness*
1-saving Indicator basic DATA	100%	33%	50%	0%	46%
2-calculating the Indicator	100%	25%	38%	0%	41%
ERP Software Capabilities	100%	29%	44%	0%	*43%*
1-saving Indicator basic DATA	83%	33%	38%	0%	39%
2-calculating the Indicator	25%	8%	6%	0%	10%
Organisational Effectiveness	54%	21%	22%	0%	*24%*
1-saving Indicator basic DATA	92%	33%	44%	0%	42%
2-calculating the Indicator	63%	17%	22%	0%	25%
Overall Effectiveness	77%	25%	33%	0%	*34%*

Source: made by the author

We can say that in general SAP Business One presents high capabilities for producing customized reports, and integrated tools for tracking financial measures, However for the non-financial indicators the modules are either inexistant or doesn't support or manage the data that serves calculating these key indicators.

- **Answering the Hypothesis of the study**:

Our main hypothesis is **accepted**, in fact the ERP system at Sarl Grafil is ineffective in strategic performance measurement not only because it does not utilize all the data that it possesses in calculating indicators, but also because many highly strategic data and processes are not supported within its modules.

Answering the sub-hypothesis:

- SAP B1 at Sarl Grafil is effective in measuring financial performance. (**rejected**)
- SAP B1 at Sarl Grafil is ineffective in measuring customer performance (**accepted**).
- SAP B1 at Sarl Grafil is ineffective in measuring operations performance (**accepted**).
- SAP B1 at Sarl Grafil is ineffective in measuring organizational growth and learning performance (**accepted**)

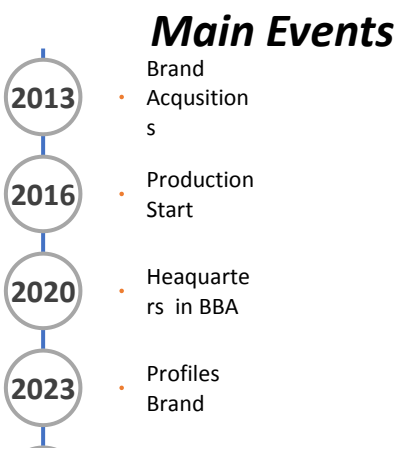
CHAPTER 6 – CASE STUDY 2 - CANTOR AT OXXO SPA

6.1 – OXXO SPA ORGANIZATION OVERVIEW

6.1.1 - Introduction and historical background

Brief History of the company

Originally Oxxo was a French brand that has existed since 1923, with an expertise and know-how recognized as a provider of efficient and durable solutions in the carpentry market. Oxxo manufactures and installs windows, doors and closures with high thermal, acoustic and sealing performance.



The brand was acquired in 2013 by Cevital group, Oxxo has been present on the Algerian market since 2014. On February 2016 the Plant started manufacturing windows. Oxxo Algérie Spa is active in the field of extrusion of PVC profiles and the assembly of PVC windows and French doors with high thermal performance. The production factory, located in the city of Ain Taghrout, over an area of 35 hectares, is equipped with ultra-modern robotics and automation technologies with an annual estimated production capacity of 550’000 windows per year.

In 2020 the headquarters moved from Algiers to the production site in Ain Taghrout.

In the late months of 2023, the company decided to sell the PVC profiles with a new brand that is different than “Oxxo”

Table 43 – Oxxo spa - Key Manufacturing capacities

Assembled Windows	550 000 pcs/year
Tones of PVC Profiles	25 000 tones/year
Window Unit	1 200 000 pcs/year
Roller Shutter	400 000 pcs/year

Source: made by the author based on the website information

Figure 59 – Oxxo spa - working sites

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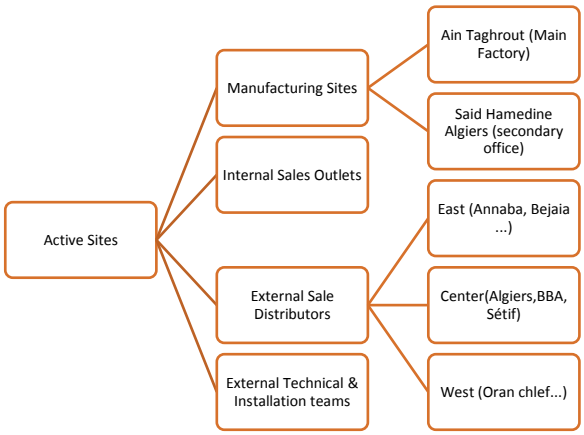
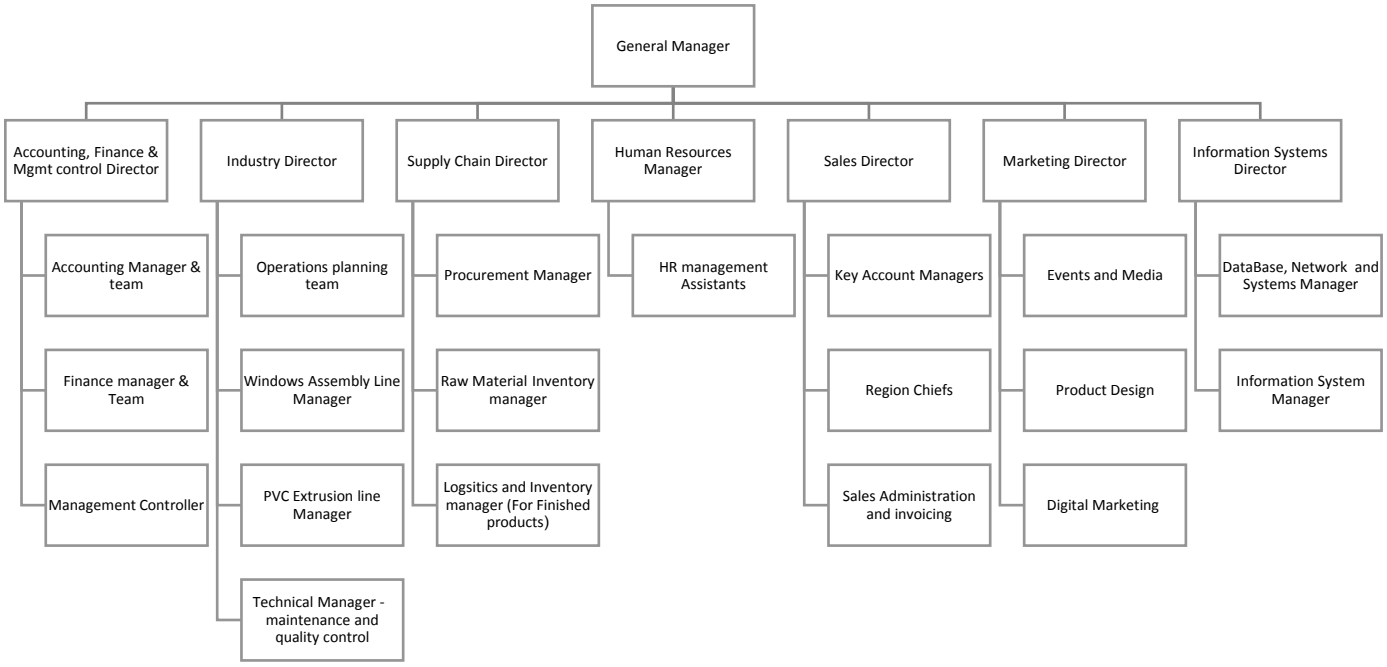
The main plant is located in the Ain Taghrout between Wilaya of B.B. Arreridj and Wilaya of Sétif, the general headquarters are located in the same place however there are some support offices in Algiers in Said Hamedine sales outlet.

The sales network keeps expanding.



6.1.2 - Organization and workforce

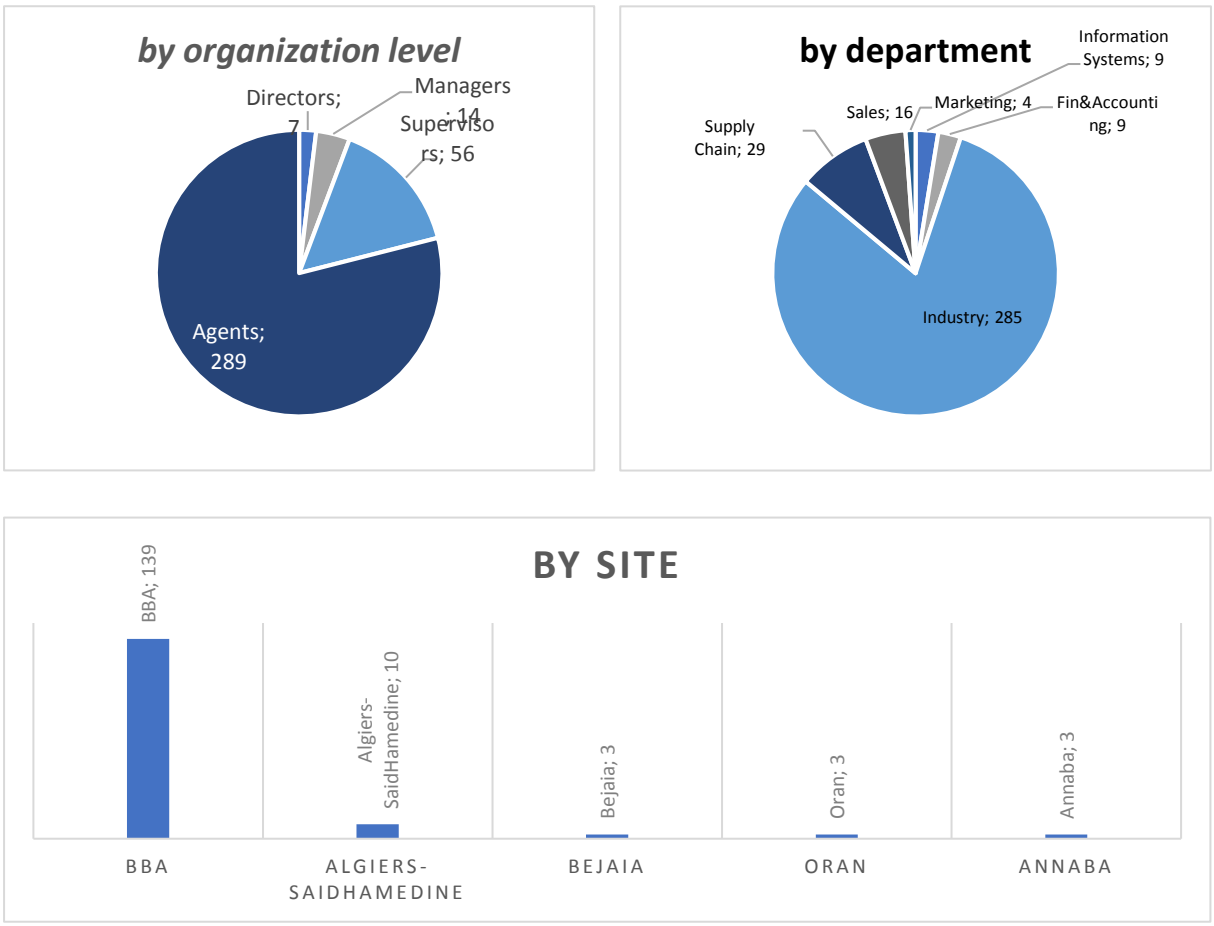
Figure 60 – Oxxo spa - Organizational Chart



. **Source:** made by the author

- **Workforce.**

Figure 61 – Oxxo spa - Workforce distribution by Level and by Department



Source: made by the author

We can observe from the figures above that Industry section holds most of the workforce employees who include agents, supervisors and managers as is shown in the other graph, the main site of BBA has most of employees since it includes the plants and management staff.

We notice at the same time the sales section has not much employees compared to the network size and this is due to the fact that most outlets belong to external distributors.

The company intends to enhance the competencies of its staff by investing more in training however the HRM is focus on payroll and maintaining operational balance.

6.1.3 - Products, activity and value model:

Table 44 – Oxxo spa - Value Offering

Providing High Quality Windows Product and Installation	Providing High Quality Products	Manufacturing High Quality PVC Profiles
		Manufacturing High Quality Glass Panels
		Automated Assembled High Quality Windows
	Installation	Internal Highly skillful Installation teams
		External Installation subcontractors

Source: made by the author

For the B2B segment which is related to big housing projects the value is the ability of company to produce large quantities of windows in short time which small workshops can't do and for the B2C to main value beside installation services is the product remarkable quality due to the automated process and PVC quality.

The Other Differentiating aspect is that PVC Windows can be colored using different patterns such as wood, the process is complex but gives very good-looking windows. This feature is also out of reach for small workshops.

The following table shows the target market, use, raw material and the process for each category windows and profiles:

Table 45 – Oxxo spa - products

Product	Target Markets	Usage	Raw Material	Process
PVC Windows	▪ B2B: government and private housing projects ▪ B2C: General public customers	Windows help to create a barrier between the interior and exterior of a house, offering protection from the elements (such as wind, rain, dust, or noise from outside)	PVC Profiles + Glass frames + Assembling Accessories	Assembling line
PVC Profiles	Small Aluminum and PVC joinery workshops	Windows and doors manufacturing for small workshops or bigger companies	PVC chemical raw materials	Blending the Chemical and then extruding

6.1.4 - Performance Measurement at Oxxo spa

As is shown in the table below performance measurement maturity depends on the function/department:

Table 46 – Oxxo spa - Performance Measurement and Review

Departments	Existing Objectives	Existing KPI	Existing Targets	Direction Performance Review	Business Review	Strategic Performance Review
Finance & Acc	Yes	/	/	Occasionally	Monthly	Yearly
HR	/	/	/	/	Monthly	/
Production	Yes	Yes	Yes	Daily	Monthly	/
Sales	Yes	Yes	Yes	Monthly	Monthly	Yearly
Marketing	Yes	Yes	Yes	Occasionally	Monthly	Yearly
Supply Chain	Yes	Yes	Yes	Weekly	Monthly	/
Information systems	Yes	/	/	/	Monthly	/

Source: made by the author

We noticed the following observations:

- The Performance review at the level of the direction is not systematic in most directions. The Supply Chain Direction is the only direction that reviews performance every week steadily.

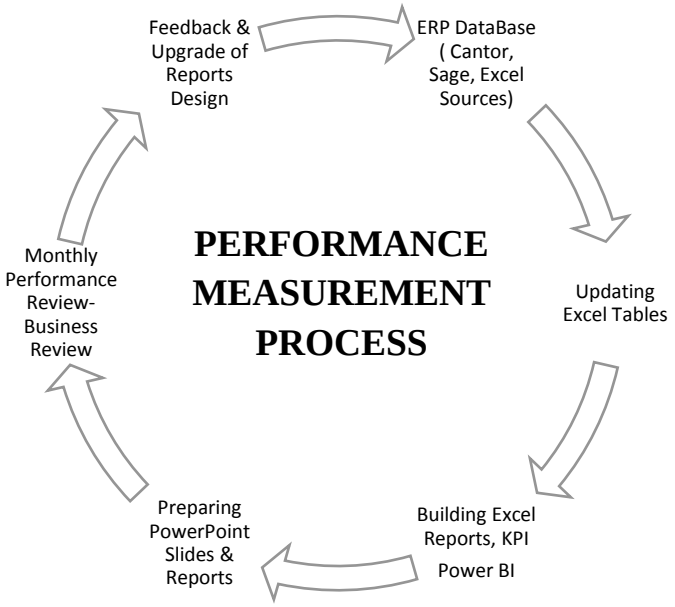
- Every Month all directors give account to Chief Executive Officer on the previous month performance in a meeting named Business Review it is dedicated for operational performance however it can include some strategic analysis or decisions.

- We have noticed also that systematic strategic performance review.

- Performance Monitoring through KPI is not systematic, except for finance, sales and supply chain the reporting is just plain activity numbers or reporting without references or targets that allows to track any improvement or deterioration in the subject performance.

For the Performance Measurement Process and data Sources it is illustrated through the following cycle.

Table 47 - Oxxo spa - Performance Measurement Process



Source: made by the author

As it is shown in the graph most reports are based on excel reports that extracts data from the ERP or other solutions such as Sage using SQL Queries.

The management control process seems to be very efficient in pushing all other departments to report good number and keep their data accurate and promote reporting.

6.2 – CANTOR AND SAGE (ERP OVERVIEW)

6.2.1 - The Software Solution of Cantor

Cantor is a German ERP solution that is designed for Windows and doors manufacturing developed by A+W company.

Cantor is structured around three main components which are Cantor ERP, Cantor CIM and Cantor Dealer.

CANTOR ERP includes (A+W Official Website):

- **The Offer and Order Processing Module:** this module gives the needed features for dealing with customer orders and quotation
  - Quotation and order processing allows entry of all materials for an order
  - A+W Cantor conducts credit limit checks and considers individual delivery blocks before creating order confirmations
  - A remake order for customer complaints can be generated with just a few clicks in A+W Cantor, thus retaining reference to the original order
- **Purchasing and Material Management:**
  - Just-in-time ordering ensures materials arrive as late as possible yet as early as necessary
  - Fully priced purchase orders and generated for stored suppliers for all order-related purchased materials
  - Incoming and outgoing goods can be automatically booked or scanned using a mobile scanner
- **Process and Management:**
  - A+W includes process improvement tools, such as workflow and task management, along with an info center, which facilitates company-wide optimization
  - The integrated SQL tool allows for the creation of queries to analyze and optimize every area within the company

CANTOR CIM includes:

- **Capacity Planning and Delivery Date Determination:**
  - Order confirmations in A+W Cantor factor in production capacity and material requirements to determine precise delivery dates
  - Just-in-time planning calculates tasks for all steps across departments, thus ensuring seamless coordination
- **Work Preparation and Production control:**
  - Flexible batch formation optimizes line capacity
  - Cut optimization reduces material waste and costs
  - Access all production-relevant information from labels to worksheets, directly within the system
  - A+W Cantor manages machine control for streamlined production
  - Increase efficiency and save time in the production process by eliminating the

need for material and element searches

- **Shipping and Loading:**
  - Pick lists detail storage locations for manufactured and , thus ensuring comprehensive loading for each truck
  - Delivery route planning accounts for truck capacities, order weights, unit cargo areas, and preferred delivery days per area
  - A+W Cantor offers warehouse organization with storage space management for finished elements, accessories, and purchased parts

CANTOR Dealers enables dealers or external distributors in our case company to effortlessly generate offers, place orders, create delivery notes, and issue invoices. Additionally, dealers can establish and manage their own installation services, handle basic items, and efficiently maintain their customer base.

6.2.2 – Cantor in Oxxo spa

- History of implementation in Oxxo

The Cantor ERP was integrated with the launching of the company, the main estimated benefit was that the ERP is not standard and is designed only for windows and doors manufacturing industries this enables the company to have many good features related to the order processing in fact the standard ERP would not be able to handle the product complexity of windows such as dimensions, criteria or glass type…

The other observed benefit was that the ERP system works well with the highly automated machines, the order details are processed automatically generating a file that contains all the guidelines for the different machines to process the window, such as thickness, drilling points, cutting length of profiles and so on. This process would be highly complex and difficult to handle if the ERP was standard since it would request many teams to coordinate together and to process it manually.

From Interviews with Information Systems Team, we have been told that the ERP was subject to many adjusting and personalization efforts these efforts intended to adapt the system to the specific needs of the company and its context and its management system.

- Modules Integration:

The following table shows the current management activities and modules from the information systems including Cantor ERP, Sage and Excel that are used to support these activities using a utilization rate.

The Utilization rate was calculated mainly by observing the number of functionalities or features that are used in the module or directly from interviewing teams that are using the module. It shows how far the ERP capabilities and resources are exploited.

Table 48 – Oxxo spa - Information System Matrix

Department / Team	ERP Modules ===>	Sales Processing	Production	Purchasing	Inventory	CIM for Fin Prod	CANTOR Dealer	Cantor Queries	Sage Fin & Acc	Sage RH & Paie	Sage Procur	Ms Excel	
Global		90%	85%	70%	70%	90%	90%	70%	80%	30%	30%		100%
Departements - Activities Titles		**CANTOR (81%)**							**SAGE (47%)**				**Excel**
Finance and Accounting	General Accounting								20%				100%
	Cost Control				10%				20%				100%
	Prices, Margins Management	10%											100%
	Budget Management												
	Banking & Cash								20%				100%
	Fin & Acc Reporting							30%	20%				100%
Supply Chain Team	Managing Suppliers info			30%							15%		100%
	Purchase Processing			30%							15%		100%
	Raw Material Inventory transactions				60%								100%
	Finished Prod Inventory transactions					90%							100%
	Supply Chain Reporting			10%				10%					100%
Industrial team	Workflow & Process Ingineering		35%										100%
	Production Reporting		15%										100%
	BOM elaboration		35%										100%
	Quality Control												
	Maintenance												
	Technical Process Reporting							10%					100%
Sales Team	Managing Customers Info	30%					90%						100%
	Sales Processing	30%											100%
	Sales Reporting	20%						10%					100%
HRM Team	Time & WorkForce Management									10%			100%
	Payroll Processing									10%			100%
	Training												
	HR Reporting							10%		10%			100%
Marketing	Marketing, Media & Digital Marketing												

Source: made by the author

The First Main observation is that the company uses two different Programs which are Cantor and Sage, Cantor is used for direct operations such as procurement, manufacturing, sales and inventory whereas Sage is using for support functions such as accounting or payroll management.

Cantor seems to be exploited to the fullest which is not the case for Sage, and especially for Sage RH & Paie.

For procurement and inventory, Cantor is used for raw material and Sage is used for indirect goods. The fact we have two systems for the same function makes it more difficult to generate full scope reports if for example you look for the total procurement amount you will need to do the effort twice because of the different criteria of each system and the struggle to adapt them to a single model. This fact makes the process heavy for example for accounting purposes they need to write down manually all the inventory transactions that occurred in Sage into the general ledger whereas for Cantor it is passed automatically.

We noticed also that Sage has the ability to automatically generate accounting postings but the feature is not used and this is considered as a loss in time and cost.

In the other hand we can see that there are some key business activities that are unsupported neither by Cantor nor by Sage such as MRP, budget management, CRM, Training and Marketing Campaigns.

- **Benefits:**

  The CANTOR certainly has brought many benefits to the company:

  - Higher flexibility in ordering and manufacturing windows adapted to customer preferences.
  - Managing complexity of the product despite the fact that the product is not standard and each order has specific criteria, Cantor is still able to manage this and generate bill of material for each order.

  As for Sage the benefits are:

  - The Accounting and Finance module has all the needed features to drive, the main key functions of the department and the interface.
  - The Accounting and Finance has very good controlling features for cost control and budget management and reporting.

- **Challenges and difficulties:**

  - One of challenges was to link **Cantor** with **Sage**, while most inventory transactions occur in **Cantor**, accounting postings occur in Sage, the challenge was to link them together so that each month the inventory transactions are summarized into accounting postings.
  - The Other Challenge is to synchronize master data in both databases, as for

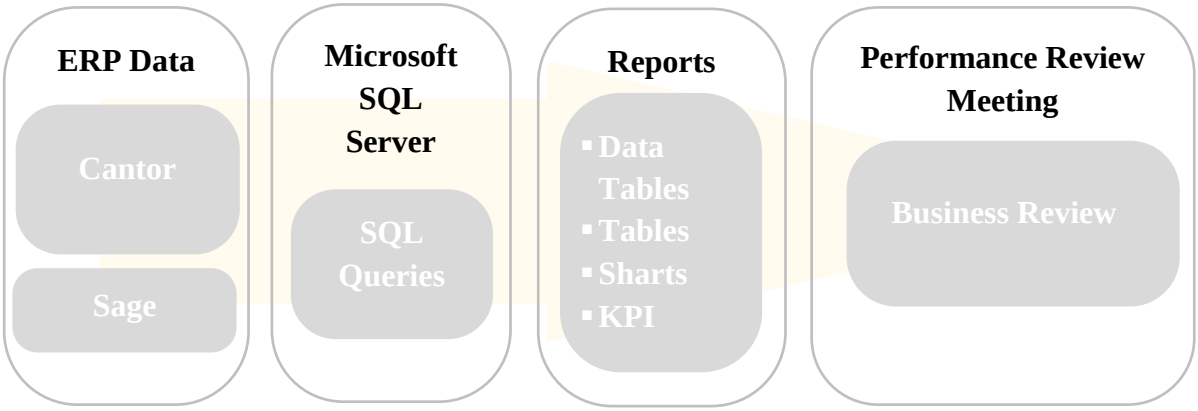
suppliers or customers often they are not written the same way in Cantor and in Sage and this create many difficulties at the level of accounting posting or tracking supplier balance.

- The Finished Products and intermediate goods inventory management present many weaknesses, in fact **Cantor** technical structures makes it difficult to return goods from customers, and the Intermediate goods inventory is not tracked by the system which causes the financial performance in P&L reports fluctuates over time making it difficult to track real performance in short time monitoring.
- Another challenge in **Cantor** is the spare part inventory management, the spare parts have some inventory management consideration different than other goods, the management of spare parts needs to have information and manufacturer, serial numbers, versions and ID from the supplier which are not available in **Cantor**.
- Some orders contain specific type of glass that the company doesn't produce and which is outsourced from another company, the **Cantor** system finds it difficult to manage and track these orders and the inventory of these parts.
- The main challenge for **Sage** is to link procurement and accounting. Despite the fact that it's the same system and has all the features to synchronize both modules, still all the transactions that happen in Procurement module are re-written in accounting module.

6.2.3 - Performance Measurement

The Performance measurement process as in any company is based on Excel reports and that are built by different team and often its management control team from data that is extracted from the ERP databases through SQL Queries. The following figure illustrates this process:

Figure 62 – Oxxo spa - Performance Measurement and Review Process



Source: made by the author

The reports which are summarized tables or charts are built in excel in general but the company started recently using Microsoft Power BI to build dashboards especially for sales.

The reports are then communicated to the head of department or for the general manager or even further for the group headquarters.

The company has monthly performance review meeting named Business Review, In which different directors give accounts on their departments performance to the general manager. While business review may include some strategic performance monitoring or decisions, we have not found the presence of any meeting that is intended entirely for strategic performance measurement.

6.3 - BUILDING STRATEGY AND BALANCED SCORECARDS INDICATORS

6.3.1 - Strategic Framework

- Context of the company

The company operational performance is quite well, it excels compared to competitors being the market leader so far however the remaining challenge is strategic in the first place, the company product value and reputation are good but that is not enough, despite the fact that the company has very good position on the market, still the demand level is not sufficient to keep the company profitable this leads to many strategic options that helps grow sales and increase production such as selling semi-finished products such as PVC profiles or glass frames, or looks for export to other markets abroad. The other challenge to the company is the delivery lead times, infact the time between the customer ordering windows and the delivery date can exceed one or two months which causes customer insatisfaction knowing that this factor has caused a bad reputation to the company where lead times reached six months which makes it primordial for the company to track leadtimes

- Strategic Framework:

- **Vision**: the company has no clear written vision however the priority is to design joinery and closures with a focus on sustainable development.

- **Mission:** Designing, manufacturing and selling PVC Windows and doors with installation services

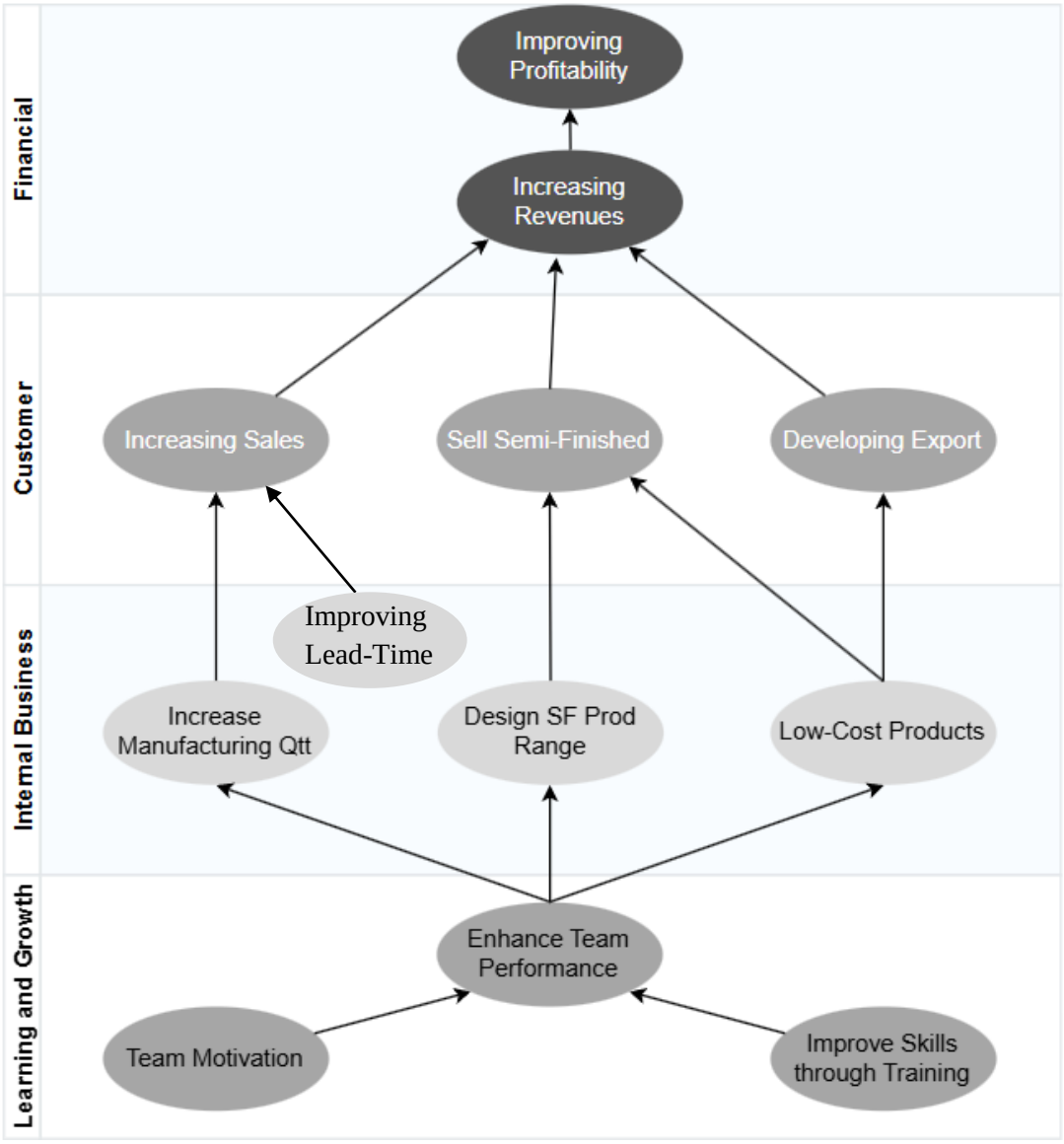
- **Goals**: the company has to ensure comfortable Profitability (net profit of 20% of revenues) for the shareholders.

- **Strategy**: in order to attain that level, the strategy is to maximize production quantity.

6.3.2 - Strategic Map:

- The strategy is based on raising production in order to ensure comfortable level of revenues in regard to gross profit margins and cost overhead. This is achieved increasing sales orders.

Figure 63 – Oxxo Spa - Strategy Map



Source: made by the author

6.3.3 - Balanced Scorecards:

Table 49 – Oxxo spa - Balanced Scorecards

	Strategic Objectives	Strategic Indicators and Targets	Initiatives
Financial	- Profitability - Revenues	▪ Net Profit to Revenues % ▪ Sales	
Customers	- Increasing Sales - Sell Semi-Finished - Developing Export	▪ Sales Volumes ▪ Semi-Finished Prod Sales Volumes ▪ Export Sales Volumes	▪ Increasing Production ▪ Design S-F Product range ▪ Low-Cost Products
Internal processes	- Rise Product Quantity - Design SF products - Design Low-Cost Products - Improving Lead-time	▪ Production Quantity. ▪ SF Products Production Qtt ▪ Low-cost/Normal Cost ▪ Delivery Lead-time in Workflow	▪ Add More Teams ▪ Sell PVC Profiles ▪ New Range ▪ Simplify workflow
Development	- Enhance Team performance - Team Motivation - Team Skills	▪ Interview- Survey ▪ Employee Satisfaction ▪ Realized /Planned Training	▪ Improve work conditions ▪ Enhance Training

Source: made by the author

For particular considerations to the company's privacy, we have chosen not to include target values of the indicators.

6.3.4 - Key Performance Indicators: (explaining choice and reflection behind choosing KPI)

- Financial Axis

For the profitability we use the net profit ratio to revenues because that's the indicator that will reflect the impact of rising production quantity. And for growth we use sales value in order to assess revenues.

- Customers Axis:

For the customer axis we have chosen to use sales in quantities, sales volumes of semi-finished products and finally export sales volumes to describe the volume of exported products.

- Internal Processes:

As the company in general masters the operational excellence performance our main focus in the balanced scorecards is to asses Semi-Finished products quantity, and Low-Cost Products efforts by using the ratio of low cost to normal cost.

For the delivery lead-time the company has to analyze the workflow time and tries to accelerate the workflow by simplifying the workflow structure, reduce checkpoints and remove unnecessary activities.

- Organizational Capacity:

In order to track training efforts, we use the indicator of percentage of realised training time to the planned training time. It shows how far we have accomplished training programs regarding the plan that is supposed to reflect the training needs of the organization. For Motivation and performance, we use employee's satisfaction and performance survey.

6.4 - ERP EFFECTIVENESS IN PERFORMANCE MEASUREMENT

6.4.1 - Financial Axis:

As it is shown in the table below, we can say the ERP software capabilities (**75%**) are good: the SAGE which contains all financial data allows to save basic data and may calculate and display the financial indicators using BI tools such as Power BI externally from the ERP.

For the Organizational effectiveness (**63%**). the data is checked and is reliable this is explained by the fact that the company is tied to financial reporting to the group headquarters each month and also by the presence of management control and for the calculations part the organization teams is more likely to use excel sheets to display reports, at the same time it is possible to use power BI tools to display financial KPI from ERP data.

Table 50 – Oxxo spa - ERP Financial Effectiveness

		Financial	
ERP Maturity in Measuring Performance	*Financial*	*Net Profit%*	*Sales*
1-saving Indicator basic DATA	100%	100%	100%
2-calculating the Indicator	50%	50%	50%
ERP Software Capabilities	75%	***75%***	***75%***
1-saving Indicator basic DATA	100%	100%	100%
2-calculating the Indicator	25%	25%	25%
Organisational Effectiveness	63%	***63%***	***63%***
1-saving Indicator basic DATA	100%	100%	100%
2-calculating the Indicator	38%	38%	38%
Overall Effectiveness	69%	***69%***	***69%***

Source: made by the author

6.4.2 - Customers Axis:

For the Software capabilities (**75%**): Cantor holds the basic data for sales at the same time the system has no feature to display sales reports or analysis inside Cantor.

For Organizational effectiveness (**63%**): Cantor contains real time data of sales for the different sales network outlets however, the data often present mistakes and needs correction since the sales teams focuses more on terrain work than sales reports and analysis. currently the sales reports are displayed using Power BI tools.

Table 51 – Oxxo spa - ERP Customer effectiveness

		Customers		
ERP Maturity in Measuring Performance	*Customer*	*Sales volumes*	*SF Products Sales*	*Export Sales*
1-saving Indicator basic DATA	100%	100%	100%	100%
2-calculating the Indicator	50%	50%	50%	50%
ERP Software Capabilities	75%	***75%***	***75%***	***75%***
1-saving Indicator basic DATA	75%	75%	75%	75%
2-calculating the Indicator	50%	50%	50%	50%
Organisational Effectiveness	63%	***63%***	***63%***	***63%***
1-saving Indicator basic DATA	88%	88%	88%	88%
2-calculating the Indicator	50%	50%	50%	50%
Overall Effectiveness	69%	***69%***	***69%***	***69%***

Source: made by the author

6.4.3 - Internal Processes:

For the Software Capabilities (**63%**), the Cantor ERP has the basic data for productions quantity and cost of products however the system lacks the inventory tracking for the Semi-Finished products which prevents from building the related indicators.

For The Organizational Effectiveness (**38%**), the indicators are calculated and displayed outside Cantor ERP in Excel sheets and for the SF Production indicator the absence of Data in the system prevents any calculations because the SF products can't be tracked manually independently from the Cantor system.

Table 52 – Oxxo spa - ERP Internal Processes effectiveness

		Internal Processes			
ERP Maturity in Measuring Performance	*Internal Processes*	*Production Quantity*	*SF Production for Sales*	*Delivery Lead-Times*	*Low Cost/ Normal Cost*
1-saving Indicator basic DATA	75%	100%	0%	100%	100%
2-calculating the Indicator	50%	50%	50%	50%	50%
ERP Software Capabilities	63%	***75%***	***25%***	***75%***	***75%***
1-saving Indicator basic DATA	63%	100%	0%	100%	50%
2-calculating the Indicator	13%	25%	0%	0%	25%
Organisational Effectiveness	38%	***63%***	***0%***	***50%***	***38%***
1-saving Indicator basic DATA	69%	100%	0%	100%	75%
2-calculating the Indicator	31%	38%	25%	25%	38%
Overall Effectiveness	50%	***69%***	***13%***	***63%***	***56%***

Source: made by the author

Noting here that for the delivery lead-time indicator there are much data in the system about the time of each status change in the workflow of every order from the first customer order to the manufacturing process and to delivery and installation and despite the fact the data is constantly checked and reliably, still no indicator was built to track delivery lead-times that is to say that ERP contains very significant data regarding strategic performance measurement yet it is not exploited in any way.

6.4.4 - Organizational Capacity

For the development axis, both Sage and Cantor don't contain the necessary data in order to calculate the indicators.

Table 53 – Oxxo spa - ERP Development effectiveness

		Development		
ERP Maturity in Measuring Performance	*Development*	*Performance survey*	*Employee Satisfaction*	*Realised/Planner Training*
1-saving Indicator basic DATA	0%	0%	0%	0%
2-calculating the Indicator	0%	0%	0%	0%
ERP Software Capabilities	0%	***0%***	***0%***	***0%***
1-saving Indicator basic DATA	0%	0%	0%	0%
2-calculating the Indicator	0%	0%	0%	0%
Organisational Effectiveness	0%	***0%***	***0%***	***0%***
1-saving Indicator basic DATA	0%	0%	0%	0%
2-calculating the Indicator	0%	0%	0%	0%
Overall Effectiveness	0%	***0%***	***0%***	***0%***

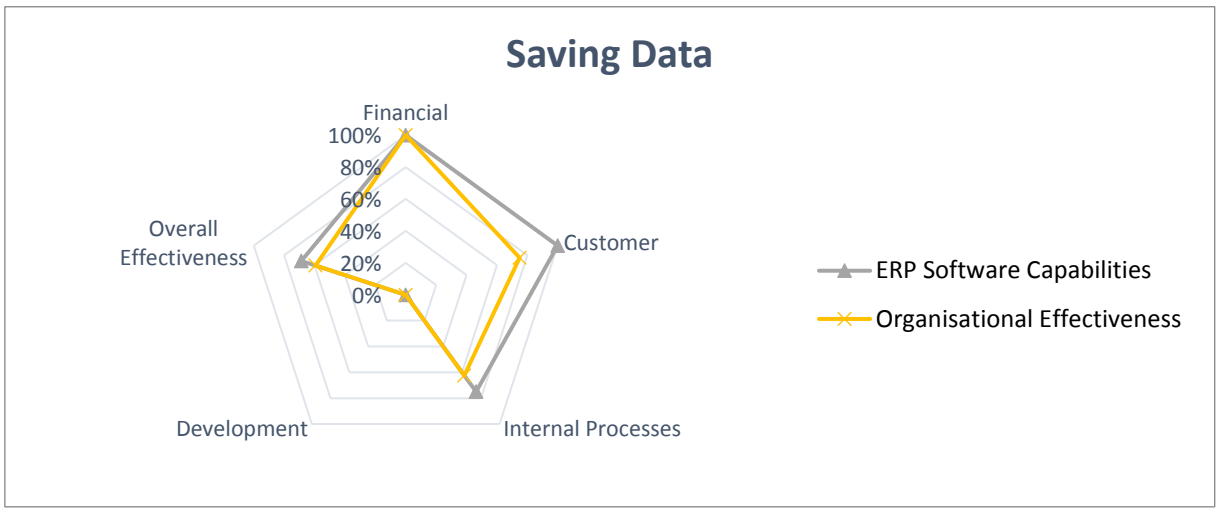
Source: made by the author

6.5 - CONCLUSION ABOUT OXXO SPA:

Based on the graph below we can see that the gap is small between the organizational effectiveness and software capabilities across the four dimensions of performance.

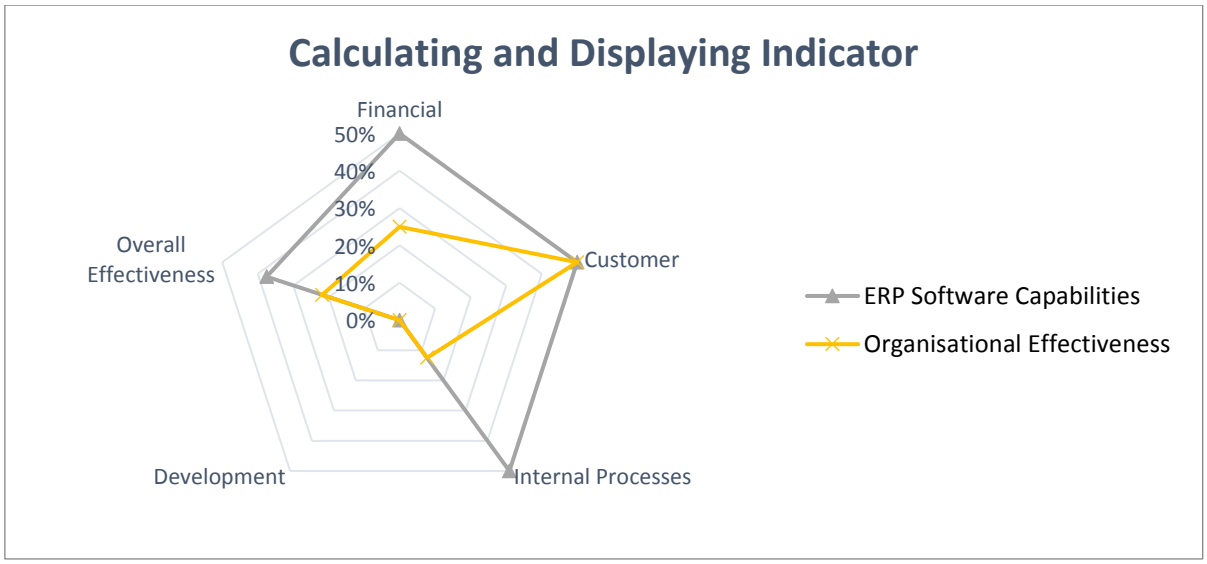
The main observation here is that the ERP system again is unable to provide data or handle processes related to Organizational capacity axis in the balanced scorecards.

Figure 64 – Oxxo spa - Software Capabilities Vs Organizational Effectiveness in Data saving



Source: made by the author

Figure 65 – Oxxo spa - Software Capabilities Vs Organizational Effectiveness in Calculation and Display of the indicator



Source: made by the author

For the calculation and display of the indicators the organizational effectiveness is quite lower which is due to the fact that teams choose to work with excel rather than Cantor or Sage at the same time both systems do not include powerful reporting tools.

Table 54 – Oxxo spa - ERP effectiveness in Strategic Performance Measurement

ERP Maturity in Measuring Performance	*Financial*	*Customer*	*Internal Processes*	*Development*	*Overall Effectiveness*
1-saving Indicator basic DATA	100%	100%	75%	0%	69%
2-calculating the Indicator	50%	50%	50%	0%	38%
ERP Software Capabilities	75%	75%	63%	0%	*53%*
1-saving Indicator basic DATA	100%	75%	63%	0%	59%
2-calculating the Indicator	25%	50%	13%	0%	22%
Organisational Effectiveness	63%	63%	38%	0%	*41%*
1-saving Indicator basic DATA	100%	88%	69%	0%	64%
2-calculating the Indicator	38%	50%	31%	0%	30%
Overall Effectiveness	69%	69%	50%	0%	*47%*

Source: made by the author

We can say that in general despite the fact that Cantor and Sage have good capabilities in tracking production, sales, inventory and financial data, they both lack a framework to build and display indicators the reason why the company prefers using power BI or excel

- **Answering the Hypothesis of the study**:

Our main hypothesis is **accepted**, in fact the ERP system at Oxxo is ineffective in strategic performance measurement because it lacks data for some important management processes and lacks the tools to display and build the key indicators.

Answering the sub-hypothesis:

- The ERP systems of Cantor and Sage at Oxxo are effective in measuring financial performance. (**rejected**)
- The ERP systems of Cantor and Sage at Oxxo are ineffective in measuring customer performance (**rejected**).
- The ERP systems of Cantor and Sage at Oxxo are ineffective in measuring operations performance (**accepted**).
- The ERP systems of Cantor and Sage at Oxxo is ineffective in measuring organizational growth and learning performance (**accepted**)

GENERAL CONCLUSION

1. RESULTS

A-regarding the goals of the study

Ineffectiveness of ERP in Performance Measurement

Almost all ERP systems lack integrated tools that enable managers to track strategic performance. Rather than this, they provide data that is used with another program or BI tool to build reports and indicators. The leading ERP concern is handling basic transactions and providing data rather than monitoring performance.

On the other hand, to use ERP for Performance measurement, the data inside the ERP must be accurate and reliable, which is not easy. In fact, from comparing the two companies we have studied, we have noticed that the presence of a management control process enhanced the data reliability significantly, which allowed us to better articulate indicators; therefore, any company that intends to use ERP for strategic performance measurement must work hard on keeping data reliable and real-time updated through management control processes.

The ERP integration Maturity

Regarding the maturity of the ERP, we found that in both companies, the ERP integration was based on ensuring the basic transactions such as sales process, procurement process, inventory and production. In both study cases, The ERP maturity improved later from the internal effort of the IT team as if the integrator intended to give solutions only for day-to-day activity and never made an effort to deliver insightful tools for planning, performance measurement and decision-making. That could be because either the integrator and solution are poor or the company management is not yet ready to handle these processes.

Key Success Factors for Implementing Performance Measurement through ERP

- **Diversity in solutions**: The Company should have diverse reporting solutions, either integrated ERP tools, BI tools, or Excel skills. That gives the user flexibility; some users find it more helpful to work on Excel, others have mastery over BI tools, and others find it better to work inside an ERP system.
- **Training**: Having the needed skills in building metrics or in using software or building reports Excel is beneficial if not necessary; any company that wants to integrate solid performance measurement using ERP data should plan and develop users' competencies very carefully and systematically.
- **Data Reliability**: Data reliability represents one of the most significant challenges in performance measurement. While the design of robust metrics or strategy maps may be relatively straightforward, acquiring reliable data to underpin these metrics is considerably more complex. For an organization to effectively utilize information within an ERP system, it is imperative to ensure the accuracy and integrity of such data. That can be achieved through rigorous controls, whether implemented via management control systems, information systems management, or direct oversight by managerial personnel.
- **Continuous improvement**: Building an entirely new performance measurement

system that tracks strategic performance with new indicators needs a fundamental transformation in the information system. It will create new processing or data to give a clear view of the performance along the four dimensions of the Balanced Scorecards. On the other hand, the information systems teams are often busy with operational tasks; knowing all this, it is clear that this shift in the system cannot be accomplished overnight and has to be a mid-term continuous improvement effort.

b-Regarding Previous Studies

The First study: performance measurement - does ERP systems measure up? (K. Bredmar, 2011)

While our study has dealt with the same subject from another angle, our findings still agree with the results of this study: We have seen from the table of results that ERP systems have a better ability to track traditional finance and customer indicators and in the other hand ERP systems are unable when it comes to modern business tools.

The Second Study: Evaluating the Effects of ERP Systems on Performance and Management Accounting in Organizations (H. Vakilifard, S. A. Meinagh & M. R. Khataee, 2013)

There is no direct impact between this study and ours. However, the added value of this study to our results is that our study directly examines the ability of ERP systems to support performance measurement by providing needed data and tools to do it. This study opens a new insight into the indirect positive impact of ERP implementation performance measurement by allowing users to consume less time on daily routine tasks and dedicate more time and energy to performance measurement.

The Fourth Study on ERP effects on management control and decision-making process (OUAFEK & OUACHERINE, 2020)**:**

In this study, SAP Business One was found to be effective in enabling cost and budget controlling, which agrees with our conclusion on the software capabilities of SAP Business One in the first study case.

C-Answering Hypothesis and Problematic

Table 55 – Main and Sub Hypothesis General Results

Cases	Finance	Customer	Processes	Development	Main
Grafil	Rejected	Accepted	Accepted	Accepted	Accepted
Oxxo	Rejected	Refused	Accepted	Accepted	Accepted
General	**Rejected**	**Accepted**	**Accepted**	**Accepted**	**Accepted**

Source: made by the author

Sub-Hypothesis

Answering the sub-hypothesis:

- The ERP systems are effective in measuring financial performance. (**Rejected**)
- The ERP systems are ineffective in measuring customer performance (**Accepted**).
- The ERP systems are ineffective in measuring operations performance (**Accepted**).
- The ERP systems are ineffective in measuring organizational growth and learning performance (**Accepted**)

Main Hypothesis

Our main hypothesis is **accepted**. ERP systems indeed are ineffective in strategic performance measurement because they lack data for some important management processes. After all, the process is entirely inexistent in the system, or the data only supports the transaction and does not consider the need for performance measurement. While some ERPs have tools to display, build, and customise indicators, the ERP still does not provide integrated solutions to report strategic performance indicators.

FEEDBACK AND INSIGHTS ON FUTUR RESEARCH

1-Feedback and Recommendations

- **Grafil - Management Control**, The good thing is that SAP Business One covers most of the business activities. However, the company should emphasize the management control process more to improve data reliability.
- **Grafil – unexploited ERP capabilities**: many modules in SAP B1 offer a rich solution to some business processes but are still unused, such as CRM or MRP Module
- **Grafil – Training**: The management team's skills in building KPI and exploiting Excel capabilities are limited; therefore, the company should develop staff competencies more.
- **Oxxo – Unsupported Processes**: The company should work more on developing or acquiring solutions for Maintenance, Quality Control, Marketing and Budget Management.
- **Both Grafil and Oxxo - HRM:** both companies should work more on Human Resources Management Processes, despite its crucial importance both companies seem to have neglected this side, the Integration rate we found in both companies is very low, the solutions are used only for payroll, time management or legal reporting.

2-Powerful ERP Development: Developing ERP

It has been observed that most ERP programs focus on a transactional level, which led us to think of developing a new, powerful ERP. We have observed that many companies devote much effort to levelling up the ERP from being transactional to providing business tools such

as planning, control, or performance measurement. That upgrade may take much effort over several years. However, the idea is that instead of every client company losing time and effort to develop the ERP, the ERP vendor makes the development effort to provide the integrated solutions, so there will be a significant gain in time and effort. These features in the ERP will provide tangible tools once the ERP is acquired.

Also, the ERP programs in both study cases lack features that manage maintenance and quality control, and therefore, including these modules in the program would be of significant value.

The other area of improvement is that human resources management provides more features broader than time management and payroll, which might include competencies management, training, and personnel management documents.

3-Using AI in Performance Measurement:

The advanced capabilities of Artificial Intelligence (AI) have enabled the automation of traditionally manual processes, including data organisation, summarisation, visualisation of key indicators, data analysis, and decision formulation. Through rapid automated processing, AI systems generate actionable insights to support decision-making. A growing number of applications are now incorporating AI tools into their frameworks. The integration of AI within Enterprise Resource Planning (ERP) systems presents a significant opportunity to enhance performance measurement, offering substantial benefits in terms of time efficiency, cost reduction, and resource optimisation.

4-Future Research:

While examining theoretical sources about the different variables of the study, it can be suggested the following:

- Organizational capacity axis: while we have explicit knowledge of customers and finance indicators, it is not the case for Organizational capacity; the performance map of this axis is not yet clear; this opens the subject for future research on the performance indicators on this dimension including teams performance, communication and motivation.
- Cost indicators: While much has been said about cost control or allocation methods, we have found little research and academic substance on cost indicators. Again, this subject can be covered in future research studies; the goal is to define clear cost indicators, the performance they track and how we set targets for them.

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