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MANUFACTURING ACCOUNTING RESEARCH**

**ANALYSIS OF THE EFFECTS OF ERP SYSTEMS IN ACCOUNTING
ORGANIZATION**

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Abstract

ERP – Enterprise Resources Planning is a concept broadly diffused to people and organizations since when it was coined by Gartner Group in early 1990 as the next-generation of MRP II (Keller). Very soon it became the symbol of a revolutionary change in the mode of operating company processes. Later, it was considered the solution for those organizations pressured by the year 2000 bug. Thousands of companies in the world have implemented ERP and continue to live with it. It is widely recognized that a reasonable portion of companies was able to make the plenitude of benefits, while others just obtained the basic level. In any case, the ERP has changed forever the way these companies were operating. Until now these changes are not quite well studied and understood, including the accounting organization. Empirical researches are necessary as to acquire deeper understanding of the implications of ERP systems for accounting and for the accountant's function and its integration with other areas of the company. This paper describes an empirical qualitative research performed with accountants of companies using ERP in Brazil. The theoretical concepts of organizational changes caused by implementation of AIS – Accounting Information Systems were used as in Markus (1983). Multiple case studies (YIN) with accountants revealed that they were key people in the implementation program. As in Ezzamel(1999), accountant's power changes was analyzed based on Foucault theories of power structure.

INTRODUCTION

The ERP - Enterprise Resources Planning systems have been diffused through people and organizations since they were coined by Gartner Group in the nineties as "the next generation or the successors of the MRP II systems" (Keller).

Because of their characteristics, they soon turned out the symbol of revolutionary changes in the operational processes of the companies that sought for larger competitive power.

In the end of the last century they were also implemented by a lot of companies as being the ideal solution for the year 2000 problem.

Thousands of companies in the world use ERP and they continue living with it. It is also recognized the fact that a reasonable amount of companies could accomplish great part of the benefits, while others only reached a basic level of advantages.

Even so, ERP totally changed the operation way in great part of those companies.

Considering the amplitude of the changes introduced by ERPs, the effects of those changes have not been completely studied and understood so far. Including the ones that happened in the performance of accounting area and accountants.

This work aims to study the effects of the ERP implementation in the Accounting function.

STUDIES ON THE EFFECTS OF ERPS IN THE ACCOUNTING FUNCTION

ERPs are information systems that provide sincronization in real time of the companies processes, through the use of advanced information technology.

Some studies have been made relating ERP and accounting by Ezzamel (2000) and Scapens(1999).

The importance of this study is justified by:

- ERP modifies the operative way of the company where it is implemented.
- ERP is an information system conceived to operate in a synchronized and integrated way because it considers the company as a unique system and in an integrated synchronized and colaborative way.
- Functions linked before in a less intense and direct way with accounting, now mandatorily need to maintain intense contact and in a durable way.
- Accounting is a function rather controlling and consolidating of the Information in any company (Riccio, 1992).
- The characteristics above allow to suppose that changes can happen in the development, in the organization, in the power and in the behavior of the Accounting, caused by ERP implementation.

Those implementations would be provoking changes like: in the organizational structure; in the services that accounting provides to the company; in the relationship that maintains with other areas; and in the perception by the accountants regarding the increase or decrease of its power over the individuals in the organization; or the power of accounting over other functions of the organization.

In Ezzamel, (1998; 46) there is a research done in England, under the sponsorship of the CIMA - Chartered Institute of Management Accountants that indicates that "it was interesting in our research that many of the non-accountants we interviewed regarded the ERPS as an accounting system. Possibly, this was because in some cases it was the accounting modules which were implemented first, and in other cases the project teams were led by accountants". The knowledge of those changes can contribute to the better understanding of the role, usefulness and performance of the accounting as an administrative tool for the organizations that work with integrated environment provided by ERP systems.

OBJECT OF THE RESEARCH

The research used the perception of the accountant to detect and to analyze the organizational and operational changes occurred in the accounting function in a selected number of companies that implemented ERP systems.

The reasons for using the accountant's perception were:

1 - the accountant is an executive that is subject to a triple control system on his work, as for instance: In that case, when assuming that position, he assumes legal responsibility for the company.

2 - as consequence, the accountant is the only one to answer for quality, truthfulness, ethics, legality, property and consistence of the information emitted by the accounting function.

3 - To perform 1 and 2, the accountant needs instruments to control the quality of his main product, the information.

The instrument of the research allowed the understanding of the vision of the accounting manager regarding those changes.

THE ACCOUNTING INFORMATION SYSTEM

The study considered companies that had implemented ER and more specifically, those who use the module denominated " Accounting ", the sub-system that includes the whole Accounting-financial function.

SAP R/3

In spite of ERPs be commercialized by several companies such as SAP, BAAN, PeopleSoft, JDEdwards, Oracle and others, the selected option for the research was to study only companies that use the same ERP system in order to allow reasonable degrees of comparability among the cases.

Considering that SAP has in the world "more than 10.000 customers with 19.000 facilities and more than 1 million users" (Kale,2000;8) in 90 countries and with average of 30% of the ERP world market in 1999, it was decided to research companies to use of the product denominated SAP R/3.

Several modules compose R/3. The module that refers to the financial functions is the FI – Financials which includes the major module FI/CO (Accounting and Control).

Another characteristic of the selected companies is that they are considered successful cases or, in other words, where the module FI/CO of SAP R/3 was implemented with success, so much in the opinion of the company as in own SAP Brasil's. Although not announced by SAP it is considered that the total R/3 customers in Brazil amounts more than 250.

INFORMATION TECHNOLOGY AND INTEGRATED BUSINESS SYSTEMS

ERPs usage started to grow since the beginning of the seventies and had its top of sales during the second half to the end of the nineties, becoming the

largest success of the software industry. As a product, ERPs are now in phase of deep transformation caused by the intense use of the internet in electronic commerce and new types of inter-business relationships emerged recently. New types of softwares applications have been adapted to it extending their capabilities, such as CRM - Customer Relationship Management (Relationship with Customers), B2B, B2C and variations.

It is agreed by many that the ERP's sales "boom" during the nineties was caused partially by the phenomenon of the globalization. Multinational companies and those involved with a modernization commitment decided to use ERP to update their processes and their information infrastructure in an increasingly standardized and competitive world. Furthermore ERP contains in its routines and tables, thousands of patterns (benchmarks) of business processes that lure any company intending to be competitive.

Another motivator that catalyzed the attention of the world in the end of the last decade was the "Millennium bug". In that case, the ERP implementation was the ideal solution for the problem. The substitution of the old systems, at once, for a group of new and totally integrated systems, offered a considered alternative more safe and faster.

THE ORIGIN OF THE ENTERPRISE SYSTEMS

ERPs can also be seen as a natural evolution of the solutions offered by IT industry for a company's control and administration.

Since the sixties, several softwares were introduced at the market with the label of integrated systems. Initially they included some of the manufacturing functions like Bill of Material (BOM), Inventory Control and Production Control.

As an example, we can look at some IBM products as to exemplify that evolution, in the sequence that it were introduced (dates are approximated):

-BOMP - Bill Material of Processor - 1960

-PICS - The Production Information and Control System - 1970

-COPICS - COMMUNICATIONS ORIENTED PRODUCTION INFORMATION CONTROL SYSTEMS. - 1975

-MRP I - Material Resources Planning - 1980

-MRP II - Material Resources Planning - 1985

Although growing in the scope, those softwares never included functions like Accounting and Human Resources.

Accounting softwares used by accounting and financial functions were sold as independent packages from software manufactures. Since the integration between manufacturing and accounting was made via batch mode, the implementation of an integrated accounting in real time with the remaining of the company was impossible. As result, a lot of companies uses (and there are still many in that situation), a mixed systems structure.

THE INDEPENDENT ACCOUNTING INFORMATION SYSTEMS (NOT ORIGINALLY INTEGRATED)

In this type of mixed structure, also called "best-of-breed" the decisions of the company for IT are characterized more by the search of sectorial efficiency than for the Company's effectiveness. In other words, to have the best specific system for each function and later to integrate them through internal adaptations. According to Lucas (1999; 109) this situation originates from a non understanding by top management that IT is part of the business strategy.

In the alternative " best-of-breed ", the company develops and makes the maintenance of the software that links the Accounting-financial module with the applications produced by other software companies and to the applications developed internally.

ERP - ENTERPRISE RESOURCES PLANNING

With an integrative proposal of being the "unique" system for the whole company, the ERPs were seen as something different and innovative, waking up the interest of thousands of companies. According to Keller (1999; 45) that was due to three great tendencies of the beginning of the nineties:

- " Reengineering
- To buy vs. To do (to buy the ready system instead of developing it internally) and
- Supposed disappearance of the mainframe ".

Because of its great popularity, the ERP implementation became part of the strategic decisions taken by big companies all over the world. (Currie & Galliers 1999, Lucas 1999, Wilkinson et alii, 2000.)

EFFECTS OF THE ERP USAGE

Some of the major effects on companies using ERP are:

1. Transforms the company in a information-driven company, in other words, guided by information.
2. The company is focused as a single system.
3. It contemplates and reproduces the integrated nature of a company, favoring the usage of MBC – Management by Collaboration.
4. Reproduces a processes-oriented company.
5. Makes possible the idea of a real time company.
6. Positions the IT Strategy as part of the global Strategy of the company.
7. Represents a progress in the technologies for improvement of the business performance.
8. Represents a new model for implementation of computerized systems.
9. Creates an atmosphere totally oriented to the users of the system .

INFLUENCES OF ERPS IN THE ACCOUNTANT'S AND THE ACCOUNTING FUNCTION PERFORMANCE

The implementation of an ERP means a unique challenge for any organization. The success depends on the successful performance of a series of works such as: the revision and alteration of the processes of the company - reengineering; employees' intensive and extensive training; complete customization with great volume of details; operation in client-server environment; adaptation of the company to the characteristics of the software, among others.

Additionally to the exposed factors, the magnitude of the project usually requests the involvement and commitment from all the organization and the attention for the execution of all of the recommendations presented in the implementation of Advanced IT projects, as explained in Walton(1993).

ERPs affect the company as a whole because they alter the processes and the way as each function operates and administered. The performance of the accounting function and of the accountant supposed to be affected in many senses.

Scapens and alii(1998;48), indicate that " ERP, of which SAP is the premier example, is changing the relationship between accounting systems and other management information systems. In the past, the accounting systems were the main focus of the corporate information systems, with other supplementary systems added as and where necessary. But, with the SAP, the accounting modules integrate directly with the other modules and a common database ensures consistent information for all purposes. This integration poses both opportunities and threats for management accountants... In companies we studied, which are subsidiaries of overseas multinationals, the management accountants had to rely increasingly on the company-wide system as the basis for information they provide to their managers. Thus control over the delivery of local of management accounting information had diminished... there is also a decentralisation of data, information and knowledge. Individual managers can directly access the system for the information they require. They do not need to ask management accountants for information.because it can be accessed directly via PCs. However, in many instances managers may not know what is available, or how to access it. In such cases the management accountant may have an educational role.... The new information system focuses on business processes and cut across many traditional functions. As a result the interpretation of the information provided by the SAP system requires a thorough understanding of all business processes. Management accountants who have consciously sought to develop their understanding of the business processes will be in a strong position to provide business support to the managers responsible for individual business processes and functional areas, and to interpret the information for senior management at both local and corporate levels."

Burns et alii (1999; 28-29) states " ... the growing use of ERPs such as SAP and Baan,... and the progresses in the information technology have great implications for the accountant. The informations are now thoroughly dispersed in the organization and the managers have direct access, in real time, instead of depending on the accountants to get them.

That created the decentralization of the accounting knowledge, with the managers and their subordinates making tasks that were in the accountant's domain, such as preparation of the budget and calculation of variations ".

As it is noticed, there is a concern with the changes in the accountant's role and even with the reduction of his importance. There is a concern about the fact that now it is a company system and the accountant does not have control on all the data.

In opposition there is the fact that the system of the company is unique which guarantees uniformity and consistence of the information. Regarding the data control, we see that in fact the control is larger because, as it was verified in our research, the accountants were in control of the whole customization process and on the decision about the structure of accountancy of the company. Additionally, the accounting knowledge turns out to be used by the whole company. In our opinion, that also means that the accounting has expanded, since it is enlarged for the whole company, by taking the advantage of ERP characteristics like architecture and of the unique database of ERP.

SAMPLE SELECTION

On May 30, 2000 a sample of companies was selected from SAP's Brazil indication of a list with companies that had implemented the Module FI/CO of R/3 and that were well succeeded. Per companie's request, the names and personal data were omitted. The industry classification and revenue were obtained from the Revista Exame - Melhores e Maiores (Ed. April, 1999). A magazine that anually ranks Brazilian companies according to their financial statement information. SAP did not provide the list of all companies, but it is considered the existence of more than 250 companies with the FI/CO modules installed in Brazil. Seven of them were visited for the research, as following:

Title	Activity	Income U\$ milhões
Case 1	Retail	400 – 500
Case 2	Construction	300 – 400
Case 3	Construction supply	400 – 500
Case 4	Higien	400 – 500
Case 5	Drugs	500 – 600
Case 6	Construction supply	300 – 400
Case 7	Electronics	700 – 800

CONCLUSIONS

The conclusions of this work are conditioned to the natural restrictions of multiple case studies. It does not allow a complete generalization but it contributes to the study of the approached problems increasing new visions to the existent theories (Yin 1990). The conclusions base on the recognition of evidences that allow verifying the possible changes. As explained in the

Introduction, the accountant's opinion was considered fundamental for the execution of the research.

The questions of the questionnaire used in the interviews were grouped in blocks allowing a better understanding of the concepts used in the research and coherence in the analysis of the answers. The blocks are Historical, Data of the Interviewees, Team, Implementation, System, Structures and Image and Power of the Accounting.

INTERVIEWEES BACKGROUND

The researched companies are of big companies, they are part of the 500 Melhores e Maiores of the Revista Exame and they obtained revenue over US\$ 300 million in 1999. All are placed among the larger 10 in their industry. Of the seven companies considered in the research, 5 are subsidiaries of multinationals and two are national.

All the interviewees are the responsible for the Accounting function and they have the degree of Bachelor in Accounting, a course track required in Brazil for everyone intending to become an accountant.

TEAM

The implementation of R/3 in accounting function provoked a change in the group's knowledge level. The members of the team started to be part of a select group of people. That happened so much inside of the organization as well as out of it since there is a high demand in the job market for people with that qualification. In a way or another the leaders of implementation of FI/CO were promoted or they left for better positions in the market.

IMPLEMENTATION

For all companies, top Management took the implementation decision and for the multinationals, the initiative and implementation decision was made at the head office. In those cases R/3 was implemented in all of the companies of the group, and in some of them R/3 had already been implemented at the head office in first place. For the multinationals the reason of the implementation was the need to adopt a corporate standard as for financial control, processes, information systems and operation integration. The national ones indicated that it was the need to have an integrated control administration and with better information and one of them declared that the reason also went to solve the problem of the Bug of the Millennium.

As for the implementation method, 4 adopted Big Bang.

The time of implementation was different among each with case 1 as the shortest with 7 months, and the longest one was company 2 and 3, with 22 months. As for the reengineering, four adopted and they made corporate restructuring and other two did not, and one of those two companies (case 2) stated that the implementation of ERP did not provoke any headcount reduction in the accounting function.

The implementation difficulties reported show some important aspects such as period, total budget, personnel and product. For the total period of implementation, the companies 1 and 6 reported that the established time was short but it was accomplished. The companies 1, 4 and 6 informed that the budget was insufficient, being complemented so that the project could reach the end.

The implementation difficulties in relation to FI/CO were related with the customization and the knowledge of all the possibilities and alternatives of the system. One of the companies reported that " it takes a long time to discover all of the possibilities of the system ".

SYSTEM

The softwares used before R/3 by three companies (1, 4 and 5) were developed internally. The remaining ones used softwares like Oracle, Consist and BPICS. In all of the cases the module FI/CO was implemented in the original version, but they had to make extensions in ABAP in order to adapt to the country legislation. As for the Financials modules used besides FI/CO, five reported to use AM and three use TR. Only two implemented EC. In the Manufacturing and Logistic module, four use SD, three use PP and MM and one uses OM and a QM.

In FI, the used functions are GL (all), AP and AR (all) and inside of CO, the functions more used are the PA and PC for three companies), CCA for all companies and IO for four companies.

As for the supply of information to the users of the accounting data, five of the companies agreed that the work became easier and the company four that didn't have this service to other users, implemented it with R/3.

The evaluation of FI/CO in relation to the previous Accounting Information Systems, the opinion is that, for all, R/3 supplies more reliable information (because of the characteristics of control of transactions), updated, do not stop running and provides more complete information. The item that presented larger disagreement was regarding to the presentation of screens of reports. The company 5, however, decided not to alter the screens because his politics in relation to R/3 is not to alter the software to enjoy the advantages of the standardization with the newcomers versions. The other companies use softwares of the type OLAP for creating screens for the final users' as management, top management and shareholders. The interviewees said not to like of the disposition and format of the original screens.

STRUCTURE

Regarding to the structure of Accounting function, the table bellow comparing the previous and subsequent structure reveals a decrease in the number of employees. In some cases, except the companies 1 and 2, the reduction was above 30% of the total. In the company 4 the reduction was 50%. However, none of the interviewees reported personnel's reduction as one of the

expectations of the project. The reduction of the physical space in the companies 1, 2 and 6 did not exist, but in the company 3, 4 and 5 had reduction, up to 50% of the space (4 and 5)

All interviewees stated that after the implementation of R/3 the Accounting is being done by everyone in the company. In other words, "passing to the tips.". Although two companies (1 and 2), said that there was not decentralization of the function, they all also recognized that now each function is responsible for a part of the accounting records. Three companies (1, 4 and 6) believe that the ERP is more flexible because it makes possible the consultation of data, current conversion and reports online and in real time. The companies that did not agree with the flexibility of R/3 refer to the flexibility for a personal intervention in the software, for correction of mistakes, and volume of transactions.

Regarding the advantages of R/3, the largest advantages were the integration of the information, the instantaneous supply of the information and the stronger control over the operation of accounting function. They also pointed the decrease of the time spent for bank reconciliation, absence of systems interruptions during the closing of the month, printing of reports.

The company 1, mentioned the largest control of suppliers, and company 5 also mentioned the decrease of the paper volume and the largest reliability of the system.

The major changes brought by R/3 were in personal. In general, the employees that composed the team received bonuses and promotions. Most were selected among the outstanding employees and had to leave their old attributions (1, 2, 5 and 6). The return of these people to the area after the end of the project was peculiar. In the company 6, differently of the others, the employees' return caused tension because the positions were occupied by other employees. In that case some were relocated to other functions and others were hired by other companies.

The largest impact in the Operation of the Accounting presented by the interviewees and that it echoed in the image of the accounting inside the company, was caused by the reduction of the time spend with the monthly closing. The data bellow indicates the amount of reduction:

Company	Time Reduction of monthly close – in days		
	Before	After	Goal
5	26/25	3	2
1	20	4	-
3	5/7	2	-
6	11	8/11	3
4	7	2	1
2	3	3	-

The companies 5 and 4 used the Time spent for the closing as one of the Control Indicators of the quality of implementation.

As for the monthly volume of transaction (postings) all companies reported a drastic reduction in the amount of manual transactions of more than 90% (company 4). The manual postings usually refer to conciliation, adjustments, closing, distribution and correction.

IMAGE AND POWER OF THE ACCOUNTING

The interviewees expressed their opinion as follows:

Company 1

"It got better because now all depend on me. Accounting has more importance. In the past nobody mattered with the registration of the expenses in a understandable way. The expenses of the other internal functions appear more quickly and can be seen easily. R/3 facilitated the performance of my job. Before, the accounting function was seen as " a necessary " evil. With R/3 the function was facilitated and it made more evident the importance of the accounting".

Company 2

The image of the accounting didn't change, since all of the reports were always of responsibility of the accounting, due to the need of currency conversion required by the head office ".

Company 3

" The accounting function has more value. The company, made up by a large majority of engineers, usually called the accounting as the group of the "it cannot be done". Little by little it began to gain more and more importance. It took some time for them to accept that they need to follow the accounting principles. Now they all trust the accounting and they respect it. A greater dependance has started. Today the accounting is the center. Now the number generated by the accounting is the final number.

Company 4

The image of the accounting got better. Everybody can access all types of accounts in the Balance Sheet. Before, they had to wait a long time to get the data. The reports are agile; before it was necessary to print them, today they are available in the system. Everybody access the accounting, the fiscal data and the costs. Everybody has R/3 in their desktops, including the secretaries, and they see that as being an improvement of the accounting. The accountant's image got better. Before it was seen as "bookkeepers", now it is the center of everything and where everything is managed".

Company 5

The image of the accounting become 100% different. Before it was seen by other departments as something bad but necessary, as the "drainage" of the company, everything ends there. Now, company managers constantly participate in an internal course about R/3. In this seminar it is possible to notice that the executive body is very involved with the accounting and concerned with the part of the accounting that is under his/her responsibility. They always ask: "Do I account right"?. Each one knows that they feed the information for the

Balance Sheet and for that he/she does try to understand how it works and what is its importance.

The accounting won intelligence and not just operacionality. The accountant became the sheriff, with control and free access to manage.

With R/3, accounting stops being simple data typist and starts to do part of the game, joining values and intervening in the future " decisions. The accounting manager had to interact more with other functions ".

Company 6

Improved a lot, the system improved the vision of the quality of accounting services. The image of the accounting throughout the company is better, but the accountant is the one that has the job of selling this image because he/she acquired more time to exercise other managerial activities”.

FINAL COMMENTS

As for the acting of the function, all agreed that R/3 facilitates their performance. Finally, the research allowed the elaboration of the following considerations:

- The implementation of R/3 provoked a group of changes that altered the way of operation of the accounting (Scapens et Alii,1998; Burns et alii,1999).
- The changes were considered by the accountants as beneficial for the operation of the accounting of those companies, contemplating directly in the reduction of the time of closing, better service to the users and quality of the supplied information. (Kale, 2000; Blain et Alii, 2000; and Bancroft, 1998).
- The decentralization of the Accounting was confirmed not only for the characteristics of operation of R/3 and the accounting knowledge that was taken to the several areas or the company as well as the co-responsibility for the execution of the registrations by other departments of the company. (Burns et alii, 1999; Scapens et alii, 1998 and Riccio and Peters 1993)
- The interviewees' perception in relation to the increase of the power of the accounting function is positive in most of the cases. The opinion of the accountants confirmed a clear feeling of increase of the capacity of the accounting in acting as a surveillance instrument of discipline, at the service of the company (Foucault, 1980)
- The improvement of the image of the accounting function was confirmed by the interviewees through his/her perception of a wider circle of personal relationship, more intense and participative, with all of the departments and levels of the company. (Wilkinson et Alii, 2000; Moscove and alii, 2001).

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