The effect of entreprise resource planninig 'ERP' on Management Control and Decision –Making Process

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Abstract:
From the 90s, Enterprises, known a significant evolution with the development of data processing and thus a transformation of information systems, and its management control was influenced. This article tries to measure the effect of these new information technologies on organizations in terms of effective governance and decision-making.
We interviewed 12 employees of CM Consulting and CEPRO Company. The results show that these ERPs, especially SAP (Systems, Applications and Products in data processing) offer an ideal device and environment for a transversal implementation of management control for more relevant results and better decision-making. Also, ERP has a positive impact on the company, from an organizational, economic and strategic point of view.
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Introduction:

In an environment characterized by globalization and the continuous evolution of information technologies, and with the inherent need for relevant information, businesses are continually coping with new challenges and new constraints.
To deal with these changes, companies are required to review the effectiveness of their management systems to manage the present, to be able to handle the uncertainty of the future. Management control, to the extent that it aims to control

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the reasonable administration of an organization by anticipating events and adapting to changes, is met by variations in the environment.
The emergence of ERP (Enterprise Resource Planning) aims to network, through a single database, all data that is relevant to the company's functions.
Therefore, the company had to evolve as a whole. Management control, which is a permanent management tool for decision-makers, based on accounting information, has been fully affected by the appearance of ERP. Indeed, management control has continuously been influenced by the evolution of information systems.
Like any transformation, the contribution of ERP must be identified and subsequently measured. With the latter in mind, we conducted this research to determine the enterprises needs and define the characteristics of ERP and their contributions to the management control function by answering the following reearch question: "How can ERP help to improve the management control task, and thus help decision-making?"

1- The theoretical basis of management control and information systems:

2-1. Management control and its evolution:

Management control, as defined by R. Anthony, "a process by which managers ensure that resources are obtained and used effectively (with the objectives) and efficiently (concerning the means employed) to achieve the objectives of the organization"[2].
In 1988, he added another definition: "management control is the process by which managers influence other organization members to apply the strategies"[3].
Therefore, the management control function makes it possible to continually check that the organization is moving well towards the objectives chosen by its manager(s). In other words, management control is an approach intended to control the progress of an organization towards its goals[4].
Also, management control has greatly evolved since its inception. It appeared in 1820 in the American industrial scene through industrial accounting aimed at measuring the cost of the production process and helping to set prices in the face of competition from other industrialists. Management control went through a phase of maturity with the scientific organization of work, proposed by F. Taylor. Since then, accounting has improved and has become operational analytics with the segmentation of activities, the development of standards, and the control of results and responsibilities.
Following the evolution of the technical and economic world with the contribution of several parts, of which we cite Taylor and his analyzes on the control of productivity (1905) and Grant and his research on structural loads (1915), the concept of control was born complementing that of costs.
The period between 1920 and 1970 saw, in turn, the emergence of conventional control tools (Fordism, Sloan Brown model, etc.). General Motors implemented

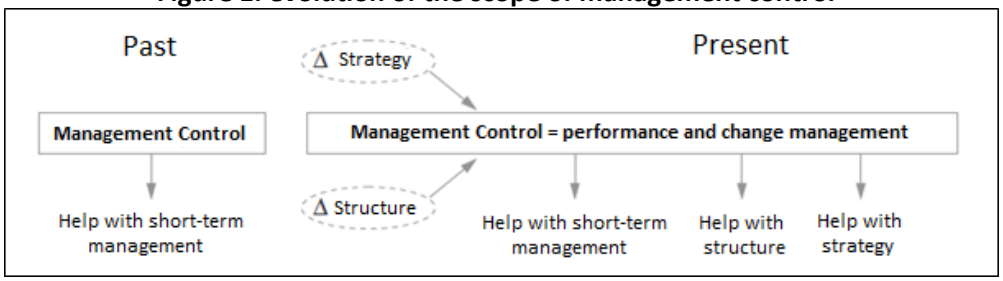
[2] **Alazard, C., Sépari,S.,** (2018) : DCG 11 - Contrôle de gestion, MANUEL ET APPLICATIONS, Dunod, P 9.

[3] **Berland, N.,** (2009) : Mesurer et piloter la performance, e-book 2009, P15.

[4] **Desire, L., Noëlle, M., ; Hirsch, D., Kacher, N.**, (2013) : Le grand livre du contrôle de gestion, édition Eyrolles, P2.

methods of financial control hitherto unknown in the automotive industry, such as budgetary management (1923)[5].
Then, Anthony's work focused on accounting in all its aspects, but more particularly on management accounting and management control, for which he proposed in 1965 a conceptual framework. The latter made Anthony a world reference in management control[6]. He was the first to have given accounting the managerial dimension that it lacked.
Finally, during the years 1990–2000, an integrated management control system based on business intelligence was developed. Management control is expanding to other areas of performance, with the development of social management control, social and environmental responsibility, and the increasing importance given to risk management. We conclude with a diagram that summarizes the evolution of the scope of management control.

Figure 1. evolution of the scope of management control



Source : DCG 11 - Contrôle de gestion, MANUEL ET APPLICATION

The primary mission of management control is to assist in the short-term management of the company, a task that has strongly progressed with the evolution of companies and their objectives and the adoption of new strategies, hence a need to master this change through a renewed management control.
Management control intervenes with the purpose of:

- Contributing to the definition of the strategy.
- Monitoring the implementation of the strategy.
- Preparing the maximum allocation of resources by short-term objectives and strategic objectives.
- Measuring performance.
- Managing the activity and take corrective actions.

The concepts of relevance, efficacy, and efficiency can be defined in the triptych: objectives, methods, results[7]:

- Objectives-results axis: defines efficacy as relative to the use of means to obtain given results within the framework of fixed objectives, i.e. the achievement of the objective;

[5] **Gervais, M.,** (2006) : Que sais-je ? Contrôle de gestion, édition Puf, Paris, P5.

[6] **Bouquin, H**., (2005) : Les grands auteurs en contrôle de gestion, Edition EMS, P 110.

[7] **Maranzana, N., Dubois, S., Gartiser, N., Caillaud, E**., (2008): proposal of a system of indicators to measure performance of problem-solving process in design - International Design Conference – Design.

- Results-means axis: defines efficiency as the ratio between outputs and total resources deployed in an activity; i.e., objectives achievement with minimal cost;
- Means-objectives axis: defines relevance as the ratio between the means deployed and the objectives to be achieved; i.e. the adequate resources allocation.

It should be noted that the effectiveness of management control depends on its significance in the organization. The latter determines the manager's clearance and comfort with which they exercise their functions. They can be bound to General Management (GM), administration and finance management (AFM), or operations directors or managers (OD / OM).

The affiliation of management control depends on specific requirements, which we can summarize in three criteria: the independence of control, the proximity of control to operations, and the availability of data.

2-2. Enterprise Resource Planning (ERP):

An ERP is a software that allows you to manage all of a company's processes by integrating not only all of its functions such as accounting and financial management, human resources management, and decision support but also sales, distribution, supply and electronic commerce. (Translated definition of the large terminological dictionary of the Office québécois de la Langue Française (OLF) [Baud 2005].

An ERP can be configured so that it can be adapted to the needs of a given organization. There are two types of ERP[8]:

- Open source ERP is ERP systems that allow the user to define himself as a certain number of determining elements of the operation and use of the product.
- Integrated ERP designates software packages to cover all the functionalities of the same domain or function (sector) of business management.

It is, therefore evident that the same software package can be both open source and integrated.

SAP is a German company created by five former IBM executives who, in 1979, offered the first version of SAP software (Systems, Applications, and Products in data processing).

An ERP is designed to form the foundation of the business information system by covering almost all of its key functional processes. It can also be partially implemented by being limited to only a few functional areas. It is scalable, and each application can be installed and run independently.

Communication between the processes improves internal consistency and avoids duplication and redundancy of processing[9].

The implementation of an ERP system optimizes management processes because it takes into account the best practices observed by the publisher. Through its development and interactions between developers and users, ERP capitalizes the most relevant expertise in each field.

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[8] **Sourdeau, L., Sauzeau, D.,** (1997): Les progiciels de gestion, concepts, méthodes, outils, les éditions d'organisation, P 20.

[9] **Soutenain, J., Willems, E., Saintenoy, P**., (2019) : DCG 8 Système d'information de gestion Manuel et applications, édition Foucher, P 397.

Besides, company directors are inevitably attracted to this generation of systems for several reasons[10]:

- By avoiding re-entry and by automating and speeding up many processes, the use of ERP is, in principle, a powerful means of increasing the productivity of tertiary activities in the company;
- The focus of a single database offers the opportunity to improve and ensure over time the consistency of management applications, which is incredibly valuable for large internationalized companies;
- It also makes it possible to decompartmentalize the company's functioning by offering to each function within the company a complete visibility of the management information and the transverse processes around which the architecture of the system is built;
- It allows managers to have quick and easy access to various categories of operational and economic data;
- The deletion of multiple records eliminates a significant cause of errors and guarantees better reliability of the information.

3 - Theoretical basis of impact analysis, methodology, and fields of study:

In our analysis of the impact of ERP on management control, ERP is positioned - according to R. Anthony in his report (1965) - about three levels of control: strategic planning, management control, and operational control. We will also use the causal structure and the works of Pfeffer, Markus, and Robey in defining the causal link between ICT and organizational change.

RN Anthony (1993) distinguishes three types of planning and control processes: strategic planning, management control, and task control (operational). Similarly, the need for information differs at each level.

Markus and Robey (1988) explain how new technologies influence organizations. Relying on the work of Pfeffer (1982), they identified three conceptions of causal agency in the literature on ICT and organizational change:

⇨ The technological imperative: this perspective views technology as an exogenous force which conditions the behavior of individuals and organizations.

⇨ The organizational imperative: the organization is decisive. Its managers build information and control systems in response to their information needs. In this vein, behaviors are chosen according to consistent preferences and take priority over the action of itself, and previously set objectives guide this action.

⇨ The vision of an unpredictable impact: according to Markus and Robey (1988: 588), "the uses and consequences of information technology arise unpredictably from complex social interactions [11] ". Technology can create organizational change, but before it is implemented, you cannot predict its shape.

As far as we are concerned, our vision approaches that of the organizational imperative insofar as these information systems are put in place to meet the needs of the organization.

In what follows, we will first present the case study with a situational analysis, before switching to the use of ERP. We will then describe the process of

[10] **Demeestere, R., Lorino, P., Mottis, N.,Nicolas** (2013) : Pilotage de l'entreprise et contrôle de gestion, DUNOD, P 395.

[11] **Markus, L., Robey, D.,** (1988): "Information Technology and Organizational Change: Causal Structure in Theory and Research," Management Science, P 588.

implementing ERP (SAP BUSINESS ONE) within an SME by a specialized consulting firm. This will allow us to assess the contribution of said ERP in the company's management in general, before tackling the management control aspect and the implementation of this module. We will end with an assembly of all this by supporting our observations in the field with a synthesis of semi-structured interviews that we conducted with different profiles.

4 - The implementation of the SAP Business One ERP:

4-1. Presentation of the Cabinet and the Case Study:

CM Consulting is the name of the company as well as its trademark, which is in fact, the contraction of Change Management Consulting. It is a consulting firm in Management and Information and Communication Technologies whose mission is to promote progress, development, and mastery of change within organizations.

CM Consulting is certified by SAP for the distribution and marketing of SAP Business One in Algeria and across the African continent as well as by a large number of vendors of solutions complementary to SAP Business One.

CEPRO-SPA is a company specializing in the production of disposable hygiene articles for babies and women. CEPRO was founded in 2002. The factory was built in 2005.

4-2. State of Affairs Before SAP Business One:

The organization of CEPRO is broken down at its strategic level by the implementation, the management of a commercial strategy and an investment plan in line with this strategy. At the departmental level, annual production programs and commercial objectives are established.

At the operational level, this involves carrying out the various operating flows, mainly logistics (supply of raw materials, storage, delivery of finished products), and production management.

Both functional and operational management that characterizes production companies such as CEPRO, as well as the multitude of its structures, create organizational complexities and information flows that are difficult to control and make reliable, for which an optimized, extremely formalized organizational mode becomes necessary.

CEPRO worked with independent management systems:

- A computerized system for stock management dedicated to monitoring and inventory keeping;
- Commercial management system for customer invoicing;
- Computerized system for recording accounting operations.

Reconciliation work between the systems was carried out periodically to keep stock and sales accounts based on the invoicing recorded by the sales department, and the movements of stock recorded on the inventory system on one side and the entries recorded on the accounting system based on documents received on the other.

This reconciliation work frequently resulted in discrepancies requiring arduous analytical work for readjustments. These discrepancies were mainly due to omissions or errors in recording movements frequently committed due to the extent of the logistics flows operated daily and to inoperative communication.

Regarding management control, it was strictly focused on the calculation of the production cost based on direct charges made up exclusively of raw materials consumed.

It was not possible to extend the coverage that those systems could offer to properly support complex processes that an organization like CEPRO would need.

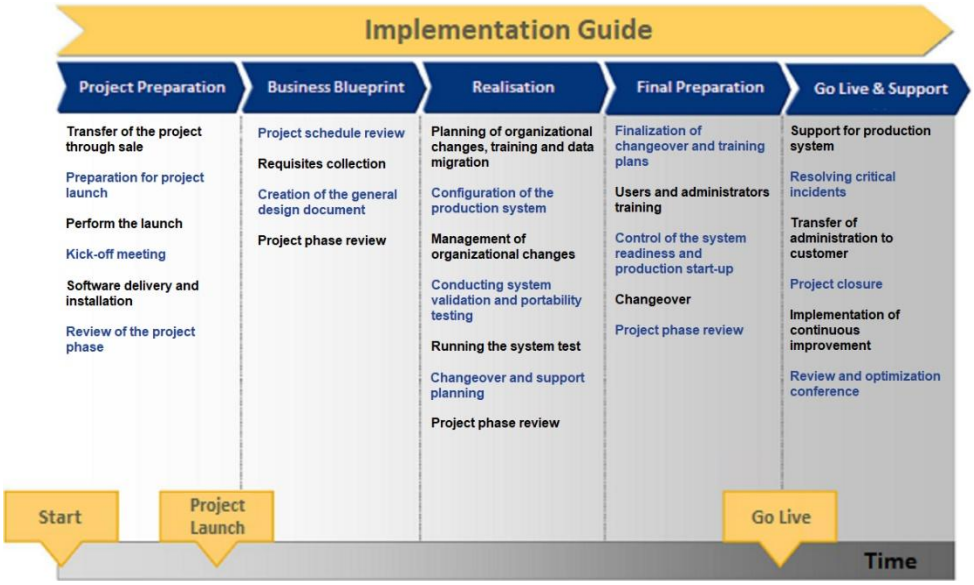
In an environment conditioned by these technical and organizational limitations, it was difficult, if not impossible, to make any rational and reliable structuring of management control at the operational level, therefore causing a lack of decisive input for strategic decision-making. The disparity of management systems used and the lack of reliability of the data made this information gathering work more difficult.

4-3. The changeover to SAP ERP: The AIP (Accelerated Implementation Program)

AIP stands for Accelerated Implementation Program: It is the methodology developed and recommended by SAP for the accelerated implementation of SAP Business One. This methodology is broken down into five phases. Each phase has its objectives, includes a set of deliverables resulting from certain activities and milestones that do not necessarily result in deliverables. This correctly structured and documented methodology also highlights the pitfalls or potential risks that should be taken into account for better implementation success.

The graph below (internal company document) represents a summary of the main tasks of each phase of the SAP Business One AIP program and which were adopted during the implementation of SAP ERP at the CEPRO client.

Figure 2. Phases of the AIP



Source: internal company document

4-4. Implementation of the Management Control module:

4-4-1 Management Control at CEPRO:

As part of this research, we tried to carry out an analysis of CEPRO's needs in terms of management control, which we will present as follows:

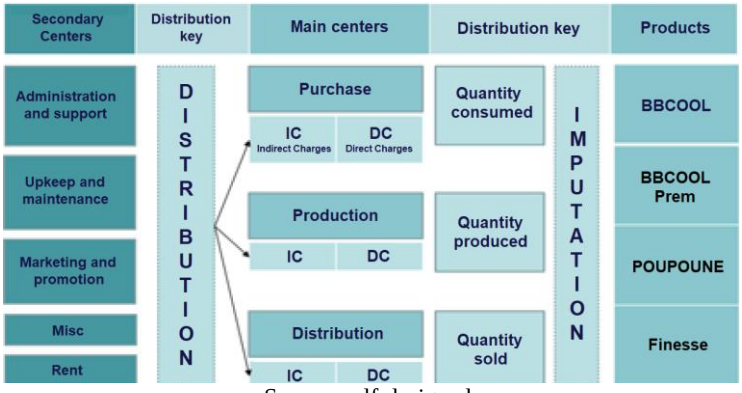
Budget management and cost accounting are the two essential tools to be implemented at CEPRO to meet the dual need of adequately allocating resources, control expenses, readjust expense items, and improve productivity. Subsequently, setting up dashboards and a reporting system is strongly recommended.

Management reporting is a set of results indicators, most often financial, built posteriori, periodically to inform the hierarchy of an operational unit's performance: cost center or profit center[12].

In addition, within CEPRO, the multitude of flows and actors ensuring their execution makes the definition of all costs more complex. The increase in the volume of production that revealed dysfunctions in the planning in our case study confirms the need for establishing an effective system to monitor these flows better and control the increase in expenditure induced by this growth.

Our proposal for the structuring and calculation of production costs is based on the full cost method, as this method is suitable for the nature of the industrial activity, which characterizes CEPRO and meets the needs of management for decision-making closely linked to the control of costs of manufactured products and their real profitability, as well as the opportunity to develop new ranges. This method relates to income all the charges that concern them, whether they are variable or fixed, direct or indirect.

Figure 3. Cost structuring of CEPRO



Source: self-designed

This method also allows us to structure costs as they buildup, therefore enabling us to "trace" the profitability of the business.

To identify the different indirect charges, we essentially relied on a set of documents drawn from the CEPRO company database on SAP ERP: the income statement, the analysis of purchases by nature, the production history over three years, the allocation of payroll by the department, etc. We then classified the various indirect charges according to their nature in the secondary analysis centers and their distribution key.

4-4-2. Management Control on SAP Business One - CEPRO:

Management control on the SAP system is based mainly on budget control and cost accounting. After the design, its two components implement, according to the distribution rules pre-established by analytics and the limits authorized by budgets, expenditure control, and systematic allocation of said expenditure simultaneously with the accomplishment of any operational task in the system.

Thanks to such permanent operational monitoring, readjustment and adaptation decisions can be taken at any time and for any new unforeseen situation.

[12] **Cappelletti, L., Baron, P., Desmaison, G**., (2014) : Toute la fonction Contrôle de gestion, Dunod, P52.

A multi-dimensional analytical design (different analytical axes: views by product, by activity, by purchasing/production/distribution analysis centers, etc.) provides company management with analyses and dashboards for decision-making, for example, to assess the profitability of a field of activity, to decide to relocate or launch new products or sites.

After analyzing the main functionalities offered by SAP ERP in terms of management control, we present below the main points identified:

- Budget management on SAP makes it possible to define budgets for significant accounts (the account that will be attached to the budget), according to selected scenarios. The budget is defined for the selected accounts, and it is possible to create an analysis that compares the defined budget with the actual activity. These scenarios make it possible to develop a forecast of a particular situation for the company's budget and to obtain important information on what the budgetary balance would be according to the selected scenario. The Budget module allows you to manage and control the company's expenses in real time: the creation of transactions can be blocked for general accounts having reached their budget limit. SAP Business One allows us to decide if one wants to use a budget restriction that does not allow budget overruns or if you only want to get an alert in case of deviation.
- The cost accounting function of SAP Business One allows us to define sets of cost/product centers and distribution rules. Generating corresponding reports in real-time provides important cost-related information. In addition to manual assignment to each transaction, SAP Business One provides the ability to automatically charge expenses once distribution rules have been assigned to each income statement. This allows the distribution to be carried out systematically upon recording an entry in the accounting journal. SAP Business One also allows us to define up to 5 axes of analysis of different expenses and products. Regarding the distribution rules, they can be linked to the appropriate general accounts of costs and sales of the company. As a result, the amount of each accounting transaction that is posted to these accounts is reported to the appropriate cost centers according to the ratio defined in the distribution rules.

5 - Results of ERP Implementation:

5-1. Investigation procedure:

We began our investigation with on-site observation techniques and approaching staff better to understand their working methods and especially their behavior. Subsequently, and to our observations described above, we opted for a qualitative survey by using interviews as a tool and by developing two guidelines for interviewing:

- CEPRO leaders to highlight the changes brought about by the implementation of SAP on the organization.
- CM Consulting managers and consultants regarding the reality of the demand on the market, the needs expressed by CEPRO and the contribution of ERP in management control following their long and rich experiences in the field.

For the conduct of the study, the method of administration chosen is a semi-structured individual interview. This method is indeed an advantageous way to study professional representations: the freedom of speech given to the interviewee

makes it possible to observe thought deployment, as well as speech articulations, logical links (similarity, difference, causality, etc.) established by the interviewee between the various elements they evoke.

The pre-established questions allow checking specific points.

To achieve the objectives of the study, it was necessary to identify and approach both CM Consulting and CEPRO managements. We came the former because of the great experience they have in the field (hence the relevance and the reliability of the data collected and the latter for an appreciation of the change created by SAP ERP, a situational analysis and needs expressed in terms of management control.

Below is a summary table of the number and functions of the interviewees:

Table 1. Number and function of interviewees

Categories	**Interviewés**	**Number**
CEPRO management	- General director - Information systems director - Finance director	03
CEPRO personnel	- Management controller - Production manager	02
CM Consulting management and consultants	- General director - Co-general director	02
CM Consulting consultants	- Project manager - Technical and functional consultants	01 04
	TOTAL	**12**

Source: self-designed

5-2. Data analysis and results:

Representation and speech analysis methods generally require three main steps: collecting data, coding it, and analyzing it.

In our content analysis, we looked closely at the responses of the interviewees.

During our reading and re-reading of responses, we proceeded to classify the data by creating categories for each axis of our two interview guides. We then provided these categories with analysis units that we were able to extract from the responses. Analysis units are the set of keywords and phrases that support a given category. The importance of the class is, therefore defined by the frequency of repetition of said units.

For instance, in the case of CEPRO management and before the implementation of SAP ERP (axis 01), we have classified the outputs into 03 categories, namely: divided management, lack of both coordination and control of all processes.

Example:

Interview N°01:

Axis 01: State of affairs before the implementation of SAP ERP

If we consider the example of the split management category, we notice that the analysis units, which, in this case, are the expression "dissociated software" and "set of software and applications", support this fact. The frequencies of repetitions of the analysis units can therefore be quantified and thus provide information on the importance of a given category in the explanation adopted for each axis.

This is how we were able to analyze the content of our interviews, and arrive at relevant findings and results capable of providing answers to the main questions (on which our research is based).

Below we have grouped the main results and findings:

Finding N°01:

Before the implementation of SAP, CEPRO management was divided. The company had an "EBP" solution, which groups together a set of software for each department. This created a lack of coordination between the various departments of the company, something that could lead to errors in information communication. This dispersion of activities also caused a lack of control of all the processes because the tools used until then did not allow the actors of the company to have a global and transversal vision of the activities within it. All of these constraints motivated the company to invest in an integrated solution.

Finding N°02:

The responses received during interviews with CEPRO staff and its managers confirmed that the implementation of SAP ERP had an impact on the performance of the company, whether human, economic, or organizational. Our interlocutors told us that the information within the CEPRO company has become more reliable, more available, and above all, more relevant as a result. Communication has become more efficient, thus creating a space for collaboration between the various departments, while conveying rigor in the management of flows and processes thanks to their standardization. This has provided employees with new knowledge and skills in operational management. All of the aforementioned has allowed the managers to have better visibility on the functioning of the company to make decisions adequate with the strategic orientations of the company. Consequently, CEPRO was able to save time, effort, and money with control of all flows within the company and the optimization of the various activities.

Finding N°03:

The answers obtained confirm that the management control department could not be efficient because of multiple constraints, of which we cite the absence of tools, the non-availability, and disparity of data, the difficulty in collecting said data, and the ineffectiveness of the methods adopted. This assertion automatically implied that of lacking control over cost calculations. Added to this is CEPRO's state of play, which has experienced a diversification of its products and a growth in its activity, hence the importance of implementing more effective management control.

Finding N°04:

Also, we retain responses from interviewees that SAP ERP improves management control. This observation can be perceived more closely in the control of costs and indirect charges often not included in costs calculation, in planning resources, control, and thereby decision-making. Added to this is the change induced by SAP ERP on the function of the management controller who has been climbing steps to a higher level with greater utility.

To conclude, CM Consulting managers and consultants told us that the motivations behind their orientations in this field are its importance about the evolution of skills, the improvement of companies, the need expressed by SMEs /

SMIs on the Algerian market and the versatility of the field. Besides, and according to them, the field of ERP integration is as important internally within the company as it is externally. It improves management, performance, and external managerial practices. The competitiveness reflects its importance that the ERP provides to the company and its efficiency in an environment characterized by intense competition.

Conclusion:

Management control is a process that makes it possible to ensure the effectiveness and efficiency of an organization in the use of its resources for good progress towards the achievement of its objectives set in advance. However, information is at the heart of this business, hence the importance of its availability on time, its reliability and its relevance.

We have observed that the presence of an information system is essential in an organization and that the need for coordination and availability, reliability, and relevance of information in real-time has become a key element for the success of any business. In this perspective, we have confirmed the significant contribution of integrated management software packages for the management of the company but, more particularly, for its management control.

ERP offers work solutions that allow the uniqueness and integrity of the information essential to the management of the business. Saving time in the flow of data, more reliable and more available information that facilitates its use in decision-making, cost control, decision support and improved business performance are the main benefits of this new tool for the management of the company as well as its management control.

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