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Contributions to the Development and Implementation of an ERP Integrated Information System

ABSTRACT

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ABSTRACT

Key words : management, IT projects managers, economic strategy, functional requirements, planning, layout, design, analysis, implementation methodologies, UML (Unified Modelling Language), ERP (Enterprise Resource Planning), Microsoft Dynamics NAV, SFA (Sales Force Automation)

INTRODUCTION

Considering the current conditions of competitive market economy, the maintenance and consolidation of the economic position of a commercial society, regardless of its size, it is impossible without the computerization of its activity. The main problem companies today have to face is the speed at which they can react to the changes of the economic climate. A decreased reaction speed can lead to opportunity loss on the market and, on long term, even the loss of its object of activity. Hence, it is imperative that the company should develop or acquire an information system, by means of which to manage the daily inventory and to offer support to the manager for the foundation of strategic and tactical decisions in the shortest time possible, which would lead its activity and to secure its position on the market and its economic efficiency.

Given the decisive role of the information and communication technologies today and their impact on the management of the company, a very important segment within the paper mentions the ERP integrated informatics systems and their implementation methods.

Such an approach was considered appropriate, given that the current dynamics of economic life requests that the companies should use integrated information systems, which, beyond their classic function of integrating all the processes which take place in a company, must also perform all of this as fast as possible and as easy to understand for its users.

The central topic of this paper is the management advancement within a particular company, through the embracement of integrated information solutions. One can affirm that this step is the element around which the whole research is based.

Given the context, within this paper we propose an integrated information system prototype based on two case studies.

Before the exhaustive approach of the search domain in question, theoretic elements carefully selected and processed were presented, referring to the management and strategy of the companies in the advancement process of their activity.

A large part of this paper is dedicated to the presentation of ERP information system. For this purpose it should be mentioned that the scientific step for explaining these aspects includes the most important references within the current national or foreign speciality literature.

This step was followed in order to have a theoretical basis, very well selected for the laying out of an ERP integrated information system prototype, which would be the empiric research developed within this paper. Also, the space dedicated to the explaining of these concepts, taking into account as well the creation of an adequate frame for further research.

Furthermore, these information systems must ease the link between the company and third parties with whom it signs contracts (clients, suppliers, banks etc.), but also with mobile users within the company (subsidiaries, commercial agents).

The Objectives of This Paper

The main objective of this paper refers to the study and analysis of ERP (Enterprise Resource Planning) information systems, in order to propose such an information solution. Also, another very important object is the one that followed finding the information solution, which is the way in which its implementation is made for it to be successful and to ensure the final objective of every company, namely economic efficiency.

Specific objectives deriving from the main objective are the following:

- the defining and description of managerial activity, focusing on the operational management, but also the management of IT activity, the main responsible activity of well functioning of the information system;
- the importance of information technology for the modernisation of managerial activity of a company;
- the presence of some elements of economic strategy, strategy which dictate the functioning mode of the information system;
- the introduction of relative base concepts into the informational and information systems of a company, short history of the ERP concept;
- the review of the main development methodologies of information systems;

- the description of modelling object-oriented methods and instruments (especially the unified modelling language UML);
- the analysis, design and (partial) implementation of a integrated information solution for a certain company;
- the development of a new way within a ERP in order to keep the requirements which relate to its architecture (case study SC Sortilemn SA);
- the analysis, design and implementation of an optimisation application of SFA (Sales Force Automation) sales as well as the integration of such an application with the ERP system;
- the layout of an implementation project of an ERP, which would contain all the required elements necessary for the assurance of the implementation success.

Approached domains

The thematic area of this paper blends both economic and information knowledge. Through its assessment, the author reviewed a vast bibliography, such as speciality books and articles (papers), legal regulations and enforcement guideline. This paper starts by depicting the company as a whole, emphasising later on the need of information of the companies' administration for their transposition into a general object model, which should count both as space to store information and as interface between the specific modules of different functional and functional compartments of the company.

In order to achieve the objectives set, this doctoral thesis approaches several concepts, from general to particular concepts:

1. *the organisation* (the economic company in general) approached from several point of view: economic strategy, planning, economic importance;
2. *the management*: administration ways of the companies and the information needs for an operative administration; the objective that a information system must have for the foundation of the decisions taken by different administration levels;
3. *the information system* of the company (focusing on the ERP systems): definitions, components, traditional approaches, and their shortcomings;
4. *modern methodologies* for carrying out information systems: object modelling using UML, the iterative and incremental development of information systems;
5. *modern solutions* for the implementation of integrated information systems of companies: ERP (*Enterprise Resource Planning*) systems, CRM (*Customer*

Relationship Management), SCM (*Supply Chain Management*) and SFA (*Sales Force Automation*);

6. *transition* from traditional to modern la systems and methodologies: the analysis and object modelling of an information subsystem;
7. *the analysis, design and implementation* of an information solution for the improvement of an integrated system.

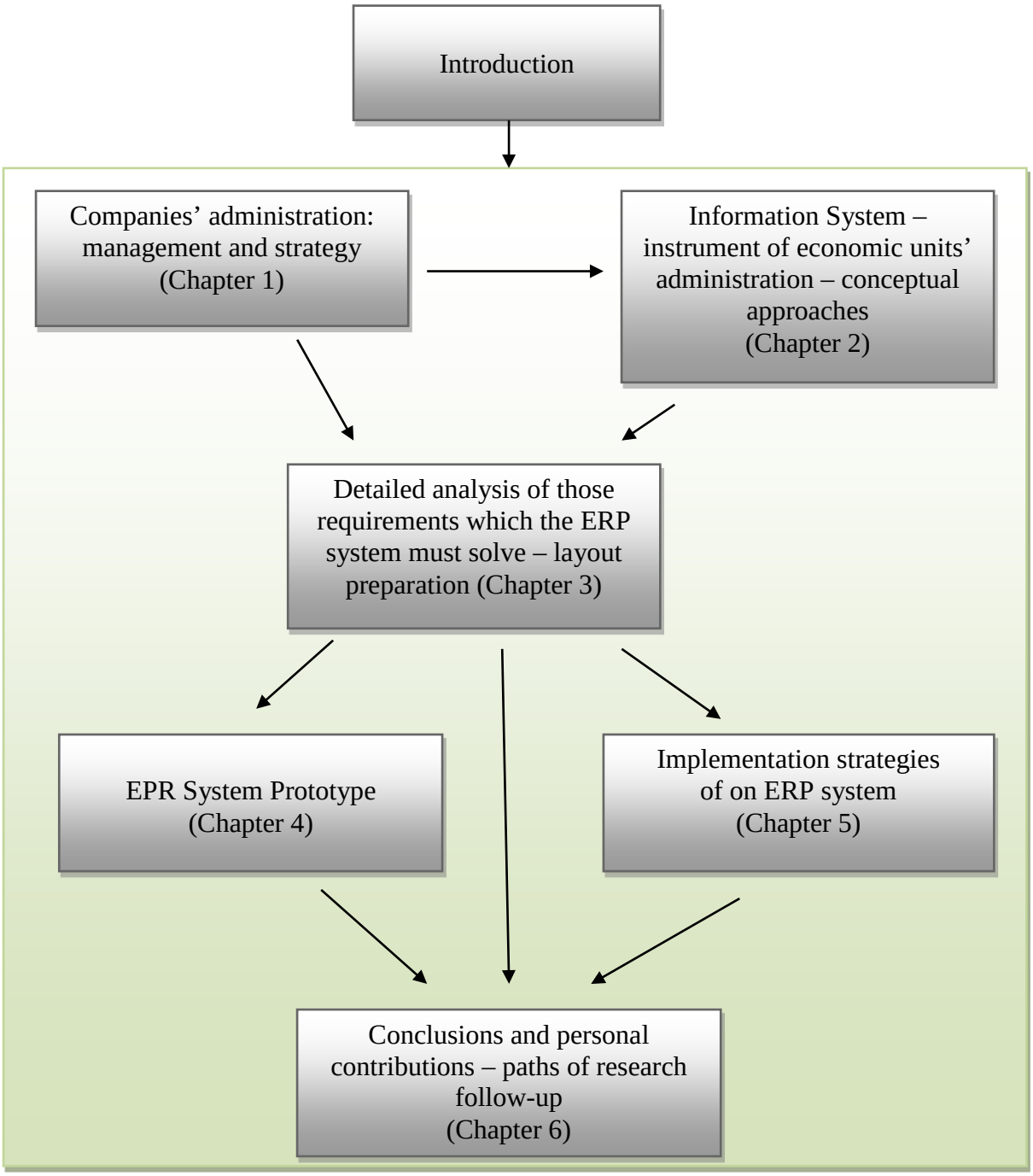

Figure 1 : *The Structure of the thesis and the links between chapters*

CHAPTER 1. COMPANIES' ADMINISTRATION. MANAGEMENT AND STRATEGIES

This chapter is dedicated to the presentation of companies' management but also the presentation of their strategy, because the choice and functioning method of the information system represent a direct consequence of the need of information of the administration and the relations within the organisation. The management concept is presented at length with different of its definitions and meanings; the entrepreneur is defined along with his profile, features, purpose and responsibilities as well as the organisational and managerial particularities of companies.

Furthermore it is presented the purpose of IT project managers, because they are directly responsible of the design and implementation of information system. The last section talks about the scope of information technology for the modernization of managerial activity, presenting the objectives of the information management system, the informational and information system of a company, but also the models regarding the application of information and communications technology in the managerial processes.

Information and communication technology[1] ICT contains all the activities related to the development, installation, implementation and maintenance of the information systems and applications, supporting all human activities from all fields.

For a company, the application of ICT represents another vision of the way in which the information is laid out, conveyed, memorised and used. Along the time numerous theoretic and applicable models have been elaborated, regarding the application la way of ICT in the managerial processes of the company.

These models focus at least on the following aspects:

- the conceptual clarifying and the prominence of the new approach of information;
- the prominence of strategic effects of the implementation of information technology within the organisation;
- the adjustment of the information technology elements implied in the support of decision assessment processes.

[1] http://www.answers.com/topic/information-technology

- the assessment of the purpose of information technology in the increase of the performances of the organisation and the impact of their implementation over at least two IMM activity sectors: *commerce* and *services*;
- the assessment of the information technology on the strategic efficiency and the forming of some particularities which concern the interdependencies between information technology and the company strategy.

We believe that the information technology is the most important way to materialize a long term or temporary competitive advantage of a company, because, aside offering the clarity and safety of stored data, it also offers a high reaction speed due to the rapidity by which these data can be consulted. Hereinafter the main advantages that the usage of an informatics system should bring shall be presented.

The facilities an ERP integrated system must bring

Safety

This facility focuses on the technical characteristics of the system which must insure the full protection of data. The existence of several access levels for users guaranties the safety of data operation, but every employee of the company must have certain reading, writing or deletion rights, to prevent the damaging and the uncontrolled access to data from different departments.

Information assortment

Starting from the idea that information must be used efficiently, its assortment allows the access to useful information in the shortest amount of time possible and guaranties immediate reaction, in real time, thus the possibility of finding the required information instantly must exist, without losing precious time while searching.

Immediate reaction

This facility must allow managers from all hierarchic levels to react in real time to the information signalled by the system and to clients' requests by taking the right decision.

Flexibility and traceability

An ERP integrated system must show adaptability to the changing requirements of the company. The legal changes which follow must be easily embedded in the system, as well as the subsequent expansion of functionalities. Even more so, the follow-up of the productions process flows must be insured until the finite products are finalised and sold to the clients.

The scheduling of time and human resources

Thanks to the fact that an ERP system allows making lists and reports, the time and human resources can be redirected towards productive activities.

Reduction of human error

The important reduction of negligence, incompetence or carelessness based errors, can be made by the inserting only once the working data, which is a well known principle within the information systems. The provided information will thus have a high quality level by the removal of inconsistencies.

Costs reduction

The majority of studies relating to the facilities of the integrated system implementation consider that it must insure the close monitoring of large processed which are consuming large amounts of resources. The purchase and production flows must be made following "Just In Time" model – decrease to a minimum of stocks and of the capital blocked within stocks. This concept was inserted and described by Henry Ford: "I have discovered that it is worth it to buy materials only for the immediate needs of the company" [2]

The increase of productivity and efficiency

A better distribution of tasks and economy of resources must be materialized in productivity gains. By interpreting the signs, the managers will be capable to identify adverse processed and to take action in order to achieve effectiveness.

The optimisation and integration of processes within the company

One other important facility refers to the centralisation of data from all departments of the company into one single database which would lead to operative and easy access of the data.

The evolution of every company must be based on a *strategy* adopted by those interested in its development. The *economic strategy* concept is essential for the development of every economic organisation; its description can be found amongst the following definitions:

- *an assembly of decision, due to uncertainty;*
- *a rule which assigns a procedure for taking-up decisions;*
- *a specification* which shows the relation between the information sources of the unit and the results of decisional flows;
- *an idea* on the basis of which the development process of the economic unit is based;

[2]Henry Ford *My Life and Work* (1922)

- *a group of decisions* for the achieving the link between the objectives of the economic unit and the finality of its activity;
- *a series of decisions* having as purpose the optimal finality of the economic unit activity during a certain period of time (according to the marketing dictionary[3]);
- *an idea for establishing the* long term *objectives of the economic unit*, with regard the establishment of actions with are to be carried out, as well as the resources distribution mode for achieving such objectives;
- *a way to determine the long term fundamental purposes and objectives of a company* and a way to apply actions measure for achieving these purposes.

Famous authors within the management field have devoted substantial space to defining and applying the economic strategy. Here are some authorised points of view:

- Henry Fayol's opinion[4], later on developed by *Harvard Business School*. This concept considers the strategy to be *„a long term option, different from the tactical decision";*
- Ansoff[5] approaches the strategy of economic unit depending on the ambient environment of every company;
- E.Hill and T.O'Sullivan define the strategy as being "*an overview of the way how the organisation purposes will be accomplished"*[6].
- P.Kotler and P.Dubois define the economic strategy as being "*a process which is based on the analysis of existing opportunities of the market and the choice of a certain position, action plans and of a control system, which allows the company to achieve its mission and objectives"* [7].

Any information system is used within an organisation for the improvement of information flow and the automation of specific processes. Evidently, an absolute necessary condition for the achievement of a useful information system is knowing the organisation but also knowing its future development strategy.

The requirements of the modern management imply taking well founded decisions, based on complete, precise and pertinent data. We consider that management can be very much improved by the implementation of an integrated information system, which would centralise the relation with the partners.

We have offered a special attention to the management of IT projects which, in our

[3] www.managusamv.ro/cursuri%20zi/ cursuri/freone/marketing/dicţionar/cuprins.htm
[4] H., Fayol, *General and Industrial Management*, Pitman, London, 1949

[5] I., Ansoff, *Strategia corporatistă*, Penguin books, 1968
[6] www.managusamv.ro/cursuri%20zi/ cursuri/freone/marketing/dicţionar/cuprins.htm
[7] P.Kotler, P. Dubois *Marketing and management*, Paris, 1992

view, have the most direct implication in the success of a certain implementation, but also in the daily functioning of an information system. The managers of IT projects have an essential role in the elaborating a development strategy of information systems and the infrastructure of the company. These strategies are based on diverse knowledge, both related to the information side as well as to the economic side.

The elements of economic and planning strategy are essential for the managerial activity within the IT field, because the management of this division must know the general strategy of the company in order to elaborate an information strategy of the company. Considering that the implementation of a new information system is made with a large amount of time and money, it is preferable that this implementation be made in compliance with the strategy of the company in order to insure the necessities of the company as good as possible and for a long period of time.

CHAPTER 2. THE INFORMATION SYSTEM - INSTRUMENT FOR THE ADMINISTRATION OF ECONOMIC UNITS – CONCEPTUAL APPROACHES

The main objective of Chapter 2 is the presentation of ERP concept as well as a short history of the changes of this concept along the years. It also presents the components of ERP software packages necessary for the insurance of “business process”.

The definitions sections include: taxonomy of economic information systems, fields covered by these and the achievement generic requirements, specific inputs and outputs. The methodological sections depict the main steps of achievement process, starting with feasibility studies, assessment of resources and planning and then continuing with the analysis, design, implementation, testing and exploitation. The next section is dedicated to the object modelling and presents the main types of UML diagrams.

The purpose of this chapter is to insure the insertion in the problematic of the information system development which can support the functioning of the economic organisation. It can be logically structured into three parts: defining, methodological and modelling.

The definitive part, made up of the first two sections of the chapter, introduces the required definitions, presents the classification of economic information systems and numerates organisational fields covered by traditional systems.

The *methodological* part describes generically the life cycle of an information system and the main methodology ranks known. The life cycle begins with the initiation of the achievement project through the realisation of feasibility studies and it ends with the start-up and the system maintenance. Regardless of the methodology used, these stages have a very well defined place. The methodologies section is distributed into four parts: functional decomposing (functions based), process-oriented (based on data and processes flow), data-oriented (based on processed data) and object-oriented.

The most consistent section of the chapter is dedicated to object modelling. It contains the defining of base concepts of object-oriented programming, the presentation of unified modelling language (UML) and the short depiction of the main UML diagrams. This modelling language uses a system of easily understandable notes, by means of which a full set of diagrams and graphical symbols can be made. The UML language is OMG standard (Object Management Group[8]), which has taken over the standardization process from its very beginning, in 1997. According to its own website page[9], the current version of the modelling language is 2.0.

The authors of UML language, Ivar Jacobson, Grady Booch and James Rumbaugh, have also created a frame-methodology for the object modelling of information systems, known as *the Unified Software Development Process*, in short *the unified process*. Their reference book was published in 1999.

Starting with middles '80s, the object-oriented technology got constantly involved in the development of information systems. Nowadays, the vast majority of newly made soft systems make usage of all the advantages of object-oriented technic advantages. In this context, the appearance and imposition of UML as a standard modelling instrument, but also the unified process (with its variations) as standard development methodology, have been accompanied by the realisation of some soft instruments designed for the help the information system development. The usage of these instruments eases the modelling work and gives more time to the development team by automating a series of routine tasks.

During the last part of this chapter a short history of ERP concept is presented, which is a multi-modular complex software application which integrates the economic processed of the company for optimising and increasing their efficiency. We consider that an ERP software must cover several interest fields of a business: production planning, acquisition

[8]Object Management Group, www.omg.org
[9] OMG UML Resource Page, www.uml.org

management, stock management, interactions with the suppliers, the management of relations with clients, orders follow-up, financial management, human resources management.

If until the '80s these systems were predominantly developed “in-house”, through personal means, today the solution for making a management integrated information system is accommodation, customization and implementation of a ERP application software package coming from a famous provider on the market.

We also consider that current requirements coming from the management of the companies which acquire a ERP system are more and more diverse, reaching various segments within their own activity, which are not included initially in the ERP system concept, which imposes their customisation at the company level which will acquire and implement such a system.

CHAPTER 3. FUNCTIONAL REQUIREMENTS FOR AN ERP – LAYOUT PREPARATION

As a starter, chapter 3 approaches the requirements an ERP system must meet, both from an economic and legal point of view, in order to insure the functioning of a company. This chapter is structured almost as a “tasks notebook” which must be fulfilled by an ERP. These requirements are divided into:

- baseboard and functional requirements – these refer especially to the functioning part, from an information point of view of the ERP system.
- structural requirements – developed in detail for all the processes within a company, starting with raw material purchase, the production process, stock management, selling them and other related processes, which are supposed to be done daily. This part also presents the functionalities which ERP system must cover as well as a reports’ list which it must generate.

A very important objective of this chapter is the achievement of the link with the following chapter by means of a short presentation of the main stages of information system development process: analysis, design, and implementation.

What do, after all, the exact establishment and measuring of functional requirements of a system mean? While trying to answer this question, we consider that, due to the fact that the implementation of an ERP information solution is a resources consuming activity, especially time consuming, before the layout and choice of such as system, it is absolutely

necessary that a detailed analysis of the fields which this solution must serve is made. It is most of all important the centralisation of requirements coming from all the departments which will depend in the future from this information system. These requirements most be as detailed as possible and must insure, besides the efficiency of economic activity, the fulfilment of all legal requirements. The implementation of an ERP integrates system is a strategic decision of the top management of an organisation and it must be well founded and accompanied by a coherent activities plan, framed with deadlines and responsibilities, which would allow an easy tracking and evaluation.

On the other hand the system analysis is the realisation of some studies on actual informational necessities, manifested at the level of all organisational processes. This implies detailed studies on: necessary data for the processes of the organisation and the final users, the activities, resources and existing products within the current information system frame, as well as the evaluation of organisational systems. Considering all of these aspects, in this chapter we present the requirements which must be met by an ERP information system in order to effectively respond to the needs of an organisation in general, focusing on specific requirements found in the analysis of the two studies, presented in this thesis.

We should also bring out the fact that due to the lack of a prior complex documentation exists the risk that the implemented system does not meet the initial desires of the company administration. On average, around 70% of the projects linked to the ERP implementation do not manage to reach their objectives. We can affirm that this is due to the fact that initial requirements have not been properly analysed. The gathered experience during previous implementations of such systems, have led us to the idea that initial requirements which focus on the ERP system must be very well from the very beginning and carefully monitored during the progress of the project.

Towards the end of this approach, we make a stop on a very important acknowledgement: identifying the fact that the implementation was a success or a failure can be made only by the comparison between the initial requirements with the effects that the system can cause during its usage.

CHAPTER 4. ERP SYSTEM PROTOTYPE

This chapter makes a short depiction of the solution proposed and defines the architecture of the integrated system, emphasising the majority of the modules (functional areas) it contains. It starts with the presentation of a functional area, which is the same for all the system modules, insuring a personal unit as well as the increase of easy maintenance, development and system usage. In this same section are presented the objectives of ERP prototype, which lay at the basis of the information system functioning.

The second part of the chapter presents aspects related to the conception, design and implementation of a SFA (Sales Force Automation) application at SC Farmec SA. Due to the specific of this company which, besides cosmetics production, it also take care of products distribution (having a number of 11 commercial subsidiaries inside the country and over 100 commercial and delivery agents), we have proposed the development of a new application. The major purposes of this application are: total integration of the existing ERP system, offering correct and fast data by means of mobile devices (PDAs, laptops), fast collecting of market data by means of the same devices.

The last part of the chapter is the conception and the layout of a module of bank relation management within the ERP Navision system for SC Sortilemn SA. For this purpose we have presented the objectives which have been laid out: tables, forms, reports for the achievement of this module. These objectives and the module respect the architecture presented at the beginning of the chapter, integrating entirely within the information system architecture.

Due to the diversity of the activity but also due to the increase of work, the necessity for laying out an ERP system prototype, which is at the basis of selecting a solution and then its implementation, appeared pursuant to the obsolescence of existing applications at that time for SC Sortilemn SA. While inventorying the requirements which laid at the basis of the new system we have considered those requirements specific to production activities at Sortilemn, which has obviously generated the orientation towards an ERP solution. Also, the improvement solutions of the existent system and the application of ERP paradigms have led to the same conclusion, which is: ERP Integrated Information System which must insure: a fast reaction, flexibility, traceability, optimisation and the integration of processes within the company.

The same thing is valid for Farmec Company. The two studied companies used as case studies for this paper are very similar both in terms of size, organisation and functioning; they

both having all the departments, stating with acquisition, production and finally sales. From this particular reason, the implementation of the same ERP is a good solution for both companies. Nonetheless, due to the differences between the industries in which they activate: cosmetic industry and wood industry, a different customisation of the ERP was necessary as well as the development of different modules for the two companies. A more detailed presentation of advantages and disadvantages obtained through the customisation of an ERP solution was made in "*ERP Customization"*, study made during the doctorship.

Within Sortilemn the focus was on the acquisition activities and their payment modalities, the products selling process is more reduced because all of these products are sold to distribution companies. This paper presents a treasury module to facilitate the follow-up of the money and the commerce effects (often used). This module, developed within ERP with means provided by it, strictly follows the architecture and the rules imposed by the system.

When it comes to Farmec, the distribution activity is very important, which is why in this paper we have, first of all, presented the of a SFA system for all mobile representatives of the company, as well as the way in this was developed as integrant part of the information system.

The main idea of this chapter refers to the fact that the same ERP information system may the requirements of two companies, but in order to achieve this it is necessary to customise each and every one, according to the specific features of each company.

CHAPTER 5. ERP SYSTEM IMPLEMENTATION STRATEGIES

In the beginning, Chapter 5 presents the stages of ERP system implementation process, according to which several more implementation methodologies are detailed, focusing on the Navision implementation technology. In Annex 2 it is developed an implementation project of an information system which includes: implementation objectives, success criteria, implementation organisation, implementation ricks, instruction plan, etc. For the information system implementation to be a success, it is imperious that such a plan exists and strictly followed.

The selection and implementation activities of an ERP system are made within an area of reconstitution of organisation values[10]. Theoreticians have described all of these activities as the process of "creating a myth", through which is built an integrated system and the organisation values are elaborated and reconsidered.

The experience resulting from different organisation fully confirms that every information system have certain limitations and that regardless of the organisation, old data must be passed through a filter in order to be validated. When the data transfer into a new system is planned, the project can be compared with an implementation project of a data deposit.

The most important steps referring to data transfer from existing system into the ERP systems would be the following:

- **the analysis of data which support the transfer process**: which is the content of inherited stored data, what anomalies have been discovered, can anything be understood from the stored data;
- **the development of a plan for erroneous data**, what will happen with these, can anything still be fixed;
- **the creation of an overview of the new application** – data must be transferred into the new system following its requirements.

Due to previous lack of complete documentation, managers and generally persons within the companies, which will interact directly with ERP, have the impression that the ERP is a software which „does all" which has to do with the financial-accounting sector, reducing to a minimum the effective human work, a sort of „universal panacea" which can transform an average company into a big success, maybe with lost costs and effort. Unfortunately, software they would like it has not been invented yet, and the ERP, a very efficient weapon if treated wisely, can show the other side of the coin from the first stages of its usage, if errors are made.

The software applications industry has such a high failure rate that it has become a sort of negative influence when it comes to project management[11]. On average, around 70% of projects linking to the ERP implementation cannot fulfil their objectives. In other words, there are either frequently budget flow or implementation time exceeding's, or the dissatisfaction following the implementation of the solution has high quotas. At the same time, we can detect

[10] Fotache, D., Hurbean, L., *Soluţii informatice integrate pentru gestiunea afacerilor – ERP*, Editura Economică, Bucureşti, 2004;
[11] http://www.marketwatch.ro/articles.php?ai=1830

that problems emerge also pursuant to the selection mode of suppliers of ERP solutions, or later on the surface and unreal analysis of the new system requirements. This failure rate it is not that shocking, if we consider the fact that ERP systems are not just software, but they also require a very important coordination strategy between IT and business managements. Companies usually implement ERP systems in order to replace obsolete technology and treat the new processes as "baggage", and not additional value.

Lately, considering the data from previous implementations, we can assess that the number of finalized and with small issues implementation processes has increased. This means enclosure within the initially established deadline and budget.

Analysts, who have studied the implementation processed of an ERP for more companies, have also considered the fact that most of the times technical problems are fairly easy to solve, by comparison to those of human nature.

Ultimately, in order to reduce as much as possible the negative aspects which may emerge while implementing an ERP, we should consider a risk management in this field. Thus, problem which may occur during the implementation could be anticipated and the prevention measurements or the reduction of their effect should be established. How can these aspects be solved is the responsibility of the project manager.

Based on the gathered experience regarding the ERP system implementation for the two companies presented as case studies within the present paper, we consider that:

1. The implementation process of an ERP integrated information system needs the support of the whole organisation for it to be successful, but it mostly needs full implication of superior management and the IT department.

2. Never can an ERP solution be laid out only to be installed in order to function, regardless of how general it is. It will always require a larger or a smaller number of customisations, new modules or integrated applications with this ERP system. What is necessary is a constant teamwork between the two sides within the implementation in order to keep under control these customisations: minimizing their number and development, considering the main architecture of the system. (Chapter 4)

3. The IT Department of company-client, which is responsible for the equity of data transfers, installations and start-up settings, must be embrace from the analysis phase, because, this department must be a cohesion point between the users' demands and the system possibilities. Our opinion is that at least one employee of this department must know very well the system which is implemented and if possible to have been taking part to other implementations.

4. During the implementation, alongside the training of key users, there should be a lot of time invested for the training of final users, because the transition to the new system will be much easier. It is possible that during the implementation the two systems will work paralleled for a while, so that the load of people will be doubled.

Surely, the success of an implementation can be considered as being successful for the supplier but more over for the beneficiary, the first benefiting from the gathered knowledge, maybe in a new economic field, aspect which will determine a prospect implementation within a company with similar profile to me easier, and the beneficiary will be able to use all the facilities offered by an ERP information system.

CHAPTER 6. CONCLUSIONS AND PERSONAL CONTRIBUTIONS – PATHS OF RESEARCH FOLLOW-UP

We have always considered and wished that to bring new elements not only at the practical level but also at the level of fundamental research level. In this context we will point, to start with, the way in which the initially established objectives were made in the first chapter, thus:

- *defining and depiction of managerial activity, focusing on the operational management, but also the IT activity management, the main functioning responsible activity of the information system*;
- *the importance of using the information technology for the modernisation of managerial activity of a company;*
- *presentation of economic strategy elements, strategy which dictate the functioning ways of the information system;*

We would like to mention from the very start that these objectives have been developed in the first chapter of this paper because the requirements of modern management imply taking well founded decisions, based on full, precise and pertinent information, which cannot be accomplished without the usage of an integrated information system.

While continuing the research, in chapter 2 of this paper we have approached the first concepts referring to ERP systems:

- *introducing basic notions relative to the informational and information system of a company, short history of the ERP concept*;
- *reviewing the main development methodologies of economic information systems* is developed more in chapter 2.4;
- *depiction of the modelling object-oriented methodologies and instruments (especially the unified modelling language UML)*

The most consistent section of chapter 2 is dedicated to object modelling. It contains de defining of basic concepts of object-oriented programming, presentation of the unified modelling language (UML) as well as the short depiction of the main UML diagram types.

Referring to chapter 4, we can appreciate that this deals with the empiric research but at the same time the basic contribution of the author. In this context we have approached the following aspects:

- *analysis, design and (partial) implementation of an integrated information solution for the company;*
- *development of a new module within a ERP which should keep the requirements related to its architecture (case study SC Sortilemn SA);*
- *analysis, design and implementation of a optimisation application of SFA (Sales Force Automation) as well as the integration of this application with the ERP system;*
- *the elaboration of the implementation project of an ERP which should include all the required elements for insuring the success of the implementation.* The theoretic part, which presents several implementation methodologies and the stages of the implementation process are developed within Chapter 5. Annex 1 of this paper is an implementation project for an ERP information system.

Contributions referring to the fundamental research

1. Contributions regarding the analysis and object modelling of SFA application for S.C. Farmec S.A. For the achievement of the presented application, the author has used the gathered experience for the realisation and maintenance of management applications for the mentioned company, which allowed a better knowledge of organisational processes, requirements regarding data and the layouts and information needs of the managers.

2. Contributions regarding the implementation of a module within the information system which to facilitate the activities related to the follow-up of commerce effects and the payments, in the company's relation with the banks, suppliers and clients.

3. Contributions concerning the definitions and structuring of clear requirements which an ERP information system must insure, alongside with the efficiency of economic activity and the fulfilment of all legal requirements. The centralisation of these requirements as well as their constant follow-up during the design and the implementation of the information system grows the chances that the final result be a success.

4. Contributions concerning the information system implementation. After carefully choosing the application and the producer, the organisation must make an implementation project absolutely necessary for the implementation of an ERP system. The main components of an ERP platform are: ERP software, commercial processes this software supports, systems' users, hardware and operating systems on which ERP applications are running. All of these components must be monitored, because the failure of one or more components may lead to the failure of the entire project.

Perspectives regarding the research follow-up

During the whole research we have identified several limits relative to the dynamics of methodologies and the implementations instruments of ERP systems, but also referring to the permanent enrichment of speciality literature with new paper. In this context, we consider that part of these papers can become, next to the others, interesting subjects for future research.

Follow-up paths of the research depicted in this paper focusing at least on the following aspects:

- design of other modules within the ERP system;
- the study of integrates system impact on the organisational and leading structure of a company;
- also a problematic which is of high interest, refers to the integration of the ERP system with the management system of documents and flow within the company, the making of a mutual interface for the two systems so that the work of the final user be as easy and as interactive as possible.

The concerns of the author of this present thesis refer to the implementation of an integrated information system do not stop with the finalisation of the present paper.

Nowadays, when “software as a service” (SAAS) is starting to cover an important part of the IT market and many companies prefer to migrate from the services offered in “cloud”, a question arises: “Is ERP cloud a viable solution?” When companies have invested large funds into the implementation of an ERP solution and considering how critical their functioning is, their migration seems to be a solution which very few companies will take into consideration.

In our opinion, there are more solutions to this question, the companies must balance the advantages and disadvantages which lead them to such a solution. The main advantages are related to the flexibility of such a solution, where “you pay what you use”, both referring to the users’ number needed and the calculus power necessary, IT costs related to the usage of such solutions can be exactly located.

Another advantage refers to the easiness with which the implementations of such a solution can be made (especially that of the new technologies) from the point of view of IT work volume; these applications are web-based. Amongst the disadvantages are the elements related to the safety of information, the way in which the customisation of such solutions will be made, the attenuations of costs with infrastructure and already existing applications. In our opinion small or new organisations will orient towards “public cloud” solutions, while companies with developed solutions and infrastructure will migrate towards “private cloud” solutions.

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