

## Entrepreneur's strategy leveraged and monitored by the interrelation of ERP and BSC

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### Abstract

Nowadays business operates in a turbulent environment, demanding quality products at low cost in short delivery times. Bearing this in mind, entrepreneurs devote special attention to define strategies, monitor entrepreneurial indicators and recruiting qualified employees. In this sense, organizations need to rely on an efficient measurement system with vast and complex information. Considering this need, the Balanced Scorecard (BSC) embraces a short-, medium- and long-term time horizon and guides entrepreneurs in the measurement of their Key Performance Indicators (KPI), as acknowledged by the well-known company like Apple, which is using BSC for planning and performance measurement. Furthermore, as the KPIs need to reflect organisational performance, the interconnection of BSC with SAP Enterprise Resource Planning (ERP) is considered of benefit. By means of this interlinkage, performance is monitored in an integrated way, as the flow of material and information of the whole chain is integrated and interlinked via ERP. Stressing out that several BSC implementations have failed, this research, intends to detail how ERP implementation can leverage the BSC's features, namely to monitor entrepreneur's strategy. As several studies have focused their attention in an isolated way and several BSC implementations failed, this research sheds light on entrepreneur's strategy leveraged and monitored by the interrelation of ERP and BSC.

**Keywords:** Balanced Scorecard, Entrepreneurial strategy, Enterprise Resource Planning, SAP

## 1. Introduction

Considering the current challenging macroeconomic context for competitors, entrepreneurs face the need to focus on management tools that identify product cost on the one hand and measure organizational performance on the other [1] [2] stated the need for faster and more competitive adaptation in the face of competition. This adaptation requires human resources willing to train and adapt, to absorb, adapt and reconfigure competences [3] as well as investment in information technology. Following the need to adapt, intangible resources sustain growth in tangible returns [4].

Several developments of the Enterprise Resource Planning (ERP) have taken place over the past few decades, aiming to support companies of different countries and different markets. Sustained on ERP, organisations are able to integrate emerging technologies Big Data, social networking and mobile telecommunications [5]. Through the ERP, several records are performed in an integrated way, enabling collection in a faster and easier way [6][7].

The perfect decision-making condition is to have in integrated way, to interlink with the BSC, in order to monitor performance.

The added value of BSC in areas of management has been confirmed by several studies and been disseminated in high profile publications such as the Harvard Business Review [8] presented as a very promising management tool [9]. Organizational knowledge of resources and competencies is a valuable key factor, so, BSC is widely recognized and used to monitor performance [10][11]. [12] report that worldwide 62% of large organizations apply BSC. Similarly, [13] emphasize that 60% of Fortune 1000 organizations have implemented BSC. The adoption of BSC in Fortune 500 organizations corresponds to a 40% rate. Despite the noted advantages, there are several organisations that failed the BSC implementation [14]–[16].

Considering the divergent current of the literature, we intend to interlink theory and practice of this research field, following the path of [17] to understand how an ERP can leverage BSC in its features, namely in monitoring organizational strategy and performance in operational management. For this purpose, the following specific objectives were defined: Identify auxiliary tools for BSC implementation;

Identify the role of ERP in leveraging BSC – in monitoring of organizational strategy and performance

Given the specific objectives, the following Research Question was defined: (RQ): Can ERP leverage BSC in operational management?

Considering the research question, we selected a qualitative approach, of interpretative and explorative nature, supported by the literature review and interviews of organisational entrepreneurs.

This is followed by a literature review, methodology, findings and discussion, and conclusions. Furthermore, the limitations and expectations for further research are pointed out.

## 2. Entrepreneurial Management and Performance Systems

Enterprise and Corporate Performance and Management (EPM/CPM) systems are now basic tools for efficiently running a company, but digitalization has the potential to completely transform procurement, production, sales, logistics or even financial accounting or corporate management (planning, reporting). EPM/CPM is a tool to integrate operational and financial information into a single decision-support and planning framework [18].

Many organizations face the difficulty to realize the value of a data and waste the valuable and usable data, lack of the integration of multiple single improvement methods. EPM/CPM enhance to fill up the gap between the leader's vision, mission, the investors' expectations and the employees' work. In addition, these methods can abolish some problems that receive great attention recently. EPM/CPM refers systems like activity-based costing (ABC) and lean accounting that enhance the correctness of costs and bear out the causes of the hidden costs. Traditional internal management accounting systems often cannot lay out cost transparency and visibility. Regarding budgeting, it is often a task done by the accountants, isolated from the executive team's strategy [18].

Business intelligence & analytics technologies as a reshaping factor in business gain a wider space for themselves nowadays, as a tool for supporting reporting and decision-making processes. As managerial accounting is supportive and one key pillar for decision-making and control in an organization, it can take clear advantages of adopting BI&A technologies. In other words, BI&A is defined as a technology and process that make it easier to collect data, to analyze and to deliver actionable information, and so better data analysis and decision support create value for companies [19].

### 2.1. Implementing the Balanced Scorecard for Strategic Management

BSC is a management tool composed of four perspectives, namely the financial, customer, internal and learning and development perspective [20]. Its strategic objectives are grouped into four perspectives, which allows entrepreneurs to aggregate focus on objectives according to the organizational strategy.

BSC is an integrated management system, so many successful cases are known that can improve organizational performance [21]. More and more organizations worldwide are choosing to implement BSC [22]. [16] report that the adoption rate in Germany, Austria and Switzerland is close to 25%. Equally, [23], in their study of the 250 largest companies, reported that the level of knowledge about BSC is almost 50% and the level of implementation is approximately 20%. In turn [24] in an analysis of the 250 most exporting organizations in Portugal concluded that over 40% of them had BSC implemented.

[25] point out that it is essential that BSC evolves to meet new organizational needs and respond to them more effectively and efficiently.

Organizations have a need to value intangible assets, so this justifies increasing the BSC implementation rate. There are a number of organizations, such as Walt

Disney, HJ Heinz, Johnson, Johnson, and Merck, which use the measurement and analysis of the organization's success based on BSC with up-to-date and relevant information [25]. For the implementation of the Balanced Scorecard one of the primary steps is the selection and structuring of the work team as well as the financing of the implementation project. Implementation work should be divided into strategic plans, financial plans, customer segmentation plans, human resources plans, and quality plans. The implementation of this tool enables the aggregation of various levels, namely control, information and communication, as well as learning, so BSC can be considered to measure, control, inform, communicate and stimulate structural changes [26]. BSC focuses on communication and liaison, business planning, vision translation, and customer satisfaction as the central focus of organizational strategy to achieve goals [27]. Regarding the BSC diffusion and implementation, data confirm that the BSC continues to be implemented in Norwegian municipalities [28].

BSC has been selected as a tool of choice by various entrepreneurs not only for measuring performance, integrating budgeting and planning activities, but mainly because of the possibility of interconnecting ambitious capital and investment goals [29]. On the other hand, certain organizations have selected BSC as a strategic management system to monitor current performance, compare past performance and project future performance [30]. This tool is distinguished by its ability to balance organizational information through indicators from various perspectives, conveying results concisely [31], Entrepreneurs are given the opportunity to tailor the indicators to their strategic needs [32].

Besides being a strategic and communicational performance measurement tool, [33], identified perceived benefits of the BSC, as shown in the table below:

Managerial focus	Helps entrepreneurs focus on what is important in the long run Helps managers prioritize and make decisions
Sense of 'balance'	Balanced and holistic view of the organization's performance
Communication and visualization	Common language Common frame of reference Facilitates discussions
Alignment of goals	Helps improve goal congruence Increased awareness of the organization's long-term goals
Cultural and motivational tool	Changes how the organization 'thinks' Captures the attentions of organizational members Motivational effects as a result of more explicit targets and incentives
Organizational change catalyst	Rhetorical tool that can be used to justify organizational changes Well-known concept

Table 1. Perceived benefits of the BSC (Source: 31, p. 85)

Organizations that need to implement corporate strategies should define a timeline in detail and have an opinion on the effectiveness of the new strategy and its strategic indicators [35]. It is recognized that entrepreneurs who follow the definition and implementation of the indicators and the whole process from roll-out enable the BSC to continue its causal links. The rolling out of the implementation process is time

consuming as it takes on average terms, after clear identification of the strategic indicators, from eight to twelve weeks.

There are several types of software that can be selected for BSC implementation, as [36] refer, applying the tool through interface integrations developed in Excel or Access, so the data upload may occur automatically or manually. The degree of compliance of each indicator against the target is flagged with a certain colour. They often opt for red, yellow and green [37]. Red marks indicators whose objectives have not been achieved or are very far from the objective. Yellow characterizes indicators that are at risk of being missed due to slight deviations. Green represents indicators whose targets have been met [36]. Some organizations add blue to symbolize indicators whose objectives have been exceeded. This whole process proceeds simply and demonstrates the fulfilment of each indicator in more or less detail as intended by each manager [36]. Research shows difficulty in confirming the effect of BSC on financial performance, as it leads to different interpretations and practical ways of being used [38].

Despite this, after implementation, it is confirmed that organizations have more transparent information, which facilitates interaction with their partners (suppliers, customers and other entities) and more complex analysis and data. Through monitoring, rather than tracking performance, you can highlight inappropriate strategic decisions and feedback from entrepreneurs [39]. In this sense, Entrepreneurs consider BSC as a crucial tool [40], provided that the conditions for implementation are met in order to vitalize the expected benefits from the tool itself [39].

Translating the Vision - corresponds to a consent between vision and strategy in order to operationalize the strategy, usually supported by strategic maps [26:155] Feedback and Learning - consists of the strategic implementation of a continuous and progressive process sustained in the ability to adjust to cultural changes [26:155].

Communication and Linking - characterizes communication throughout the hierarchy by integrating the various levels individually and in aggregate, respecting the key processes and goals to be achieved [26:155].

Business Planning - consists of allocating resources and identifying internal priorities to meet strategic goals [26:155].

It is possible to elucidate business practice, vision and organizational strategy defined by entrepreneurs [41]. However, mere strategic clarification alone is not sufficient, given that many entrepreneurs effectively develop their strategic plans, yet their operational implementation is not yet effectively fulfilled. Recognizing these assets, BSC may hold the key to success, as it demonstrates how to link organizational strategy through the implementation of indicators [42]. BSC is composed of organizational principles and corporate objectives, individual to each organization, so it is not standard, but adaptable to each organization [43], and adjusted by users [44].

BSC implementation has to be adapted to the technical, cultural and political characteristics of the organization [45]. Regarding the individual indicators of each business unit, the alignment of the vision of each productive unit and the definition of its own objectives have to be defined and subsequently measured through indicators. To be tailored to the needs of each process, everyone involved must be motivated and contribute to these indicators. Expectations are difficult to manage, so the customer

should be involved in setting their expectations, as this will enable the business [46]. Once individual indicators have been defined, the units' BSCs serve as a monitor. By measuring the indicators, deviations from the targets are identified so that managers make their respective decisions [46].

BSC authors [47] report that there are five principles that transform BSC from performance measurement to driving strategic performance, namely: translating operational strategy; strategic alignment; understanding of strategy and incorporation by all employees; continuous and mobilizing process of change sustained in a dynamic management of new cultures and strategies [46][47].

Given the importance of BSC implementation, [49] states that there are eight key factors for BSC to be successfully implemented: (1) involvement of Top Management; (2) involvement of Department entrepreneurs and participation of their employees; (3) culture of excellence that enables the desired performance; (4) learning and development; (5) keeping the tool relatively simple and easy to use and understand; (6) clarity of strategic vision and expected returns; (7) linking the incentive system to the BSC indicators and (8) the existence of resources needed for implementation. In addition to these factors [50] list the following success factors for BSC implementation: (a) adaptation of BSC to the organizational and strategic context; (2) constant learning and training, as also referred to by [49] and (3) review of BSC indicators after implementation.

Strategic execution goes beyond an organizational phenomenon, as it has to be clear and objective for it to be executed accordingly [51]. In this context of strategic clarity, [51] states that whenever the strategy is clear it is possible that consequently the performance achieved will be fostered. Controllers play an active role in organizations by focusing on a strategy driven by the objectives of [47]. BSC is not only a reporting tool, but also a tool that combines executive management strategy with operationalization, enabling communication with other members of the organization [37].

Defining indicators and communicating objectives is crucial, so that all employees know which strategy to communicate, so indicators should be reviewed regularly and updated [48]. In Controlling departments, entrepreneurs raise questions in order to identify possible improvements, notably identifying what is being done and how it could be improved. Controllers ascertain the existence of resources, namely the needs of physical and human resources, to enable an efficient allocation respecting the defined organizational strategy. [52] found in the Mobil Case Study that the CEO said that through Scorecard parameterization he can define the organization's strategic priorities of individual and global performance, as well as the anticipation of possible turbulence [52].

Monitoring of both short- and long-term indicators [29] balances both timeframes [37]. As detailed in this research most of the cited Case Studies, are related to private organisations, but public organisations are also implementing the BSC, even so, in public organisations strategic directions are missing, which are crucial for the BSC to sustain decision-making and performance improvement [50].

Furthermore, the lack of information and knowledge on how to implement the tool triggers disinterest in its implementation, so attention must be paid to the

characteristics and requirements needed for it to be implemented in order to contribute to organizational performance [53].

**2.2. Balanced Scorecard Limitations and Implementation Failure**

In the literature review, several authors, such as [54], [55] highlight multiple success stories of BSC implementation. However, there are publications that mention that there are organizations that do not implement or intend to have this management tool implemented. Considering this divergence of opinions, [56] conducted an investigation to identify some of the reasons that lead large companies to dispense with the implementation of BSC. The authors conclude that these motives may be related to contingency theory, as well as to the fact that they consider the tool to be unsuitable for measuring performance in their specific context [57]. However, [56] report that the lack of experience makes it impossible for entrepreneurs to implement BSC effectively. This gap causes [58] to emphasize the relevance of investigating the critical factors inherent in BSC implementation. In order to identify the reasons [56] conducted some research and found that there are cases in which entrepreneurs and administrative employees are unfamiliar with the indicators and how they are measured, leading to difficulties in relating the indicators to the strategy. Consequently, they present difficulties in establishing cause-effect relationships between them, as they cannot obviously identify their interconnections [56] In addition, one reason is that some administrative staff are resisting the implementation of BSC by avoiding the change and pressure required for BSC monitoring. Given the diverse reasons for possibly not implementing the tool, it is relevant to distinguish reasons related to inexperience from reasons related to resistance to change and consequent lack of implementation initiative [56].

Furthermore, [59] have identified in a summarized way a portfolio of problems related with the BSC implementation, which can be seen in table 2 below.

Issue type	Problem	Explanation
Conceptual issues	Contextualization	The BSC is a “general model” which may be difficult to customize to fit the organization
	Causal relationships	Organizations struggle with understanding and testing causal relationships
	Strategy maps	Organizations have difficulties understanding how to implement strategy maps
Technical issues	Technical aspects	Organizations have problems with data gathering and automation, or become too focused on the technical aspects of the concept

Social issues	Organizational culture	The BSC may be incompatible with the organizational culture, e.g. lack of acceptance of measurement
	Participation	Organizational members remain passive and delay or block the implementation process
	Commitment	Lack of commitment from central actors in the organization, such as the top management group or the BSC project group
Political issues	Time and resource Resistance	The implementation of the BSC consumes a lot of time and resources
	Concept champion	The organization lacks a person that is spearheading the BSC project
	Continuity	The continuity of the BSC project is threatened by turnover
	Resistance	Organizational members resist the implementation of the BSC

Table 2. Perceived problems associated to the BSC (Source: 57, p. 123)

Organizations that really want the implementation need employees with willingness and learning capacity, in order to fulfil the defined goals related to their organizational functions.

However, while entrepreneurs recognize the potentialities of BSC, they are also aware of the requirements and complexity inherent in implementing such tools. Because of these difficulties, it is advisable for organizations that choose to implement this tool to hire experienced consultants to guide them through implementation. It is important that a senior project manager is appointed and that the number of employees involved in the project is not insufficient or otherwise excessive. Consultants must rely on a robust experience to meet their stated goals and can translate and convey the strategy to all employees so that everyone can work motivated and committed [47].

There are difficulties of familiarization by the employees, when organizational change happens, or is required. Given that learning is a lengthy process, it is important for employees to move out of their comfort zone and adapt to their needs, which will impact organizational performance as they influence the working climate and employee motivation [60]. To this end, the working climate must be favourable for knowledge sharing and a commitment to teaching, motivating and educating employees [47] which is made more difficult in older organizations.

Shortcomings in the conceptual configuration of BSC related to BSC design are often identified, such as the excessive number of strategic objectives defined for each perspective [56]. There may also be failures related to inconsistent strategic alignment



along organization's processes. Considering the dynamism of markets and customer's requests BSC will have to be constantly adapted and improved, to fit to organizational reality [56]. Outdated financial indicators may induce organizations to make misleading decisions, given that indicators, once set, remain static until they are updated again [61]. Given this need, outdated indicators lead to inefficient management and consequent mis-decision making of reality [61]. On the other hand, [13] state that the indicators refer to specific scenarios, so it would be convenient to be uniform in different situations.

The literature also points to other limitations regarding the imbalance between perspectives, because according to [62], BSC underestimates the employees' perspective, considering that it overvalues control and trade. Contradicting this statement, [63] highlight BSC implementation studies also in universities, which clearly shows the broad applicability of BSC. Marketing and business objectives pay insufficient attention to human resources despite playing a key role in BSC implementation [27]. Learning capacity generally remains underestimated [11]. In this sense, [64] highlight the impact of the learning and development perspective on organizational performance. There is still a gap regarding the link between performance and employee compensation, as well as the uncertainty of the indicators to be selected and the internal resistance to change [50]. On the other hand, an exaggerated number of indicators, as already mentioned, could make it difficult to monitor them in the Scorecard (Nørreklit, 2003). Through practice, namely testing and analysis, theoretical and practical concepts can be developed considering that indicators differ according to perspectives [65].

Beyond conceptual and empirical limitations, the lack of financial resources leads to the implementation of inadequate information systems or organizational resistance to change. Because it is closely intertwined with the organizational philosophy of each organization, the identification of indicators and their metrics cannot be automated because it must be parameterized in accordance with the mission, vision and specific objectives of each organization. Given that it is not possible to aggregate all the knowledge and strategic information of a given organization in the way a liquid can be stored in a bottle, BSC allows knowledge melting, objective measurement and deviation analysis [66]. BSC's organizational perspectives must also be viewed in aggregate so that weaknesses are addressed in accordance with the [47] strategic plans, recognizing that value creation depends on the supply chain which has to be addressed in depth [67].

Some criticisms of BSC are reported in the literature, as they reveal that BSC may favour or drawback organizational control, as it is incomplete in certain indicators [68], such as: (1) undefined how employees and suppliers collaborate to achieve the objectives; (2) undefined contribution of the community in the environment surrounding the organization; (3) lack of definition of performance indicators that demonstrate shareholder contribution.

[69] states that the tool is not implemented in small companies in the Czech Republic for the following reasons: (1) implementation of alternative systems; (2) small size of the organization, (3) insufficient resources for information interconnection and (4) entrepreneurs' lack of time for effective implementation.

Clearly, limitations are more significant for small and medium-sized organizations because of the time required for implementation, as well as the financial investment required for implementation [69]. Successful implementation can be achieved by minimizing additional costs and efforts through the interconnection of human capital with structural capital, thereby achieving the intellectual capital needed for market sustainability [70]. Knowledge management is critical to future decisions and organizational progress, so it is extremely important to identify how knowledge is absorbed [70]. Short term analysis has been criticized as it does not allow the efficient identification of value creation of organizational activities [71]. [67] state that the BSC should be composed not of four, but of five nuclear perspectives. (see Figure 1).

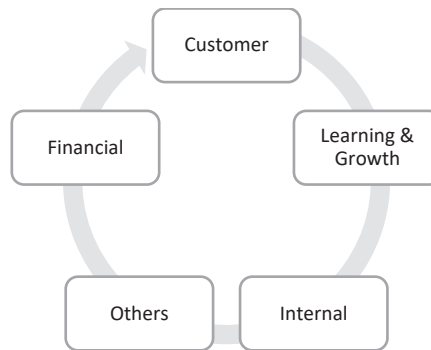


Figure 1. The Five Innovative Perspectives of BSC (Source: Mingming et al., 2010: 66)

For organizations, it is crucial that employees understand and agree with the indicators, so that they do not hinder their implementation and monitoring. In this sense, it is important for employees to be involved, so that they feel part of the project and consequently collaborate efficiently [36].

Communication must be motivating so that in an organization all members work towards the same goal. Although BSC is considered a strategy communication tool [72], this relevant feature is sometimes overlooked when faced with a quantitative measurement system [65].

In this context of quantitative measurement, entrepreneurs often focus almost exclusively on the definition, monitoring and achievement of the defined quantitative targets and disregard the surroundings and all the innovations that the competition exhibits in the meantime. Due to this lack of attention to the external environment, when the organization faces competition threats it finds that the response time is very long and the business opportunity may no longer be profitable [73]. Today the BSC fails to help organizations speed up, meet market challenges, and meet customer expectations. The most successful organizations are those with highly qualified employees who work closely with stakeholders and pay greater attention to the variables that ensure success [74].

[75] consider that the lack of consideration for external factors is because BSC focuses primarily on the correct definition and control of operational tasks, which may consequently make it impossible to adapt to market demands. Given these limitations [76] report that the BSC follows the efficiency-seeking logic, noting certain

limitations such as: (1) BSC is an inflexible tool and tends to fit indicators into one of four perspectives; (2) BSC statically shapes an organization and disables competitive opportunities from the surrounding environment; (3) difficult connection with the external environment as it focuses mostly on an internal analysis; (4) BSC proves gaps in value creation, learning and growth, as it follows a very traditionalist logic of innovation and (v) BSC indicates linear thinking, with no room for the intellection of complex organizational processes.

Given some of the limitations mentioned, [11] report that the BSC is not sufficient in performance management, so they recommend that other resources be used with this tool, while maintaining the BSC as the foundation.

As a complement to existing management tools on the market, a more comprehensive management tool has been launched to enable performance measurement and relationships with local communities and government and their respective stakeholders. This tool, called the Triple Bottom Line, enables the joining of social indicators (such as the impact of the company and its suppliers on society), as well as environmental indicators (such as energy, area and geographical conditions). However, although comprehensive, it was not well received due to its complexity [77] and is therefore not considered an alternative to the BSC.

The literature lacks empirical studies that detail the implementation stages of the tool, so the use of the tool needs attention and practical analysis, and the empirical validation must be reinforced [65]. Additionally, the cost-benefit analysis remains to be determined [31], despite the recognized advantages inherent in the management tool.

Current investigations point to the BSC as a virus, on the one hand and as a tool of fashion, on the other. Although they seem antagonistic, the characteristics should not be seen as mutually exclusive, as they complement each other. Macro-oriented fashion theory describes the contagious nature of the BSC; in turn, micro-oriented virus theory best characterizes post-adoption evolution of the BSC as a practice in organizations [38].

### *2.2.1. ERP Implementation*

In the early 90s of the twentieth century, with the emergence of new technologies that companies were able to enjoy systems that enable the interconnection of their entire business. Initially, these systems were called Enterprise Wide Systems (EWS), currently known as ERP systems [78].

These systems can be used to manage and coordinate all of an organization's information and resources from a shared data set. Data is organized into different modules and integrates all corporate information into a single central database. Thus it is possible to cover in a single system very distinct areas such as: Financial, Logistics, Production, Sales, Human Resources, Quality, Marketing and Maintenance [79].

ERPs are software packages that enable the complete integration of information generated and processed within organizations. The operation of ERP systems is relatively simple and can be summarized, as mentioned above, by the existence of a

database, which collects and feeds this data in applications organized by modules, supporting most of the company's activities. As new information is entered into the system, all related information is automatically updated [80].

According to Rom and Rohde (2007), the ERP implementation lead several manual processes to become automatized, reducing the manual repetitive tasks of accountants. [81] stated that based on an ERP implementation a new way of practicing accounting was reached.

This new version supports the execution of business functions inside and outside companies, not only for employees, but also for all entities that interact with the organization (Suppliers and Customers). The primary focus of ERP is to support organizations throughout the supply and distribution chain, including the integration of social networks, with the goal of creating direct channels for the promotion and sale of goods and services to current and potential customers [82].

This was also very relevant for the positioning of Financial Entrepreneurs and Directors, which in the past have been several times disregarded. Therefore, these entrepreneurs used the implementation of the ERP to have the needed information in an integrated and aggregated way and to get rid of the minimizing title of "beancounters" [83].

However, the decision to implement an ERP system must be taken into account, as it is a very complex decision, which cannot be taken without considering all the pros and cons that these systems can bring to the organization, in terms of both business processes, the tasks and behaviours of employees, as well as the financial structure [84].

In fact, these systems bring many benefits to various levels, including the introduction of organizational best practices, the implementation of standardized procedures throughout the organization, and the use of current and dynamic tools. All this enables companies to be able to integrate, analyse and report information from all business areas, enhancing organizational excellence through full integration [85].

In addition to the benefits, implementing ERP systems has several risks and issues that need to be considered. Therefore, the installation processes must be well planned, managed and constantly monitored by qualified personnel. The implementation of an ERP system can become an endless process if entities take on an unfinished project logic, where information generates the need for more information [79].

It is also crucial that companies do not forget that if all information is integrated, as data enters a part of the system, there may be multiple impacts throughout the system and thus produce harmful effects in various sectors of the organization. Therefore, the implementation of these systems will necessarily have to be accompanied by a constant reengineering of all business processes [86].

ERP systems are seen as levers to exert greater management control and impose more uniform processes and are used to inject more discipline into organizations. These systems are often also used for the opposite purpose, in an attempt to break down hierarchical structures, freeing up their employees, making information available to lower hierarchical levels of management, making them more innovative and flexible. For multinational and geographically dispersed companies, ERP is also

an advantage, as these companies often use these systems to introduce and ensure process uniformity across multiple dispersed units [87].

Currently, information systems in general are implemented in all organizations in a more or less developed way, being part of the daily routine of any element in the organization and assisting in the most diverse tasks [88].

The success of these systems was exponential and even during the 1990s, transforming the famous German company SAP (Systems, Applications and Products in Data Processing) into the leading global company in this field with its flagship SAP ERP product and becoming fastest growing software company in the world [87].

The modules offered by SAP are many and fully integrated, allowing its users to access real-time information about any part of the business. The main modules are divided into accounting and finance, human resources, production and logistics, sales and distribution. According to several studies that have questioned the most implemented modules, they concluded that the financial accounting and materials management modules are the most chosen [84].

### 2.2.2. *Connecting the Balanced Scorecard to the ERP*

Research has confirmed that there are some changes in the practice and implementation of advanced management accounting techniques. In this study, regarding the practices used after the ERP installation, the organizations responded that they introduced cost centers, profit centers, profitability analysis by product and by business activity / segment and financial ratio analysis. Regarding the introduction of new, more advanced practices, the results of this study indicate the introduction of financial and non-financial performance appraisal indicators and customer satisfaction surveys. The adoption of BSC and ABC were other techniques chosen after the implementation of the SAP system in the organizations studied [84].

However, another study consisting of ten exploratory case studies found that most advanced management accounting techniques, or even the most traditional ones, were performed in systems independent of the ERP. The implementation of techniques such as the BSC and the ABC method are not being included with the implementation of ERPs. This is not because these techniques are not installed, but because there is a preference to associate them with specialized and standalone software, which are more flexible, pleasant to use and reduce the complexity of operationalization brought by the ERP. These authors consider that despite the potential of ERP systems, changes have only been noted in the reliability of information, faster access to operational data, and automation in data collection and processing. Although not changing the logic of management accounting, ERP has allowed a deeper analysis of results, improving their understanding [89].

[90] dedicated themselves to interconnecting the BSC with ERP systems to monitor performance and enable process automation through the SAP software program. The main objective was to identify how the benefits of an ERP implementation can be measured, so [90] developed an ERP Scorecard.

It is the focus of organizations to maintain competitive advantage, as pointed out by [91], recognizing that the market requires orders to be executed quickly and at the

lowest possible cost. This requirement underlies the main organizational strategies based on the recruitment of qualified employees [74]. Consequently, performance measurement has been the subject of much concern [92]. For it is essential that the measurement system be efficient and provide vast and complex information [69]. Entrepreneurs need to adapt to globalization and to update to efficient management tools [93].

[94] suggest the implementation of a visual map to measure organizational performance. Strategic maps are aligned with the BSC, as they help define their vision and strategy [95]. The ultimate goal is to provide real-time performance information, as supported by the Strategy Board Map [94].

Given any strategic change, it is relevant to take into account organizational culture in organizational performance, given that it has a strong impact on performance [96].

Given the noted relevance in the literature, BSC has effectively demonstrated some measurement-related limitations [97], so ERP may assist in the strategic implementation of the BSC today, researchers focus on finding efficient measurement tools.

### 3. Methodology

Considering the Research Question that triggered this research, namely: Can ERP leverage BSC in operational management? The Case Study was selected as an exploratory step, encompassing method selection, question formulation, data collection and subsequent analysis so that the respective conclusions can be recorded [82][83]. Following the path [17] qualitative methodology can affect the quality of a research paper, so all methodological steps need to be followed. Temporal phase is one of the five methodological phases identified by [17] that describe aspects of the research phenomenon, fitting with the aim of this research.

Based on the initial question, we opted for a qualitative approach, namely an interpretative and explorative one, based on the literature review and the experience of entrepreneurs in order to identify the specific objectives, namely:

Identify auxiliary tools for BSC implementation;

Identify the role of ERP in leveraging BSC – in monitoring of organizational strategy and performance.

BSC needs information to measure performance from different perspectives through indicators. Successful implementation of this tool requires organizations to produce information in a reliable and timely manner. ERP, through its modules, enables users to obtain potentially more reliable and real-time integrated information. Thus, ERP can serve as an important source for obtaining and feeding indicators and enhancing BSC functionality.

The data collection phase is considered a primordial and very exhaustive phase, because it needs a lot of rigor and preparation time. In this specific case, we then carefully selected the interviewees, namely, the Entrepreneurs of the various Processes.

[100] confirm that the methodology consists in exploring and studying methods to develop academic research. Case Studies enable an in-depth understanding to explore and interpret the reality [99].

As the methodology of this research is of qualitative nature, the first part of this research devotes special attention to a more conceptual methodology in order to reconstruct theory, concepts, and ideas to develop theoretical foundations [101]. Afterwards, the empirical part of the research, namely the interviews were performed. Through the interview, based on semi-structured questions, as Appendix A, the interviewees have greater freedom to comment on the topics covered, as well as an easier way to observe and capture certain details, which may have enormous importance in relation to the questionnaires, which in essence are much more objective, not allowing extraordinary information. [102] state that there is no single method for data collection, despite the large range of methodological procedures for research in social sciences, often case studies follow their own methodological perspective. For [103] the case study has become a commonly used method in accounting and management control research, where interviews are one of the most important primary sources of information [99].

Semi-structured interviews are one of the most common methods in qualitative research, aiming to provide deeper knowledge of interviewees' experiences [104]. Following this path, in order to achieve empirical evidence in this interpretative and exploratory study, five semi-structured interviews were performed with the Process Entrepreneurs and Key-Users of the ERP implementation.

Although authorization, as Table 3, was given for the recording of the interviews, permission was not granted for the identification of the interviewees so they were coded as I1, I2, I3, I4 and I5, as below mentioned table, Table 4.

Company	Activity Sector
Case 1	Textil

Table 3. Organization characteristics

Concerning the interviewee's profile, all of the interviewees work since years at the company and know about the processes and procedures related to organisational control.

Code	Sex	Years of experience	Academic degree	Interview Duration
I1	Female	43	Bachelor	45 minutes
I2	Male	42	Secondary	50 minutes
I3	Female	44	Master	35 minutes
I4	Male	41	Master	45 minutes
I5	Male	44	Bachelor	30 minutes

Table 4. Interviewee profile

Additionally, in order to compare the data collected during the Interviews, direct observation was made of the productive sector, in four distinct periods, during the two shifts, on two consecutive working days. Direct Observation is a method that allows the observer to verify, on the spot, the way employees behave, ascertaining the information flow, ascertaining possible divergences from what was expected or referred to during the interviews.

### 3.1.1. Analysis of results

In order to simplify the link between the Research Objectives and Interview Questions we decided to accomplish the below mentioned table.

Interview-Questions	Research Objectives
Beyond the importance of defining strategy, which is the importance of monitoring strategy?	Identify auxiliary tools for BSC implementation;
This institution is dynamic and entrepreneurial which led to the need to implement a management control tool	
The implementation of management control tools is crucial, but implies a detailed process	
In order to reach a successful implementation of management control tools other auxiliary tools are needed	
Auxiliary tools need to be integrated to provide accurate data	
Through an integrated database organizational objectives and goals are monitored	Identify the role of ERP in leveraging BSC – in monitoring of organizational strategy and performance
ERPs are updated immediately on-time which provides consequently an on-line monitoring of performance indicators	
ERPs provide integrated information which provides consequently an immediately following of the defined strategy	
Any operational deviation is immediately detected when ERP is linked to BSC	
Any financial deviation is immediately detected when ERP is linked to BSC	

Table 5. Interview Questions linked to Research Objectives

Knowing that the implementation of these tools require huge financial effort, because it is a long process and requires highly qualified human resources, it is also essential that employees understand the goals set. Furthermore, all collaborators should behave in a motivated way to achieve a positive working climate, sustained by effective involvement of top management. This need to motivate and to ensure employees are dedicated and believe in the benefits of the implementation prove to be a difficult but important goal said I02 and I03. For I02, the most difficult was “to convince the employees that the effort that they were doing, would benefit them in the future”. In



the same vein, also I03 confirmed “at the beginning it was a huge challenge to motivate our teams, making them believe that this effort and initial trouble would result in better work conditions in the future. The implementation of all the changes related to the new system relies on qualified collaborators; as otherwise, the implementation can be a never-ending process [79].

Literature recognizes that very often the annual Budget are performed by Financial departments, having no link to the executive strategy [18]. Along this research also I04 referred this limitation, namely that due to the pressure of time and the missing link to further information, the Budgets and Forecast are established without an internal informational link. I01 stated that nowadays, organisations have indeed a huge range of possibilities to integrate information, so there is no need to rely on estimation when accurate information exists.

Knowing that organisations and their managers seek for accurate and on-time information to take decisions. On hand, of the BSC implementation managers are able to measure, control, inform, communicate and stimulate structural changes [26].

Along the interviews this specific need to have an implementation of a management control tools was highlighted, specially beside the interviewees that were more linked to provide information for top management’s decision, as I04 and I05. Interviewees told that every time that forecasts need to be performed a huge difficulty arises, as the information is not gathered.

Considering that each implementation consists in a special project and singular attention is devoted to each implementation phase, managers usually see advantages in the implementation, but on the other side see the need to have members of their teams affected to this implementation process. I02 referred “Every time we plan to have a new project, it is not just to think about and quickly start with the implementation. We need to meet with the whole project group, define a project timespan and define key-users for each phase”. Indeed, it is crucial to define a detailed timeline to follow the defined strategy divided into its strategic indicators [35].

ERP implementation enabled that several manual processes were gathered and showed on-time information, avoiding non-value-added activities [105].

Manager I05 confirmed “We spent several hours designing and analysing the flow of this integrated tool. Even for us this whole process was new”. Entrepreneurs knew that after all these definitions, in future once a new data is inserted in one area, it would be automatically updated [87]. [81] stated that based on an ERP implementation a new way of practicing accounting was reached.

As shown in the literature review, both the BSC implementation process and the SAP ERP implementation process are of a high organisational relevance.

According to the Entrepreneurs’ perception, I01 confirmed “the first milestone was to identify the team to work with, for the ERP implementation. The first criterion was knowledge of the specific key area and the second criterion was ability to communicate”. Also, entrepreneurs I03 and I05 were of the same opinion, as I03 referred “It was challenging to be selected as a key-user, as we were challenged to detail the future process of the organisations and also to transmit and communicate all the afforded changes in the system and employees’ mindset”.

Regarding the need to have an integrated database to gather objectives and monitor goals, indeed all of the interviewees agreed, that this is the source of success. Especially interviewees from financial departments highlighted the need of integrated database.

Managers benefit from integrated management tools, as on hand of this integration they are able to measure and anticipate the impact of all sectors that compose the organization. In order to keep the management tools updated, constant upgrades of all processes are afforded [86].

Related to the benefit of having updates constantly, in order to assure an on-line monitoring of performance indicators, interviewee I1 referred that “nowadays, constant updates are crucial as otherwise we’ll be removed from the supply chain, we need to be very dynamic. Therefore, for sure, we need to rely on trustful information”. I02 following the same path, stated, “all Processes need to be aligned, but furthermore, need to understand the needs and demands of the Processes that operate before and after. If we look in an isolated way, we’ll never guide the whole organization”. Performance Measurement tools, need to integrate operational and financial information, so that this information is available to support in decision making processes [18].

Based on the common alignment between processes, ERP provides integrated information to follow the defined strategy.

I03 referred the concern about updating and following the strategy, saying “every day, or sometimes several times along a specific day, we face changes in requirements of customers, so that naturally, as a consequence, we need to adjust very fast in a dynamic way. Considering the ability to adapt, to my understanding, this is not enough, as we need also to follow the strategy and confirm, if the path still keeps the same”. Following the same idea I05, highlighted, that based on an integrated system, the fears of missing information will be automatically reduced. Based on the BSC organisational information, shared into four perspectives will be performed in order to reach accurate results [31]. Considering the features of the BSC, the ERP might be an excellent source to promote this alignment. In order to assure strategic needs, indicators should reflect organisational interest and entrepreneur’s need [32]. On hand of the BSC, individual indicators ought to be defined and consequently monitored, in order to detect deviations of targets and to define actions [106]. As previously highlighted, interviewees stated that one of the mayor advantages of having a management tool interlinked to an integrated enterprise resource planning is the possibility to react very fast to any possible deviation, this was specially highlighted by I01-I03, as these colleagues referred that without this interlinkage when a deviation is noted it is already to late to react, it just occurred. To provide the BSC with information, several integrated enterprise resource planning softwares might be selected as [36]. The relevance relies in having the interlinkage updated. Based on this link, BSC may be considered the success path for managers to link strategic indicators to organisational’s success [42]. Regarding the financial benefits, these were highlighted mainly beside interviewees I04 and I05, referring that I05 stated “having the ERP linked to a management tool any deviation is immediately identified”. Regarding the role of accounting, the introduction of ERP has brought

some changes in the most routine tasks, eliminating them with the automation promoted by the system, giving them more time to perform other more relevant tasks that can contribute to the improvement of the information provided. Another important change was in the day-to-day accounting role of the company. In the ERP implementation process, the opportunity was given to accounting professionals to be more involved in designing all implementation processes to ensure that information introduced and handled in the system would produce more reliable and timelier financial and management reporting. Therefore, considering that this implementation enables the analysis and integration report, this could serve as a basis for the BSC indicators, as it levers management control, guides the implementation of new procedures and assures effective internal control. Regarding the ERP implementation process, the main factors for choosing ERP were the company's strategy, the business's rapid growth and the fact that the previous system could not cope with the increased workload and growth. As many studies demonstrate, and interviewees confirm, ERP introduces improvements in organizational practices, standard procedures across all units (national and international), enabling companies to integrate.

Throughout this work we found that the specific objective of characterizing the necessary steps for BSC implementation was fulfilled, as well as identifying auxiliary tools for BSC implementation, considering that we evidenced that ERP could be a lever for BSC in operational management. Therefore, the third specific objective is also fulfilled, namely to identify the role of ERP in BSC.

Based on the specific objectives, we can answer the research question that guided all this research, namely that the ERP could leverage BSC in operational management, as both tools complement each other.

#### **4. Conclusion**

This research shed some light on this relevant managerial topic, emphasizing the research question of this work - can ERP leverage BSC in operational management and its specific objectives: Identify auxiliary tools for BSC implementation; Identify the role of ERP in leveraging BSC – in monitoring of organizational strategy and performance Considering the literature review and the information extracted from the interviews, the perception of the interviewees confirm that ERP has a facilitating role when implementing BSC. The aggregation of information in an ERP enables the consequent implementation of the BSC, as it may serve as a ground for BSC's feature, namely to provide communication and monitoring of organizations' strategy.

BSC and ERP are both integrated management systems that complement each other, as ERP has the ability to manage and interconnect data of the entire business and BSC, on the other hand, needs this vast information provided by ERP in order to measure performance in its perspectives.

Based on this research we noted that both ERP and BSC foster organizational practices and common procedures, leveraging organizational excellence. Considering that a meaningfully positive correlation among economic, legal, ethical and discretionary social responsibility and development of SMEs are recognized, the

implementation of ERP could also foster SMEs performance [107]. Before implementing ERP, SME managers have to solidify knowledge and their processes [108]. Furthermore, it is noted, that even in start-ups the implementation of ERP is relevant, but investigations dedicated to startups are rare [109]. However, highly qualified and motivated human resources are needed. As a long implementation process needs to be avoided, concrete and realistic objectives have to be defined. Furthermore, top management needs to support and provide a good environment, giving confidence to their employees and ensuring that the goals to be achieved are understood by all.

To sum up Big Data might be an opportunity to adapt fundamentals and business strategy of the company as it demands for information management and consequently professional growth and positioning [110].

Along this research, interviewees have confirmed that the ERP might be a powerful tool to foster the BSC implementation with success, so as the future monitoring and control of performance. Considering that based on the ERP, all organizational information is available and gathered together, BSC will be able to have on-time and online information to guide managers to take decisions and to follow organizational performance. The aggregation is crucial and might, for some tasks, reduce the work of the accountants [110]. Therefore, accountants would have the possibility to concentrate on analysis and other more analytical tasks [19]. Bearing this adaptation in mind also academia should adjust their lecturing programmes to focus on more analytical skills [110].

Currently, BSC implementation in Portugal is still in a growth phase, so several studies should be carried out in the future to provide a broader knowledge of these management tools [24], [97]. Despite the recognition of BSC and the fact that several organizations have successfully implemented BSC, there are other organizations that have failed to implement it [16], [111], [112] so we suggest that on hand of the interlinkage with ERP these barriers might be overcome.

## **Limitations and future research**

This empirical study was performed based on a single Case Study, even if it enriches the research with detailed information, it does have a clear limitation related to the single focus on this organisation. Indeed, we selected to research focusing on a single case study, in order to have in depth analysis, as to our understanding, in this field, is still missing detailed information.

Further Case Studies of organisations that already have the ERP and BSC implemented should be performed to confirm the perception of the entrepreneurs of this Case Study.

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