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Adoption of Enterprise Resource Planning: Analysis Using Structural Equation Modeling

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Abstract

ERP is one of the most important innovations that impacts the business world, generating tangible as well as intangible improvements in many professional environments. Firms adopting ERP software face the double challenge of successfully selecting and implementing this technological innovation, while ensuring that it is used in a way that produces real added value for the company. The large number of failures reported in the ERP literature underscores the fact that companies may not realize the expected benefits. This is particularly true for SMEs which, moreover, have their own contingencies, of limited resources, making them vulnerable to the failure of an ERP implementation. This constant therefore leads us to question, first, the origins of this success, that is to say, the determinants of the success of this technical and organizational innovation; then, secondly, on the existence of a general model for analyzing dependency relationships between these determinants and the success perceived by management. The empirical study is carried out with 72 SMEs that have integrated all or part of their management IS with an ERP. The analysis of the data collected using a questionnaire, applying the method of structural equations (SEM), confirms in this communication the existence of a "general fit" of the data with supposed causal relationships.

Keywords*:ERP success, IT infrastructure, integration, systemic approach, structural equation modelling (SEM).*

1. Introduction

One of the most coveted technological innovations has been the increasing use of Integrated Management Software (ERP) since the early 1990s. ERP is seen as a powerful reengineering tool that profoundly transforms business processes. a company and changes how to conduct reengineering projects and implement new software. Many IT companies are attracted by this desire because of their desire to change their architecture, as well as the processes that support the business system [18]. In this way, the 1st generation ERP was designed to process real-time and network management information within the same organization. He helped streamline and integrate business processes and information flows to create synergies between corporate resources. The 2nd generation one now offers a platform for reengineering and internal integration of business processes [21]. One important aspect of ERP II is the adoption of electronic customer relationship management practices, which are driven by the organizational database [23].ERP has also expanded to encompass business intelligence (BI) while also handling "front-office" functions. It allows us to glimpse new models of inter-organizational integration by industry, as is the case in highly competitive sectors in which SMEs operate. The deployment of this IT fits in this way in a context of governance that has been very little work.

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Companies that choose an ERP face a double challenge, first, to control its choice, then to lead its implementation and its use with certain guarantees of success. In both cases, their managers must decide with knowledge of the risks of failure incurred [21] [24], while ensuring, as postulates [8], that this technology is thought and used to produce a real added value for the company. Thus, the interest in failure, or in contrast to the success of an ERP, is justified in the research, but also by the specialized press, because the expected returns from this investment are difficult to quantify in terms of net results in the short or medium term, that is to say immediate direct benefits [7].

Investment in this enterprise software package is now becoming more of a standard for integrating management systems and as a strategic lever for intra- versus inter-organizational collaboration [4]. This standard makes it possible to coordinate operations in business networks by facilitating long-term relationships. It facilitates the integration of SME management systems belonging to the same industry or operating in the same market [3]. Marketplaces by industry are thus intended to support this collaboration by emphasizing the importance of being able to interconnect different management systems, whether CRM, B2B or SCM, to the company's ERP system.

This is particularly true for SMEs that have their own contingencies, limited resources, making them vulnerable to the failure of an ERP implementation. This observation leads to assigning to this work a double objective. The first step is to find the determinants that favor the adoption of ERP innovation and to determine, in a second step, the structure of a model of analysis of the causes of success ERP, in a SME context. This problem of evaluation of the causes of the success of an ERP, and the questions that emerge for this communication of identification, in the first place, of the determinants of success and, secondly, of a model of prediction, fit into a general research context on the governance of IT-ERP [6]. This positioning is dictated by two reasons:

- In the first place, SMEs are now an attractive target for publishers and ERP service providers, given the saturation of the large enterprise market [32]. In addition to the technological dimensions of the integrated system, publishers are challenged by organizational and methodological concerns specific to small and medium-sized organizations to deploy their offer with a certain guarantee of success.

- Second, even if these technologies are useful, they are nonetheless costly and uncertain in the minds of leaders, from the point of view of their profitability. The weakness of the work carried out (in the field) on small structures [36] and in a socio-cultural context different from that of Anglo-Saxon, European or Asian countries, is here a handicap to communication, which could help to lift some prejudices.

This work delimits, first of all, the theoretical framework underlying the methods for evaluating the adoption of IT innovations. Second, it offers an original conceptual research model supporting a comprehensive systemic approach to assessing the success of adopting an ERP. It then describes the research methodology, and reports the results and interpretations leading to validating the structure of the model, via a hypothetico-deductive approach.

2. Evaluating ERP success

The theoretical framework for the success of ERP is formulated, in an IT governance context, based on previous work [41]. This framework describes two independent but complementary approaches, leading to the treatment of the problem of the success of an IT, such as ERP, on the one hand, in a context of strategic planning and, on the other hand, in a context of organizational innovation. These two approaches aim to formulate an explanation of success in a theoretical framework supporting a deterministic view of

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the problem studied, more behavioral and organizational, than economic or financial. This theoretical approach to the success of IT is at the origin of a recent research path [6] which mobilizes the many theoretical contributions of "behavioral" models for evaluating the success of IT.

The first approach used is that of strategic alignment of IT (SAM) postulated by the founding model of Henderson and Venkatraman [12]. The SAM, at the origin of numerous works aiming at determining the impact of IT on organizational performance, is based in particular on the concepts of strategic integration and functional integration [15]. Strategic integration suggests alignment between the external and internal business environment, while functional integration suggests synergy between the business processes and the IT used. The implementation of an ERP, leading to the integration of the organization's IT applications, here limits the framework of the theoretical investigation to only functional integration. This is retained in the modeling of the success of the ERP system as being able to be a theoretical domain of investigation of the problems of governance, that is to say of strategic impact of this technological resource, whose success.

The second approach used is that of the diffusion of innovation postulated by the founding model of Rogers [33]. The original model of adoption of innovation, which is the source of a great deal of work on IT, such as EDI [4] or ERP [10], insists on the perceived characteristics of an IT to explain the probability and the speed of diffusion of innovation within the social system. Perceived characteristics play a fundamental role in the persuasion phase during which the decision-making unit assesses whether or not to adopt technological innovation. Regarding the case of ERP, the work highlights the advantages, complexity and technical compatibility during ERP project. This research takes into account only the single characteristic, called "relative advantage", as a characteristic attribute of an ERP innovation. This choice is explained, firstly, by the concern to simplify the ERP adoption model and, secondly, by the fact that the results of previous studies, having dealt with the adoption of this innovation organizational, have concluded that only "the benefit provided" was a determinant of adoption [10]. Thus, the main advantages mentioned are as much technical, operational as strategic and organizational [30]. The technical advantages are mainly linked to the possibilities of the IT infrastructure [35]. The IT infrastructure constitutes the basis and the support of IT applications and, consequently, the prerequisite and the determinant of any type of advantage provided by an IS [16][17]. This advantage (measured in terms of improving the possibilities of the IT infrastructure) would condition, in other words, the other advantages. He must therefore be considered as the one who is at the origin of the choice of an ERP innovation and which leads to its adoption. The perceived characteristics of innovation are therefore introduced into the modeling of ERP success in terms of "improving the possibilities of the IT infrastructure".

The links between these two theoretical approaches, supporting the premises of this research, find their justification in the work carried out by the school "from a view of the evaluation of the success of IT based on resources" [39], from which the conceptual scheme formulated by [4] is taken. This postulates, in a meta-model of governance reporting strategic technological and organizational resources, on interactions that create value. In this sense, it constitutes a conceptual aid for the analysis of IT adoption by considering the simultaneous effects of innovation and the integration of IT in an intermediate capacity transformation process, as suggested by Massetti, and Zmud [4] or Raymond and Uwizeyemungu[32]. This scheme helps to define theoretical choices and interactions, and in this sense offers a revised framework for evaluating the success of IT. It helps to understand and justify the conceptual components in relation to (1) the functionalities of the IT studied, (2) the structural characteristics of the adoption process and its applications during its integration into the company's IS, and (3) the methods for evaluating the performance of the IT studied.

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On these theoretical bases, an ERP adoption model was proposed by Chatti [41], then first put to the test of a qualitative study, in order to identify the key factors of ERP success and put it to use. test the premises. The results of this work establish the existence of important endogenous factors in the explanation of success, and of a probable systemic structure, hitherto unidentified, to study their interdependencies. The theoretical construction of the research model then takes up the foundations and the results of this work. This construction is intended to empirically validate this systemic structure, and more precisely to test a general hypothesis of the structure of the causes of ERP success. In this sense, it aims to formulate an original conceptual model and test its multiple relationships between three levels of analysis: that (1) of the determinants of success (technological and organizational); then (2) ERP innovation processes (in terms of perceived benefits) and integration of its IT applications; finally, (3) the success of its implementation (via the results induced by its use). This model supports the general research problem and thus postulates the examination of direct and indirect relationships between these three interdependent levels of analysis:

- The entry level (KSF) describes the factors (relating to information systems, software packages, implementation project management and integrated management systems. These factors are as many resources or even determining capacities for acceptance and proper use of an ERP. They have been identified, by exploratory study and in the literature, as risk factors for failure during implantation. They can, in this sense moderate the absorption capacity of innovation and that of the integration of management IS and must therefore be "controlled / mastered", during implementation, to achieve the set organizational and functional performance goals of ERP .

- The intermediate level describes the factors that describe the process of implementing ERP. These factors played an important role during this process. They testify to the interest in ERP innovation and the way the integration went. They express the effects of strategic, risky and complex decisions, of innovating and integrating. These effects are apprehended by perceptions of success or failure measured at the end of the planning and implementation exercise of the technology. The model thus captures perceptions of perceived capacities for innovation and integration, and identifies them with "quality factors of the adoption process (QFP)".

- The exit level indicates the success factors for the adoption of ERP, and which are evaluated by the perceived organizational performance. They characterize the effects of the ERP adoption process, in terms of results of its implementation and effects on the management system of the SMEs (such as operational, managerial, strategic, technological and organizational benefits) .

The theoretical model that structures this research work is presented in Figure 1. It shows three independent levels of analysis characterizing a closed system, without feedback, and direct causalities designated by the arrows. The intermediate level reports mutual causality between perceived innovation (in accordance with the theoretical approach borrowed from Rogers) and IT integration (in accordance with the theoretical approach in SA borrowed from Venkatraman and Henderson [12]). The entry and exit levels borrow their theoretical foundations from the resource-based approach.

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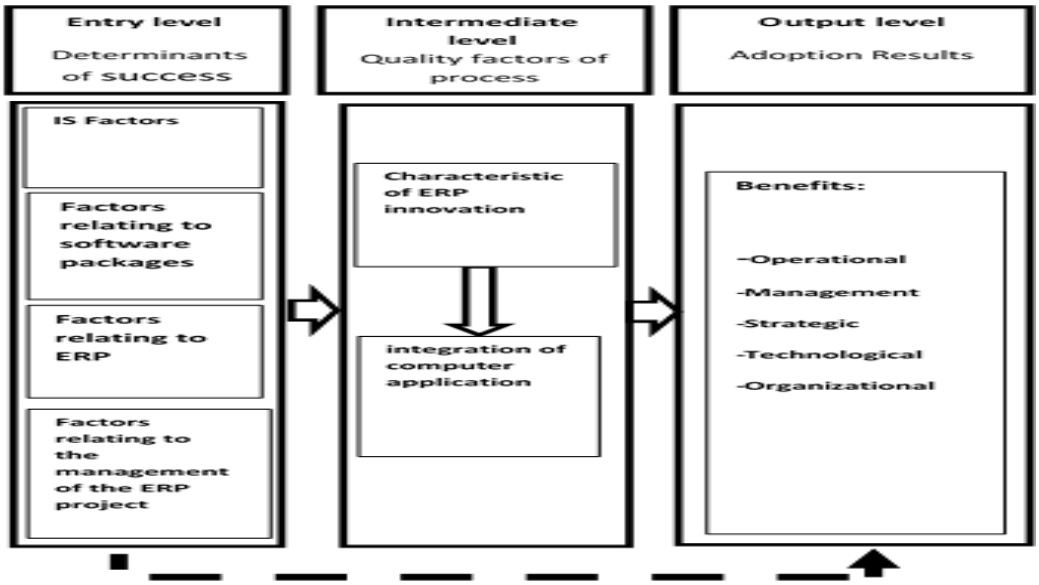

Figure 1: Theoretical model of the determinants of adoption success

3. The conceptual model of research

This conceptual model establishes the relationships between (1) the key success factors for ERP implementation (prerequisites / precursors); (2) specific process quality factors, on the one hand, to the innovative capabilities of the infrastructure and, on the other hand, the integration of applications (speakers / moderators); and, (3) the outcome factors reflecting the benefits of the implementation (performance / success). The contribution of the model essentially relates to the joint effects of moderating factors which have apparently never been the subject of work, at least in the field of evaluation of integrated information systems. This systemic vision of evaluation offers an interesting research perspective intended to understand the effects of organizational factors, such as perceived innovation and the integration of IT, during or after an implementation. These effects are relatively unknown in the works, even if the theories and practices of IT project management assume their importance to explain the success or failure of an implementation. They are involved in a complex transformation process, named in this work ERP adoption process,

So far, work has focused on studying the existence of a direct link between the possibilities of the IT infrastructure and the integration of IS [42]. They test the hypothesis that the improvement of the possibilities of the IT infrastructure is underlying that of the interconnectivity and integration of the IS. Integration requires IT capacities which make it possible to exploit organizational resources in a complementary manner, by facilitating the sharing of information [29]. Broadbent [42] thus find a strong positive association between the integration of information and IT and the possibilities of the IT infrastructure. A high level of IT infrastructure capabilities is thus associated with a high level of IS integration. This relationship therefore expresses the importance of the role played by an IT infrastructure to improve the integration capacities and organizational performance of a company.

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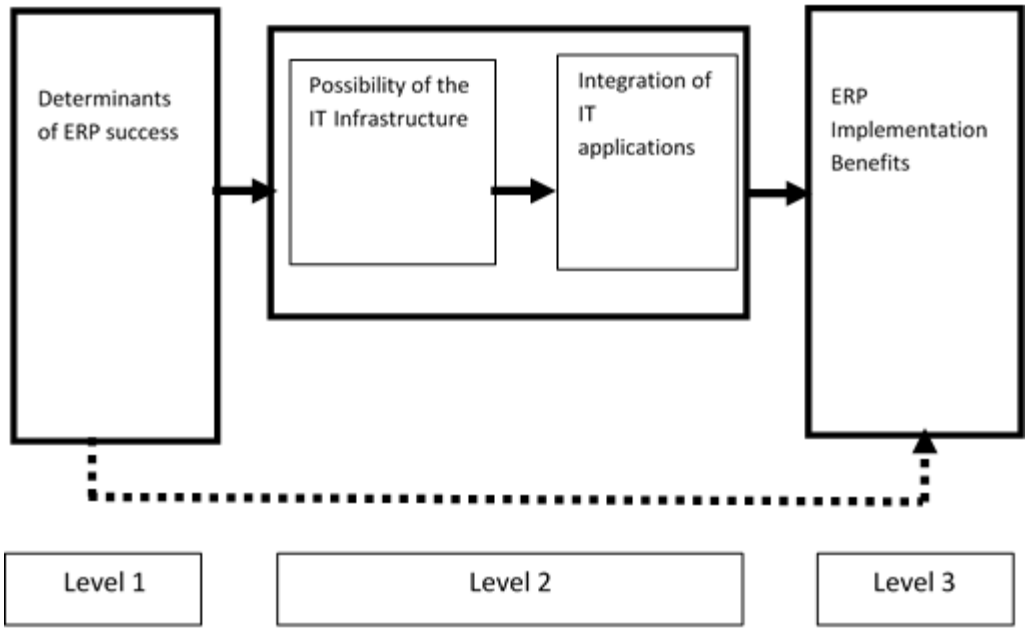

Figure 2: General structure of the conceptual model

Figure 2 presents the general structure of the conceptual model chosen for this research. This model restricts the theoretical framework of the intermediate level (adoption process) to the existence of a probable causality between the capacities or possibilities offered by the infrastructure and the organizational capacity for integrating applications. The existence of this relationship, previously established by previous work, is validated by the results of the exploratory study conducted by Chatti [41]. The interaction identified during this study between these two factors, which legitimizes a qualitative approach to the phenomenon of adoption of ERP, which can for example be proposed for a work on change management, that is to say in -situe and during implantation, is impossible to analyze in a context of punctual research limited to grasping the phenomenon at a given time. Thus, the study of a single relationship, like the one proposed, limits the scope of the theoretical framework by relativizing the dynamics of the process studied and by supposing, at the time of the evaluation, the existence of a quasi-stable structure of the model, that is to say without retroactive effects of integration on capacities [1].

This general conceptual model constitutes, to summarize, a variation of the theoretical model formulated by Chatti [41] after an initial investigation work going back and forth (abductive research approach). This work helped to validate the existence, in the field of ERP in SMEs, of the factors mentioned below and that, ultimately, of the concepts used. He also contributed, beyond the results of the content analyzes of the interviews, to the consolidation of the premises stating the possible links between these factors. To be generalized, this model requires an empirical study conducted with a representative sample of SMEs, and a testing of the data via research with hypothetico-deductive aims. This study leads to briefly recall, in this communication, the concepts and variables used for each of the three levels of this research model.

3.1 The benefits of implementing an ERP system

The results of the exploratory study point to several potential benefits, the most important of which are information literacy and improved use of skills [41].

- Information literacy is an important concept in the success of ERP, which is the main benefit [2].Previous work shows that among the most important reasons why organizations adopt an ERP is its ability to facilitate the exchange of information, to solve the problems of information fragmentation[8],

and to meet the information needs of all functional units [2]. This concept is reproduced by the results of the exploratory analysis in terms of availability (BEINFD), reliability (BEINFF), security (BEINFS) and access (BEINFA) to real-time information. These terms refer to variables to be explained in the model, to describe the improvement in the management and control of information circulating via the ERP. The comments gathered, confronted with the results of previous work, also point to the organization's capacity to master information, as a source of other induced benefits, such as improved decision-making, control, financial performance, productivity, resource and production management.

- Improving the use of skills is an equally important concept of the success of ERP which must also be considered as a significant advantage [35]. This concept is reproduced by exploratory analysis in terms of capacities brought to employees to develop new and more appropriate management and organizational skills (BECPMT), as well as to promote better use of certain management tools and techniques (BECPTG). These terms refer to so many variables to be explained in the model measuring an improvement in the management of human resources, sources of wealth creation, but also significant expenditure. This is why, the optimal exploitation of the potential of employees remains a permanent concern for companies. The comments gathered, confronted with the results of previous work show that an ERP offers employees the possibility of detaching themselves from routine and repetitive tasks, and to concentrate on analytical tasks, with more added value. The new business practices and the multiple functionalities offered by this IT also provide the tools necessary to better master the procedures and develop their skills.

The success of the implementation of an ERP is evaluated, to summarize, by two conceptually independent levels of apprehension. The first, that of "information literacy" is the subject of four variables to explain, measuring the efficiency of the management system impacted by information literacy. The second, that of "use of skills" is the subject of two variables to be explained, measuring the transformation and the induced improvement of skills by the "fit" between work and IT.

3.2 The determinants of success

The results of the exploratory study show several key success factors, the most significant of which are the quality of the project team, the definition of the project team's mission, user training, user acceptance, the commitment of general management, the reengineering of business processes and the selection of the ERP supplier [41].

- The quality of the project management team is a key concept for the success of an ERP implementation [22]. Previous work shows that a quality project team is a balanced, experienced team, made up of qualified people [22], who have been trained and who are led by a confirmed project manager[20]. This concept is reproduced by the results of the exploratory analysis in terms of composition (DSEPCE) and competence (DSEPCQ) of the team.

- The definition of the mission of the project management team is a concept frequently cited as a determinant of success of ERP projects [25][20]. This concept is here one-dimensional and is the subject of a measurement (DSESMES) reflecting the quality of the planning of the ERP implementation project. As a reminder, in terms of ERP, the plan specifies the role of the stakeholders and specifies the field of investigation, as well as the objectives of the project at these different stages.

- User acceptance is also a concept frequently cited as a determinant of the success of ERP projects [34]. This concept is here one-dimensional and is the subject of a measure (DSACCP) reflecting the fact

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that if at the start, the users do not accept the system with good heart, the general management then imposes constraints. Users are then forced to cooperate and deal with the system.

- The lack of user training refers to a concept frequently cited as a cause of problems during the implementation of ERP [20]. This concept is one-dimensional and is the subject of a measurement (DSFORM) reflecting the fact that the participation of users in training sessions is necessary to effectively use the software. Remember that, in terms of ERP, training produces knowledge for all of the functionalities and modules to be implemented.

- The commitment of the general management refers to a concept well identified, by work on IS planning, as a determinant of the success of IT acceptance, and therefore ERP [9]. This concept is one-dimensional and is the subject of a measurement (DSDGEN) whose specific attributes are important, essential, strategic, philosophical, stimulator and motor. These terms are often used in the words of those involved in the ERP project to describe the role and commitment of senior management in the implementation process.

- The review of business processes refers to a generic concept (the BPR) always mentioned as an explicit condition for the success of IS integration and is made for ERP implementation success [23]. This concept is one-dimensional and is the subject of a measurement (DSRPA) which shows that the objective of this reconfiguration is generally the adaptation of the ERP to the solution desired by the client, the adaptation of the processes of the company with software standards and improved business process performance.

- The selection of the ERP solution refers to a concept, globally evaluating the quality and appropriation of the tender dossier, strongly conditioning the success of ERP projects [25]This concept is returned by the results of the exploratory analysis in terms of selection of the appropriate software package (DSFRCH) and supplier / company relationship (DSFRRL). These terms are the subject of two different explanatory variables which measure: for the first, the fact that the ERP meets the needs of the organization and the coverage of its processes, on which the success of its implementation and its use will depend. Exploratory analysis shows, in this sense, that the majority of companies proceed at the start of the project, to the development of a set of specifications on the basis of an analysis of the need and supply on the software market ERP. For the second, the fact that the supplier / company relationship is vital for the success of the project [20] [26]. The exploratory analysis also shows that the establishment of a confident and serious relationship between the buyer and the ERP supplier is recommended for the good conduct of the project.

The determinants of success cover, to sum up, four areas independent of key success factors, relating to the management of IS integration, the choice of ERP software, the project and the support conditions for the solution. The exploratory study of these four areas made it possible to restore nine explanatory variables, qualified as "precursors" on the one hand, of the adoption of ERP and, on the other hand, of its success.

3.3 Quality factors of the adoption process

The results of the exploratory study reveal two conceptual levels in the analysis of the ERP adoption process: improving the possibilities of the IT infrastructure and the integration of applications

- The possibilities of a company's IT infrastructure constitute an integrated set of services to support existing applications and new business initiatives [40]. Chang and Seddon [35] identify two variables by

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which they measure the improvement in IT infrastructure capabilities, namely: improvement in the stability and flexibility of the IT infrastructure. These two measures are taken up by the research model:

That of "flexibility" is subject to a variable (BEMNFX) which is defined as the ability of a system to change easily in order to adapt to circumstances. Flexibility represents the ability of the technique to cope with new changes or evolutionary scenarios

That of "stability" is the subject of another variable (BEMNST) which is defined as the normalization or standardization of the IT platform necessary for the global deployment of the ERP solution.

Singlatery [37] conducts two successive studies, one qualitative for exploratory purposes with 51 IT practitioners, and the other empirical with 399 companies, which identify three variables intended to measure the level of integration of applications, as perceived by an user. Each variable takes into account a property of the ERP architecture, intended to facilitate its use, namely:

(1) general operation or apprehension (BEIGFN), via the technical characteristics of the ERP;(2) data management (BEIGVS), via the functionalities relating to data manipulation;(3) application interconnectivity (BEIGCM), via the interoperability of applications intended to work together, to manage common data, and to provide standard functionalities.

These dimensions are all properties to take into account in the assessment of the ability of an ERP to integrate software components into its architecture. In other words, they are attributes of integration that explain how applications are integrated [37] and easier to use when they can easily align with job requirements.

The process of adopting an ERP is understood, to summarize, by two conceptual approaches describing the ERP in terms of innovation. The first is based on the relative advantage perceived in the capabilities offered by TI-ERP, and is the subject of two explanatory variables for ERP success, via their supposed influence on functional integration. The second is based on strategic alignment and more precisely on the fit between ERP capabilities and task needs, and is the subject of three explanatory variables for success. It should be noted that, in the context of ERP governance, these five variables are explained by the nine independent variables measuring the resources used to deploy the ERP.

3.4 Research model and hypothesis

The conceptual model (Figure 3) formulates a hypothetico-deductive approach to the simultaneous influence of critical success factors, then of quality of the process on the benefits of ERP implementation. It formalizes a deterministic framework supposing the existence of direct and indirect causalities between the endogenous and exogenous variables of the three conceptual levels

The goal is to test this model on many ERP implementation cases. To do this, it is necessary to test the data, first, the structural validity and reliability of the variables involved, and, second, the hypothesis of direct influence relationships (1: direct links) and indirect (2: indirect links) between the variables of the system studied. The direct dependency analysis is carried out between two sets of variables, namely: the determinants of success and the benefits of implementation; while the indirect dependency analysis is performed between the three sets of variables. This analysis is intended for testing a single general hypothesis, formulating the "fit" of the structure of the linear relationships between variables from the control model to the data. The study of this "fit" is intended for the identification of an optimal model

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bringing out significant pathways between the endogenous and exogenous variables of the 4 conceptual levels mentioned.

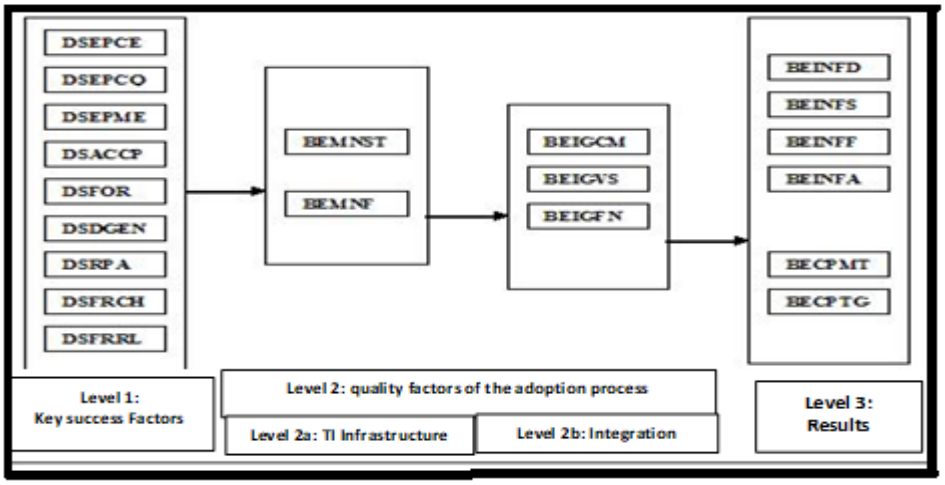

Figure 3: The conceptual model

The general hypothesis supporting the fit of the research model is formulated for all the variables set out in the previous title 2:

HG: The benefits of an ERP system (Level 3) are directly influenced by the integration of applications (Level 2b), and indirectly by the possibilities of the IT infrastructure (Level 2a) and the key success factors (Level 1).

4. The methodological framework

This study is carried out in the context of SMEs. It uses as research ground companies that have chosen an ERP in the last decade. These are now in the post-implementation phase of this IT, and are able to assess the conditions of implementation and the benefits of its use.

The research field and the approach used to constitute the representative sample are presented first. The methodology used to support the empirical research approach is then based on a brief presentation of the evaluation questionnaire, and the series of methods of descriptive data analysis with the PCA, and explanatory with the MES.

4.1 The field of research

The population concerned is made up of SMEs which have implemented an ERP, and which meet the following two requirements:

- the number of (application) modules is at least four (ie two specific modules in addition to the two generic accounting and financial management modules). This requirement must confirm that the ERP integrates the management system.

- the duration of use of the system is necessarily greater than 6 months, after implantation of the last of the 4 modules minimum. This requirement must confirm that the ERP is no longer in experimentation and

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that its use is guaranteed by the knowledge acquired and a good experience of the users who will have to answer the study questionnaire.

These two requirements constituted constraints to constitute a sampling base for SMEs, and to select the most representative of ERP practices.

4.1.1 The sampling frame

The lack of primary data on ERP implementations, as elsewhere for other IT, very often leads researchers and analysts of the Press, to turn to either solution providers (providers) or providers services (consulting). This was the case for this study, which devoted an enormous amount of time to convincing eight ERP providers of the interest of participating in this project. These confidential sources provided the names and contact details of nearly 200 companies operating in different economic sectors (mainly industries and services). This base, which it is not possible to compare with a population of unknown size, therefore does not allow to judge a certain representativeness. This was probed by an information message from "providers", in order to be validated and updated, but also in order to obtain the approval of SME clients on their response to the questionnaire. It is certain that this procedure does not meet the requirements of scientific sampling, and that probably this base remains incomplete. The exhaustive list of the target population could not be established for three reasons: (1) no empirical study of this scope has so far been carried out on LES in the context of SMEs; (2) new players (suppliers and customers) have entered this market over the past 5 years, without being listed; (4) some SMEs have necessarily turned to free software; finally (4) the constitution of a complete sampling frame, using for example the usual criteria of segmentation or contingency (e.g. size, turnover, ...) to create a sample would have been downright impossible, even prohibitive.

4.1.2 Selection of target respondents

The questionnaire was administered to people who were both active members of the ERP project team and members of senior management, with a certain preference for directors of information systems (DSI). Targeted people (e.g. financial managers, production mangers, supply managers, etc.) were expected to be involved in all phases of the project. They had the opportunity, during the pre-implementation, to participate in the constitution of the specifications and in the consultation of the tenders relating to the project. They also participated in setting up the system and were in permanent contact with all of the stakeholders in the project, either formally or informally. They were selected in order to take advantage of their experience, their knowledge of the ERP project, and the company field. However, the choice went preferentially to the CIOs. It was implicitly dictated by the findings established during the exploratory stage. It is a fact that, in the SMEs surveyed, the IT function or activity and its director (IS or CIO) are almost always:

- initiator and direct manager of the project;

- the most involved in the implementation process of all the software modules in the different departments of the company;

- the most involved in training users of the company; and,

- in constant contact with the users of the different departments to help them in the optimization, maintenance, monitoring of the different modules installed. It is up to him to find the configuration and configuration solutions relating to problems and / or business changes.

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Thus, in addition to its technical knowledge of the software package, the IS function is supposed to have knowledge of all the trades and businesses of the SME, its processes and its operation. She often has a fairly clear and global view of the ERP project and its spin-offs. To conclude, it was she who was most able to respond to the questionnaire with ad-hoc information on the subjects covered.

4.2 The evaluation questionnaire

A measurement questionnaire was developed, based on the exploratory study Chatti [41] and a review, in the literature, of existing metrics in order to adapt them to the measurement of research variables. This reports three parts relating to the three components of the conceptual model (Fig. 3). For each of these components, the concepts, variables and constructs are stated. Each construct is subject to a coding of the items summarized in Annex 2, and to Lickert scales measured with a 5-point interval scale.The questionnaire was sent to the sample of 200 selected SMEs: a return of n = 72 questionnaires was processed by data analysis to test the conceptual model.

4.3 Methods of data analysis

The treatment of the research problem is addressed using a structured methodology using conjugation (justified by the low number of cases), and a sequence of first-generation descriptive methods (such as the FAPC and the reliability test). constructs) and explanatory 2nd generation (like the structural equations with the SEM and dependency analysis):

- 1st generation descriptive analysis methods are intended to verify the empirical validity of the research constructs, when they are original and have never been tested. These methods are commonly used to test convergent and discriminant validity and ladder reliability.

The validity test is carried out beforehand through the analysis of the correlations between the items of a variable (convergent validity) or of a concept involving several constructs (discriminant validity), then is completed by an FAPC [13]. The objective of this test is to verify the uniqueness of the measurement scales and to assign each variable a standardized weighting that uses the "score factors" established by each FAPC.

The reliability test is performed following the convergent validity test of each construct. It is performed on the items of the constructs restored by the convergent FAPC. The measuring instrument used is Cronbach's coefficient, which tests the internal coherence of the attributes of each construct and its ability to reproduce.

- The explanatory analysis methods aim to verify and validate the structure of the causal relationships established between the variables of the research model (SEM) by means of the test of the general hypothesis and, secondly, to test the relationships of direct and indirect dependencies between the different variables of the model (dependency analysis).

The explanatory study is carried out in this research through the method of structural equations (SEM). This is complemented by an analysis of the direct and indirect dependencies (path-analysis) whenever a network of significant direct causalities ($p < 5\%$) is identified between the variables of 2 or 3 levels of the conceptual model. The "fit" approach of the data model with SEM involves 3 standard steps for parameter estimation and reliability, identification of the structure of realizations, and interpretation. The purpose of estimating the model is to verify the fit of the theoretical model with the empirical data. It is carried out here using the maximum likelihood method. The identification of the model aims to find an optimal

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solution theoretically and statistically. This stage is conditioned by the analysis of χ^2 reduced to its degree of freedom, which must always be significant at a threshold p> 10%. The interpretation of the model amounts to estimating the quality of fit from the theoretical model to the empirical data. Overall, three families of indices are used for the evaluation of the adjustment: absolute, incremental and parsimony (The ratio χ^2 / ddl must be less than 5, the GFI, AGFI, RMR, RMSEA, NFI, CFI, PNFI, PGFI are to blame for 1). The risk of error is set in this study at the 5% threshold. Only the variables whose risk is lower than this threshold are retained in the tree structure, to validate the structure of the model. All of this is done using the AMOS software. The sequence of descriptive and explanatory methods aims, in summary, to overcome the effects of the small size of the sample.

5. Research results

The results of the treatments carried out concern, for the variables of the model, the descriptive analysis intended to check the validity (convergent and discriminant) and the reliability of the constructs ("alpha" Cronbach coefficients calculated for the items denoted in the questionnaire (Annex 2 The results of the treatments intended for the HG test concern the study of the significance of the general fit of the model to the data (with an MES) and the study of the direct and indirect paths between variables of the model.

5.1 The content validity of the search variables

5.1.1 The content validity of the explanatory variables

Each construct measuring a variable or determinant of ERP success at the first conceptual level is subject to a validity test with an PCA and a reliability test.

- The PCA of items measuring the construct "mission of the project team" shows the existence of a one-dimensional factor structure. The extracted factor has an eigenvalue equal to 2,076 and restores 69,202% of explained variance. The factor contributions of the three measurement items are high and greater than 0.782 (Tab.1). The reliability of the construct is confirmed.

Table 1: Convergent validity and reliability of the DSESMES construct

Items	DSESMES
	1
DseSMEs1	,831
DseSMEs2	,782
DseSMEs3	,880
Eigenvalues	2,076
Explained variance	69,202 %
Cumulative variance	69,202 %

- The PCA, using a Varimax rotation performed on the items measuring the construct "user acceptance" (DSACCP), shows the presence of a factor structure with two independent components. These extracted factors jointly restore an explained variance of 74.042% and each have an eigenvalue greater than 1. For the rest of the study, the factor "Dsaccpf2" is used as an effective measure of user acceptance while the factor " Dsaccpf1 "is used as a measure of usability (Tab.2). The reliability of these two constructions is confirmed.

Table 2: Convergent validity and reliability of the DSACCP construct

Items	DSACCP	
	Dsaccpf1	Dsaccpf2

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Dsaccp1	,438	,517
Dsaccp2	,852	
Dsaccp3	,928	
Dsaccp4	,895	
Dsaccp5		,782
Dsaccp6		,836
Dsaccp7		,849
Eigenvalues	3,850	1,333
Explained variance	55%	19,042%
Cumulative variance	55%	74,042%.

- The PCA of items measuring the construct "user training" (DSFORM) shows the existence of a one-dimensional factorial structure. The dimension extracted by the PCA has an eigenvalue equal to 2.119 and restores 52.966% of the variance explained. The factor contributions of the three measurement items are greater than 0.654. The low value of Cronbach's alpha (0.6943) may be the result of a confusion in the measurement of training and documentation (Tab. 3).

Table 3: Convergent validity and reliability of the DSFORM construct

Items	DSFORM
	1
Dsform1	,739
Dsform2	,814
Dsform3	,694
Dsform4	,655
Eigenvalues	2,119
Explained variance	52,966 %
Cumulative variance	52,966 %

- The PCA of items measuring the "business process reengineering" construct (DSRPA) shows the existence of a one-dimensional factor structure. The extracted factor gives an eigenvalue of 2,795 and restores 70% of the variance explained. The factorial contributions of these items are greater than 0.761 (Tab.4). The reliability of this construct is confirmed.

Table 4: Convergent validity and reliability of the DSESMES construct

Items	DSRPA
	1
Dsrpa1	,761
Dsrpa2	,860
Dsrpa3	,840
Dsrpa4	,879
Eigenvalues	2,795
Explained variance	69,883%
Cumulative variance	69,883%

- The PCA, using a Varimax rotation carried out on the five items of the construct "management commitment" (DSDGEN), shows the presence of a factor structure with two independent dimensions. These extracted factors jointly restore an explained variance of 77.986% and each have an eigenvalue greater than 1. For the rest of the study, the factor "dsdgenf1" is used as an effective measure of the involvement of general management while the factor “dsdgenf2” is used as a measure of the intervention of the general management (Tab.5). The reliability of these two constructions is confirmed.

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Table 5: Convergent validity and reliability of the DSDGEN construct

Items	DSDGEN	
	Dsdgenf1	Dsdgenf2
Dsdgen1	,868	
Dsdgen2	,906	
Dsdgen3		,846
Dsdgen4		,800
Dsdgen5	,785	,784
Eigenvalues	2,090	1,809
Explained variance	41,797%.	36,189%
Cumulative variance	41,797%	77,986%
α Cronbach	0,8132	0,7301

- The quality of the project team is assessed by two variables measuring the composition of the project team (DSEPCE) and the capacity of the project team (DSEPCQ).

The PCA carried out on the items of the construct "composition of the project team" testifies to the dimensionality of the construct. The extracted factor has an eigenvalue equal to 1.918 and restores 63.918% of explained variance. The factor contributions of the three measurement items are greater than 0.6. The reliability of this construct is confirmed.

Table 6: Convergent validity and reliability of the DSEPCE construct

Items	DSEPCE
	1
Dsepce1	,684
Dsepce2	,794
Dsepce3	,905
Eigenvalues	1,918
Explained variance	63,918 %
Cumulative variance	63,918 %

The PCA of items measuring the construct "the capacity of the project team" highlights the presence of a one-dimensional factor structure as well as the poor quality of presentation of the item "dsepcq2". With the exception of the item "dsepcq2", all of the items have factor contributions greater than 0.7. The dimension extracted by the PCA from the four items has an eigenvalue equal to 2.131 and restores 53.271% of explained variance. The reliability of this construct is validated without the item concerned.

Table 7: Convergent validity and reliability of the DSEPCQ construct

Items	DSEPCQ
	1
dsepcq1	,782
dsepcq2	,588
dsepcq3	,785
dsepcq4	,746
Eigenvalues	2,131
Explained variance	53,271%
Cumulative variance	53,271%

- The selection of the ERP solution is measured by two supposedly independent variables: the selection of the ERP software package (DSFRCH) and the quality of the company / supplier relationship (DSFRRL).

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The PCA, using a Varimax rotation operated on the items of the construct "the selection of ERP software" shows the presence of a two-dimensional factor structure. The items have high contributions on the two extracted factors (> 0.8). The first factor "Dsfrchf1", obtained from items 1, 2, 5 and 6, and retained as an effective measure of the project requirement, has a high eigenvalue of 2.823 and restores an explained variance of 47.054%. The second factor "Dsfrchf2", obtained from items 3 and 4, and used as a measure of the adaptation of supply, has an eigenvalue of 1.459 and returns an explained variance of 24.320%. The variance cumulated by these two factors is 71.374%. The reliability of these two constructions is confirmed.

Table 8: Convergent validity and reliability of the DSFRCH construct

Items	DSFRCH	
	Dsfrchf1	Dsfrchf2
Dsfrch1	,821	
Dsfrch2	,859	
Dsfrch3		,804
Dsfrch4		,813
Dsfrch5	,780	
Dsfrch6	,863	
Eigenvalues	2,823	1,459
Explained variance	47,054%	24,320%
Cumulative variance	47,054%	71,374%

The PCA carried out on the items of the construct "quality of company / supplier relationship" shows the presence of a one-dimensional factorial structure. The factor contributions of these measurement items are greater than 0.769. The extracted dimension has a high eigenvalue of 2.853 and restores 71.313% of explained variance.

Table 9: Convergent validity and reliability of the DSFRRL construct

Items	DSfrrl
	1
Dsfrrl1	,864
Dsfrrl2	,888
Dsfrrl3	,769
Dsfrrl4	,851
Eigenvalues	2,853
Explained variance	71,313 %
Cumulative variance	71,313 %

The discriminant analysis focused only on the two multidimensional concepts, namely: "the quality of the project team", "the selection of the ERP solution".

- The PCA, using a Varimax rotation performed on the items of the concept "quality of the project team", restores two factors. It shows high factor contributions (greater than 0.658) on the factors to which they are initially attached. The PCA carried out thus shows the discriminating nature of the measurement scales of the constructs measuring the quality of the project team. The reliability of this construct is confirmed.

Table 10: Discriminant validity of the concept "the quality of the project team"

Items	Components	
	Dsepce	Dsepcq

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Dsepce1	,722	
Dsepce2	,736	
Dsepce3	,858	
Dsepcq1		,658
Dsepcq3		,868
Dsepcq4		,781

- The PCA, using a Varimax rotation performed on the items of the concept "the selection of ERP software" restores three factors. It shows high factor contributions (greater than 0.759) on the factors to which they are initially attached. Each item of a scale is correlated with a single factor. The PCA carried out therefore shows the discriminating nature of the measurement scales of the constructs measuring the selection of the ERP software package. The reliability of this construct is confirmed.

Table 11: Discriminant validity of the concept "the selection of ERP software"

Items	Components		
	Dsfrrl	Dsfrchf1	Dsfrchf2
Dsfrch1		,868	
Dsfrch2		,867	
Dsfrch3			,765
Dsfrch4			,838
Dsfrch5		,759	
Dsfrch6		,771	
Dsfrrl1	,826		
Dsfrrl2	,874		
Dsfrrl3	,779		
Dsfrrl4	,831		

5.1.2 The content validity of intermediate variables

The second conceptual level distinguishes two multidimensional concepts.

- The concept "Integration of applications" is evaluated through the variables: BEIGCM, BEIGVS, BEIGFN. The three constructs are measured by eleven items. The PCA, with varimax rotation operated on all of these items, highlights the presence of a factorial structure of three dimensions. The factorial contributions (loadings) of the items, greater than 0.602, are all significant (tab.12).

Table 12: Discriminant validity and reliability of the "Application integration" concept

Items	Components		
	Beigvs	Beigcm	Beigfn
Beigcm1		,877	
Beigcm2		,811	
Beigcm3		,874	
Beigvs1	,602		
Beigvs2	,821		
Beigvs3	,881		
Beigvs4	,833		
Beigvs5	,754		
Beigfn2			,739
Beigfn3			,849
Beigfn4			,748

-

The concept "the possibilities of the IT infrastructure" is evaluated through the variables, BEMNST, BEMNFXF1, BEMNFXF2. The three constructs are measured by eleven items. The PCA, with varimax

rotation performed on all of these items, returns two factors instead of three. It shows factorial contributions greater than 0.529, on the two restored factors. The items Bemnfx1, Bemnfx2 are correlated with the items of the variable "Bemnst", they together constitute a new factor. Aside from restitution of the factor "bemnfxf1", the analysis brings out a new factor "bemnstf". The factorial contributions of the items, greater than 0.529, are all significant (tab. 13).

Table 13: Discriminant validity and reliability of the concept "possibilities of the IT infrastructure"

Items	Components	
	BEMNSTF	BEMNFXF1
Bemnst1	,772	
Bemnst2	,726	
Bemnst3	,585	
Bemnst4	,693	
Bemnst5	,707	
Bemnfx1	,529	
Bemnfx2	,677	
Bemnfx3		,804
Bemnfx4		,791
Bemnfx5		,705
Bemnfx6		,605

5.1.3 The content validity of the variables to be explained

The third conceptual level contains two multidimensional concepts relating to information literacy and the use of skills.

- The concept of "information literacy" is evaluated across the variables, BEINFD, BEINFS, BEINFF, BEINFA. The four constructs are measured by twelve items. The PCA, with varimax rotation performed on all of these items, restores four factors. It indicates factorial contributions greater than 0.558, on the four restored factors (tab. 14).

Table 15: Discriminant validity and reliability of the concept of "information literacy"

Items	Components			
	BEINFD	BEINFS	BEINFF	BEINFA
BEINFD1		,558		
BEINFD2		,851		
BEINFD3		,805		
BEINFS1			,754	
BEINFS3			,616	
BEINFS4			,884	
BEINFF1				,892
BEINFF2				,727
BEINFF3				,672
BEINFA1	,828			
BEINFA2	,840			
BEINFA4	,705			

- The concept of “better use of skills” is evaluated using the variables BECPMT, BECPTG. The two constructs are measured by eight items. The PCA, with varimax rotation performed on all of these items, restores two factors. It indicates factorial contributions higher than 0.602, on the two restored factors (tab. 16).

Table 16: Discriminant validity and reliability of the concept "best use of skills"

Items	Components	
	BECPMT	BECPTG
BECPMT1	,644	
BECPMT3	,875	
BECPMT4	,602	
BECPMT5	,762	
BECPMT6	,805	
BECPTG1		,888
BECPTG2		,910
BECPTG3		,661

5.2 The test of the general hypothesis HG

The purpose of this test is to validate the general structure of the control model. It is carried out by studying, firstly, the "fit" of the general model and, secondly, the paths in an optimal model rejecting the path coefficients between variables to be explained and non-significant explanatory (p> 5%)

Evaluating the quality of the fit of the model to the data consists of estimating the quality of the fit of the theoretical model to the empirical data. This step (in particular the analysis of the precision indices of the global model) uses a combination of indices with different characteristics (absolute, incremental and parsimony). Analysis of the values of these indices indicates acceptable results; the model is “over-identified” (the degree of freedom (DOF) is equal to 115 and therefore strictly positive) and all the indices respect the limit values suggested by the literature relating to the method of structural equations (tab. 17)

Table 17: Precision indices relating to the general model

	Precision indices	**Calculated values**	**Recommended values**
Absolute indices	Chi-Deux (χ^2)	96,4	
	P (χ^2= 96,4)	0,896	
	ddl	115	
	χ^2/ ddl	0,838	< **5**
	GFI	0,891	> **0,9**
	AGFI	0,801	> **0,9**
	RMR	0,066	< **0,1**
	RMSEA	0,000	< **0,08**
Incremental indices	NFI	0,873	> **0,9**
	CFI	1,000	> **0,9**
Parsimony indices	PNFI	0,528	
	PGFI	0,605	

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The analysis of the quality of the fit, using these indices (tab. 17), therefore shows a good "fit" of the model proposed to the data, as well as a very low impact of the residuals on the model. The general hypothesis concerning the general structure of the model and in particular the presence of the causal effects between the different explanatory and explicable variables of the model is thus generally accepted. It can therefore be said that the benefits of an ERP system are directly influenced by the integration of IS, and indirectly by the capabilities of the IT infrastructure and the key success factors of ERP implementation.

The validation of the HG also requires verification of the significance of the parameters of the dependency model and of the coefficients of determination (R^2) of the variables to be explained of the ERP implementation benefit.

Analysis of the regression coefficients shows that the direct dependence relationships are significant at the risk threshold p <5%. These relationships reflect a high determinism of the influence of the explanatory variables on the variables of the ERP implantation result.

The coefficients of determination (R^2) of the dependent variables are rather balanced and significant (P <1%). Indeed, 36.1% of the variance in the availability of information "BEINFD", 69.1% of the variance in the variable information security "BEINFS", 53.7% of the variance in the variable reliability of the "BEINFA" information, 63.4% of the variance of the variable reliability of the "BEINFF" information, 74.5% of the variance of the variable "BECPMT" and 68.2% of the variance of the variable "BECPTG" are explained by the causal model HG.

Thus, the results relating to the fit quality of the model and the explained variance of the dependent variables validate the structure of the model tested. The optimal model that supports the HG hypothesis (represents the only significant dependency relationships identified whose significance level is at most 5%) is established by the following relationship diagram (Fig. 4):

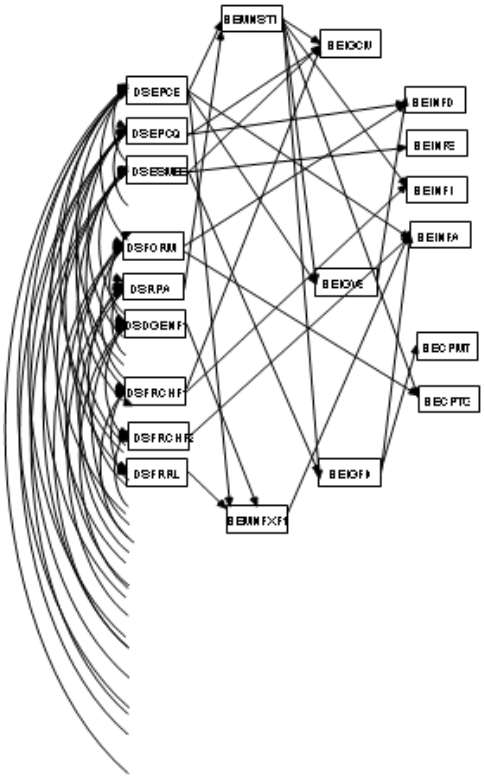

Figure 4: The optimal HG control model

The analysis of the paths carried out for the only significant paths (a <5%) partially confirms the HG hypothesis. The study of the pathways reveals the main dependency relationships between the variables of the benefits of an ERP system (Level 3), and the key success factors (Level 1). The study thus carried out on direct, indirect and combined dependency relationships made it possible to globally confirm the hypotheses of KSF influences from ERP implementation on information control and improvement in the use of skills. . The analysis shows, in fact, that:

- The composition of the "DSEPCE" project team has a positive (direct and / or indirect) impact on the four dimensions of information literacy ("BEINFD",

"BEINFS", "BEINFA", "BEINFF") and on the two dimensions of improving the use of skills ("BECPMT", "BECPTG").

- The capacity of the "DSEPCQ" project team has a direct negative impact on the availability of "BEINFD" information and a positive indirect impact on the control of "BECPMT" work.

- The mission of the "DSESMES" project team has a positive (direct and / or indirect) impact on two dimensions of information control ("BEINFS", "BEINFA") and on one dimension of improving the use of skills (“BECPMT”).

- The "DSFORM" training has a direct positive impact on the availability of "BEINFD" information and on the improvement of the use of "BECPTG" management tools and techniques.

- The reengineering of "DSRPA" business processes has a positive (direct and / or indirect) impact on the four dimensions of information control ("BEINFD", "BEINFS", "BEINFA", "BEINFF") , and a positive indirect impact on the two dimensions of improving the use of skills (“BECPMT”, “BECPTG”).

- The requirement of the “DSFRCHF1” ERP project has a positive (direct and / or indirect) impact on the four dimensions of information control (“BEINFD”, “BEINFS”, “BEINFA”, “BEINFF”), and a positive indirect impact on the two dimensions of improving the use of skills (“BECPMT”, “BECPTG”).

- The adaptation of the "DSFRCHF2" ERP offer has a direct positive impact on access to "BEINFA" information.

- The company / ERP supplier relationship "DSFRRL" has an indirect positive impact on access to "BEINFA" information and direct on the control of "BECPMT" work.

- The involvement of general management in the management of "DSDGENF1" resources has a negative influence on access to information "BEINFA" while the intervention of general management "DSDGENF2" has no influence on ERP benefits.

- Finally, the acceptance of "DSACCP" users has no effect on the benefits of ERP implementation.

5.3 Discussion of the results

The results obtained from the analysis of the paths of the optimal research model lead to different conclusions relating to the determinants of ERP success:

- The "quality of the project team" constitutes one of the most determining factors (directly and / or indirectly) of ERP success. Companies planning to implement an ERP system must ensure the establishment of a balanced project team (a combination of both the technical and management aspects) with the knowledge, talents, and the experience necessary to cope with the duration and complexity of the task [23].

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The positive impact of the composition of the project team on information literacy is due to the dual skills (technical and management) of the project team. This mix of skills facilitates the understanding and technical formulation of the information needs of users. A step necessary for the ERP system configuration operation and which is important for improving sharing [37] and the availability of information [9].

The positive impact of the composition of the project team on improving the use of skills also shows that when the team is balanced, the choices relating to the configuration operation (the functionalities to be used), the management of access to the system's applications, better meet the needs of users and better promote the use of talents and experiences.

- The definition of the "mission of the project team" is essential for the proper conduct of the ERP project. The specification of the role of each stakeholder in the project (at the level of the contract or at the level of the specifications, even before the launch of the call for tenders) makes it possible to set the responsibilities and the right of each party [23]. The precision of the objectives of the ERP project also makes it possible to achieve the benefits expected from the implementation of the ERP system.

- The "reengineering of business processes" is necessary for the realization (directly and / or indirectly) of the projected benefits of the implementation of ERP systems (21]. The incompatibility of the characteristics of ERP software with the business processes of the organization and the IT infrastructure in place, can be the cause of problems with software package implementation (ERP). For the successful implementation of ERP systems, it is imperative that the ERP implementation is preceded, therefore, by a review of the content of functions, processes, tasks and the IT infrastructure in place [9]. The objective of this reconfiguration is generally to respond to the solution desired by the customer, to adapt the processes to the standards of the ERP software package and / or to optimize the exploitation of the ERP functionalities.

The impact of reengineering on the use of new management tools and techniques is thus explained by the effect of "Best Practices" and the wide range of functionalities incorporated in ERP. The business processes, incorporated into the ERP, are the fruit of long experience and benchmarking operations in different economic sectors. They embody the best business practices that can generate a competitive advantage for those who adopt it [38]. For many companies, complying with these rules and procedures results in significant productivity gains[8].

The positive impact of reengineering on improving employees' mastery of work is due to the revision of the content of their functions and tasks. The standardization of business processes means that users are obliged to improve their old management and organizational practices.

The positive impact of reengineering on improving information literacy is due to the rationalization of the IT platform. This standardized allows a diverse use of information (e.g. summarized, aggregated, condensed data from several sources of information within the company). Updating the IT infrastructure generally results in the replacement of transactional file systems or disparate databases with a single relational database system. These DBMS allow better management and manipulation of data.

- "User training" is an essential condition for the success of the ERP project. User participation in training sessions is necessary for the efficient operation of the software. These training actions must be carried out according to a clear program capable of meeting users' expectations. It is also recommended that training be carried out on all the functionalities and modules to be implemented for a better appreciation of the functional links generated by the integration. The lack of user training frequently appears to be responsible for problems with the implementation of ERP systems [20] [26].

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The positive impact of training on the availability of information is explained by the fact that the training given on the various functionalities of the ERP system, allows ERP users to be much more autonomous concerning information. The training covers the possibilities offered by the new system to each user, to have and use the information they need, right from their workstation.

The positive impact of the training on improving the use of management tools and techniques "BECPTG" shows that training can benefit employees through the acquisition of certain management and organizational skills. The training allows employees to make better use of certain management tools and techniques, such as "dashboards, simulation techniques ..." incorporated into the system, to practice "international management", to "break away from routine tasks, to focus on business aspects and to move on to analysis tasks ".

- The "selection of an ERP solution" appropriate to the needs of the company is an important (direct and / or indirect) condition of success for ERP projects [20] [23]. SMEs companies call on the service of their ERP suppliers to help them in the implementation of the acquired system. In this case, they are called upon to seek not only the software package which best adapts to their needs, but also to watch over the choice of the supplier having the human resources necessary for the proper conduct of the project.

Defining the "ERP project requirements" for choosing a better ERP solution is an important factor for success. Before acquiring an ERP system, companies generally conduct a needs and supply analysis on the ERP software market. Choosing the wrong software package can signify the commitment of an IT architecture and applications that do not adapt to the organization's objectives or to its business processes [20] [26] and consequently limits the chances of ERP success.

The relationship of trust between the buyer and the ERP supplier is recommended for the proper conduct of the project. This relationship requires a certain skill, know-how, experience, as well as the availability of the personnel of the ERP supplier (quality of service), responsible for helping the company in its project [20] [26]. It generally results in better involvement of supplier personnel and company users in the project. This situation further promotes communication and knowledge transfer between these stakeholders and promotes the achievement of the expected results of the ERP project.

- Unlike some studies [22], the results reveal that "user acceptance" and "management commitment "are not critical to the success of using ERP. The results relativize, in this sense, the effect of user acceptance by stressing that they do not accept the system here voluntarily at the start of the project, but that they are often forced, thereafter, to cooperate and implement this IT with the objective of achieving results required by their general management. Furthermore, the non-determining effect of this direction can also be explained from a double perspective:

- First, that of its strong involvement in dealing with problems relating to the ERP project, as well as possible restrictions in terms of resources (budgets) [19] and delegation of powers empowerment decision-making. These problems can deprive those involved in the project of a comfortable margin of maneuver, and thereby negatively influence the success of the ERP project [23].

- Second, that of the fear of sanctions. This problem pushes the parties involved in the project, in particular the employees of the company, to do their best to appear as model elements (the respect of commitments and fixed objectives) in the eyes of their hierarchical superiors. The "apparent" absence of resistance to change or conflict between stakeholders would limit the intervention of senior management.

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6. Conclusion

The results of the analyzes intended to test the partial hypotheses of dependence, confirms the existence of a general structure at three conceptual levels, and verifies the general hypothesis in its genericity. It should be noted that this is generally accepted and, therefore, that the benefits of using ERP technology are influenced directly by the integration of applications and indirectly by the possibilities of the IT infrastructure and the factors keys to successful ERP implementation. Apart from the intervention of the general management and the acceptance of users who have no effect on the success of ERP implementation, the analysis made it possible to validate the benefits and KSFs released during the study exploratory [41].

These results generally validate the conceptual precepts of this empirical research. It is useful, in what follows, to wonder, first of all, about their scope and their contributions at the theoretical and methodological levels. Secondly, it is necessary to estimate their practical implications for companies which have adopted and / or are considering the acquisition of an ERP system. Finally, it is important to present the limits of this research work and to announce some avenues for future research.

On a theoretical level, while helping to validate certain theoretical and conceptual results of previous work, this work contributes to a better understanding of the success of ERP adoption in an emerging country, by proposing a model for evaluating ERP success, from a dual perspective of integration and alignment of the IT infrastructure, thus resembling the necessary governance of ERP on the strategic objectives of the SMEs studied. This modeling is one of the main contributions of research because it mobilizes specific research variables that can enrich the modeling of this type of problem.

On the methodological level, the contributions mainly lie in the development of a new measurement instrument to answer the questions of this research. The absence of precise measurements for certain variables of the conceptual model and the lack of empirical work in relation to the problematic of this research but also its field and its context of investigation, justify the recourse to this heavy task but rich in meaning.

On a practical level, the impact of this research work concerns the development of businesses. These are both beneficial for those who have already adopted an ERP system, but also for those who plan to acquire and implement such a tool. For the first category, an ERP project success evaluation framework is developed. This framework makes it possible to justify this investment by assessing its benefits. For the second category, it is a question of formulating a coherent framework of appropriation of the ERP based on the experience of the first, and of benefiting from it (on the basis of the results of this work). In fact, companies can hope for an improvement in their performance and benefit from an ERP implementation, knowing that the achievement of this objective is conditioned by a certain number of key success factors which determine the benefits of implementation. 'an ERP. These key success factors are identified in this work, so as to contribute to better planning and better management of this type of project. These contributions give the possibility, among other things, to propose means of action (direct and indirect) relating to the determining factors of ERP success.

The conclusions relating to the various results of this study must be put into perspective given the limitations of this research. The limits of this work relate to the difficulties specific to its realization in the field. They concern:

First, the refusal of cooperation of some companies to participate in this research project, to answer questions related to "good practices" cannot be disclosed.

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The measuring instrument also has some limitations. It has not been pilot tested. Pre-testing risked "vandalizing" or "cannibalizing" the primary data source, which is quite limited in volume.

Finally, this work opens the way to new empirical work and research avenues, the object of which would be, among other things, to complete this study, in the near future, by an analysis of adjacent hypotheses (HA1, HA2, HA3) in order to understand the nature of the links established between the exogenous and endogenous variables of the research model subsystems.

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