
**The Impact of Enterprise Resource Planning Systems
(ERPS) on the Management Accounting (Information)
Systems of an Organization**

Xavier GABRIËLS

University of Antwerp, Faculty of Applied Economics, UFSIA-RUCA

Prinsstraat 13

2000 Antwerp

Phone +32 3 220.41.20

Fax +32 3 220.47.99

E-mail : Xavier.Gabriels@ua.ac.be

Website : <http://www.ufsia.ac.be/~xgabriels>

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Abstract

The general aim of this research is to study the impact of these "new" information systems on the role of management accounting in the organization. Therefore the effects of these systems on organizational decision making, power relations within the organization and the role of the management accountant will be investigated.

Therefore, the scope of this study is not to investigate the reasons for the actual change, but rather what is affected by this change.

First of all, the reasons for implementing such ERPS will be discussed. They vary from strategic incentives such as the reduction of uncertainty, the integration of information along the entire value chain due to for instance the current globalization, the introduction of new accounting systems, ... to the more practical day-to-day motivations such as the faster delivery of information, the possible cost reduction, the urgent upgrade of the outdated (and mostly inflexible) legacy systems, etc. These latter problems are more professional and not the goal of this study, but they constitute the environment that creates the need for these information systems.

The management control implications as well as the organizational and behavioral changes associated with the introduction will also be discussed here. In order to study these various issues we can draw upon a rich variety of previous studies and theoretical perspectives. First of all, there is of course the diverse management accounting and control literature, the innovation-diffusion-adoption literature, the organizational change and decision making literature and the various implementation studies. But apart from the literature that is grounded in the various management accounting theories, the MIS theories and literature also offer us a good starting point to develop viable hypotheses.

To develop or extend theory [following Keating (1995)] regarding these ERPS, an exploratory case study in a single organization - in order to gain sufficient in-depth information before carrying out a more extensive survey - will be conducted (in cooperation with a large consultancy firm).

1. Motivation for implementing an ERPS

Although it is often stated that ERPS merely just speed up the delivery of information¹, it is of course obvious that ERPS do a lot more than that. Therefore, the next paragraph will try to give an overview of the different changes - we especially avoid to use the term benefits, because not all changes are beneficial - the introduction of an ERPS brings about.

In defining ERPS, we follow Granlund and Malmi (2000a) and refer to ERPS as *"integrated software packages that control all personnel, material, monetary and information flows of a company (Bancroft et al., 1997; Curran et al., 1998; Davenport, 1998)"*.

It could be argued that ERPS are introduced to reduce uncertainty, which can be explained following Galbraith (1973, p. 15) who describes the increase in the capability to handle information (as ERPS do) as one of the options to reduce this uncertainty².

Also, *"Gordon and Miller (1976) hypothesized that accounting information systems could be designed to cope with environmental uncertainty by incorporating more non-financial data, increasing reporting frequency, and tailoring systems to local needs (see also Macintosh, 1981; Ansari, 1977)." (Covaleski, Dirsmith and Samuel, 1996, p. 7).*

One of the main features of all the major ERP-packages is their relatively high degree of standardization³ (Granlund and Lukka, 1998a, p. 195), which allows the integration of information (Granlund and Malmi, 2000b, p. 430), not only in the entire (global) organization, but also along the whole value chain⁴ (Chapman and Chua, 2000, p. 4),

¹ In this paper, no distinction is made between data (symbols or stimuli) and information (data conveying meaning as a result of reducing uncertainty), following Huber (1990).

² The other option is to reduce the need for information by organising for that.

³ *"Such systems lead to the standardization of data collection format and reporting patterns in the production of accounting information." (Granlund and Lukka, 1998b, p. 160)*

⁴ *"The latest generation of ERP systems extends beyond the organization by capturing inter-organizational processes such as customer and vendor relationship management (Kumar and Van Hillegersberg, 2000)" (Hunton et al., 2002, p. 2)/*

which entails on his turn economies of speed, scope and size (Chapman and Chua, 2000, p. 13).

This trend is consistent with the proposition of Lawrence and Lorsch (1967) that the need for more integrative devices increases as the level of organizational differentiation enlarges, in order to assure a consistent and coordinated strategic effort and to avoid interdivisional conflict (vide infra).

The characteristics mentioned above, are also indicated by the study of Bouwens and Abernethy (2000, p. 226) about the "decision-facilitating function" of management accounting systems⁵ (MAS). Following Gordon and Miller (1976) and others (Chenhall and Morris, 1986; Mia and Goyal, 1991), they examine four dimensions of MAS : scope, integration, aggregation and timeliness, whereby the subdimensions of each of these four are also illustrated.

But it remains debatable if the high degree of standardization is actually an advantage or a disadvantage⁶. Some authors indicate that this standardization defeats the tailoring of the system to specific local needs, due to for instance cultural differences (Scapens et al., 1998).

Others, on the contrary, welcome the - according to them - increased flexibility : "*... they open new opportunities to tailor accounting information to the information needs that emerge in local decision situations.*" (Granlund and Lukka, 1998b, p. 160)

In a more general perspective, "*Argyris (1977) has argued that the characteristics of 'local' and 'distant' information systems reflect different conceptions of management. In particular, 'distant' systems induce rational, abstract thinking and managers who are concerned with general conditions and trends, whereas 'local' systems encourage managers to think concretely and intuitively in order to respond to specific conditions.*" (Scapens and Roberts, 1993, p. 16).

⁵ Libby and Waterhouse (1996) mention five different functions of MAS : planning, controlling, costing, directing and decision making.

⁶ In general, the inflexibility and the rather limited adaptability of the system is seen as a major problem in the contemporary business environment.

Nevertheless one cannot deny the major advantages of this high degree of standardization and integration, such as the enhanced decision support⁷, the improved quality of information (Chapman and Chua, 2000, p. 4 & 7), the possibility to centralize the coordination of data processing, the possibility of real-time reporting (Granlund and Malmi, 2000, p. 435) and continuous auditing in the current insecure and dynamic organization context⁸, the - although debatable - flexibility of the system, the answer to the quest for more rapid information due to the increased globalization and competitiveness, etc.

Furthermore, in their study about management accounting practices (MAP), Granlund and Lukka (1998b, p. 157) argue that accounting information systems (AIS) in general are among the economic pressures that drive the convergence MAP around the world, which consequently provides us with another explanation for the adoption of ERPS.

And if we assume that ERPS are, among others, introduced to change MAS - whereby we leave it to the discussion and empirical investigation in the second part to determine whether they actually do - the study of Libby and Waterhouse (1996) provides us with an additional reason for implementing an ERPS, namely the intensity of competition, which necessitates cost reduction, quality improvement and waste reduction.

Moreover, the benefits perceived by Anderson and Young (1999, p. 537) in their study about the introduction of an ABC-system could also be added. They mentioned mainly the cost reduction, the improved accuracy and the process improvements. Unfortunately there does not exist any evidence regarding these benefits in relation to ERPS, but one could hypothesize the same influence in this study, since ERPS can - just as ABC - be considered as a management accounting change project.

⁷ Hereby ERPS can be viewed as not only providing more information, but also providing information that is better tailored to the decision at hand.

⁸ The provision of real-time information will on his turn have a considerable effect on managerial actions (Granlund and Lukka, 1998a).

As the following section will discuss the impact of ERPS on the organization, this section will end by an overview (drawn from the MIS⁹ literature) of the technical functionality - which refers to the function a system serves in the organization - of ERPS.

"Markus (1984) identifies the following five primary functions of systems : (1) to structure work (operational systems); (2) to evaluate performance and motivate people (monitoring and control systems); (3) to support intellectual processes (planning and decision systems); (4) to augment human communication (communication systems); and (5) to facilitate interorganizational transactions (interorganizational systems)." (Benford and Hunton, 2000, p. 58).

⁹ Management Information Systems

2. The impact of ERPS on management accounting

Since ERPS are actually a new or changed form of AIS, they could be interpreted as a major technological change in response to a "new" environmental challenge - the need to reduce uncertainty (vide supra).

Therefore they influence almost all aspects of the organization.

Hereby we define the organization as the organization itself, the different departments, as well as the various individual employees, such as management accountants and IT-professionals.

But since the focus is on management accounting, this discussion will be limited to the definition of management accounting research, as it is formulated by Foster and Young (1997, p. 64) : *"Management accounting research, then, is the process of using rigorous methods to explain and/or predict: (1) how changes to an existing management accounting system will affect management actions, motivation and organizational functioning, and (2) how internal and external organizational forces will affect management accounting system design and change."*

Therefore the management control implications and the organizational & behavioral aspects will be discussed in this chapter, because *"if we are taking management accounting practices seriously, we must explore how practices evolve, how accountants and managers are trained, how intra-organizational conflict is suspended, how accounting routines fit with other organizational routines, etc."* (Scapens, 1994, p. 317). More specifically we intend to look at the implications of these new ERPS for decision making and control.

In this regard it is important to remember that *"accounting systems and procedures stand between the various groups in the organization; they provide a way in which the relative contributions to organizational activities can be evaluated and the mechanisms through which resources are allocated. Thus accounting can be part of the process of controlling and channeling actual and latent organizational conflict (cf. Macintosh and Scapens, 1990)"* (Scapens, 1994, p. 315)

It is clear that ERPS - in combination with the increased competition from the current globalization trend - changes the nature of the organization and influences its value¹⁰ (Granlund and Malmi, 2000 & Chapman and Chua, 2000, p. 1), but one could ask to which degree these changes are different from those brought about by previous systems (e.g..EIS¹¹) or innovations (e.g. ABC) ?

Moreover, "*we may ultimately question whether the nature of managerial work truly changes due to the adoption of the new technology (see Mintzberg, 1980)*" (Granlund and Malmi, 2000, p. 436).

Nevertheless, it is obvious these new systems provide new information to the organization, and we would like to assess to what extent this information can be considered "new", and whether or not this information improves the decision making and performance evaluation processes¹². Therefore, it is important not only to determine how optimal these processes were before the introduction of the new system, but also to isolate the effects of this new system from other innovations, such as for instance the adoption of an ABC system. Furthermore, it is also important to assess the accurateness of this "new" information¹³, since numerous important decisions will be based on this highly integrated information.

Several literary sources stipulate that the adoption of ERPS will encounter resistance from various sources in the organization, unless the implementation of the ERPS is carefully prepared. This resistance from various organizational sources can be explained following Foster and Ward (1994) who point out that information that is best suited to superiors for decision control, might not be optimal to other managers for decision management¹⁴ (Abernethy and Bouwens, 2001, p. 2), as it is seldom recognized that both functions can be served equally by the newly implemented system (Zimmerman, 2000).

¹⁰ When one should try to assess whether the new system adds value to the organization or not, one can draw upon the success stories relating to ABC-implementation, such as McGowan and Klammer (1997) the already above discussed paper of Krumwiede (1998) and Foster and Swenson (1997). Also, the MIS paper of Hunton and Flowers (1997) concerning the effective use of IT in accounting, based on the DeLone and McLean (1992) model is relevant in this regard.

¹¹ Executive Information Systems

¹² The importance of accounting information to performance evaluation has already been confirmed by Bretz et al. (1992, p. 331).

¹³ Of course, in order to come to valid conclusions, our assessment would have to consider the accurateness of the information previously used in the organization.

¹⁴ This explanation can also be found in the study of Scapens and Robers (1993).

Lawrence (1954) states that *"the real problem is not technical change but the human changes that often accompany technical innovation. [...] People do not resist technical change, rather they resist social change - the change in their human relationships that generally accompanies technical change."*

This resistance can be explained following the institutional framework developed by Scapens (1994) which states that *"organizational routines (including regularly enacted management accounting practices) largely underpin organizational know-how, which then informs day-to-day decision making and provides a degree of stability and potential resistance to change."* (Burns and Scapens, 2000, p.18).

Also Granlund (2001, p. 160) states that *"it can ultimately be suggested that people fundamentally resist change because they feel comfortable with routines, which in turn enhance the feeling of (ontological) security (Erikson, 1963; Giddens, 1979)".* Consequently, *"management accounting change which is consistent with the existing routines and institutions will be easier to achieve than change which challenges those routines and institutions"* (Burns and Scapens, 2000, p. 12).

In order to overcome this resistance, it is very important not to dismiss it as emotional or illogical (Scapens and Roberts, 1993, p. 30), but to recognize it and address it. One way to achieve this is to make sure that the various benefits (economic, technical and even individual) of the new technology are being acknowledged by the different organizational participants (Jermias, 2001, p. 142), since they will naturally embrace a technology that is considered capable to contribute to their personal or unit's effectiveness (Huber, 1990, p. 52). Therefore it is of utmost importance that all the participants really understand what is being advocated, without being discouraged by the technical language surrounding ERPS.

In order to achieve this, the actual users of the system¹⁵ not only have to be adequately trained and briefed about the new system, they also have to be actively involved in the design and the implementation of the actual new system (Abernethy and Bouwens, 2001), so as to ensure that they can identify and commit themselves

¹⁵ Since there are of course a lot of different modules in an ERP-system, we will limit our attention to the users of the management accounting modules, as this is the focus of our research.

with/to the new implementation (Jermias, 2001, p. 155; McGowan and Klammer, 1997; Hartwick and Barki, 1994), which on his turn facilitates the adoption of the proposed system¹⁶, since people automatically neglect to look any further at the abandoned alternative (Jermias, 2001, p. 147). Furthermore, user involvement may promote the development of realistic expectations (Krumwiede, 1997, p. 224).

Jermias (2001, p. 156) also provides us with "*a considerable number of studies that have convincingly shown that participation leads to both commitment and acceptance of new initiatives (e.g. Cooper, Kaplan, Massel, Morrissey & Ochm, 1992; Gilmore & Barnett, 1992; Janis & Mann, 1977; Sagie, Elizur & Koslowsky, 1992)*".

Furthermore, this approach guarantees the best use of the system since it has been tailored to the specific needs of the people who have to use it on a daily basis, which decreases the required effort later on and thus reduces ex-ante uncertainty (Abernethy and Bouwens, 2001, p. 7).

Therefore, Hunton and Flowers (1997, p. 4) also suggest to verify the levels of user satisfaction and job commitment associated with the new system.

Of course, there are numerous other factors¹⁷ during the design and implementation phases that determine the resistance to the ERPS afterwards. Prior literature mentions the absence of a realistic timeframe, the presence of an adequate workforce, sufficient top management support, ... With respect to ABC, "*Anderson and Young (1999) provided an excellent review and summary of the factors that have been identified as affecting ABC implementation in earlier studies*" (Granlund, 2001, p. 152).

Moreover, Granlund (2001, p. 161) also warns for the considerable influence of potential previous experience of (some of) the organizational participants with implementations of new technologies and/or methods, since this experience can be deterministic for their attitude towards the current implementation.

¹⁶ In this regard, De Brabandere and Thiers (1984) mention the importance of effective communication (absence of semantic gap) and the absence of power asymmetry. Furthermore, "*the important roles of communication in the change process have been discussed extensively in the change management literature (e.g. Beckhard & Pichard, 1992; Daly, 1995; Ford & Ford, 1995; Kotter, 1990)*" (Jermias, 2001, p. 156)

¹⁷ Jermias (2001, p. 157) warns in this regard against the significant role some purely technical and/or economical factors might play in prohibiting the adoption of the "new" system.

This attitude could very well be explained following the framework developed by Jermias (2001) based on the cognitive dissonance theory.

Related to this, the number of times the accounting system has changed before may also have to be considered, since Foster and Ward (1994, p. 406) point out that frequently changing the rules and conventions significantly reduces their credibility¹⁸. Nevertheless we may not forget that previous experience with changes can also be positive, as this might reduce the uncertainty associated with the new project¹⁹ (Libby and Waterhouse, 1996).

However, the study of these various forms or causes of resistance - some of which are almost impossible to measure -, lies outside the scope of this research.

Consequently, we can hypothesize that the impact of ERPS on management accounting will be greater (so less resistance) when the user has been actively involved in the design and implementation process (H1).

And since "... *management accounting is seen as the provision of information for decision-making, or more specifically the provision of information to assist in the formation of expectations and beliefs*²⁰" (Scapens, 1994, p. 313), the decision-making process is also greatly affected by the introduction of ERPS (for instance, are the decisions taken more quickly²¹ and/or more efficiently²² ?). And since the quality of the decision process also proves to be enhanced (Huber, 1990, p. 64; O'Leary, 2000) - which significantly reduces the uncertainty associated with it -, this on his turn leads to improvements in information processing efficiency, since better quality decision making uses less, but more appropriate, information (Smart et al, 1978).

¹⁸ "Furthermore, frequent rule changes would also occasion costly revisions to the internal labor market structure." (Tiessen and Waterhouse, 1983, p. 265) (vide supra)

¹⁹ This effect is generally referred to in the literature as the "organizational learning capacity". In this regard, "Cohen and Levinthal (1990) advance and test the proposition that prior knowledge in an area facilitates an organization's ability to assimilate and exploit new knowledge." (Libby and Waterhouse, 1996)

²⁰ See also Scapens and Arnold (1986), who argue that the "conventional economics-based approach regards management accounting as the provision of information which is designed to enable rational decision makers to make optimal decisions."

²¹ Huber (1990, p. 64) assumes on a more general level that advanced information technologies indeed lead to a reduction of the time necessary to make a decision due to the faster delivery of information..

²² Again, on the same more general level, Huber (1990) argues the decreased need for formal meetings due to the increase in information available, the reduction of people involved in the actual decision

This reduction in the information necessary to make decisions, naturally entails a reduction of the information asymmetry in the organization (Chia, 1995, p. 612).

Moreover, Bruggeman and Slagmulder (1995, p. 249) already mentioned that studying the impact of technological change on management accounting, involves looking at the possible emergence or disappearance of new decision and control activities as well as at the changes in information needs²³.

In this regard, Libby & Waterhouse (1996)²⁴ also examined the relationship between changes in management accounting and control systems (MACS) and several organizational and contextual variables at 24 Canadian organizations, and found that the decision making process was the most affected by the implemented change.

Since it is obvious that the available information will increase enormously due to the implementation of the new system, and suppose the quality of the information²⁵ is also rather good, one would expect that this would lead to better informed decisions. Nevertheless, one could ask whether this new information is also effectively acted upon in order to make decisions²⁶ (Argyris and Kaplan, 1994, p. 84).

This enormous increase in information naturally entails that the complexity associated with the actual decisions that have to be taken, will increase significantly.

Nevertheless, it remains highly advisable to limit the complexity introduced by the new system, otherwise this complexity will destroy the advantages of the reduced uncertainty, as Tiessen and Waterhouse (1983) stipulate that an uncertain and complex environment both lead to bounded rationality, since it may be impossible for individuals to process all the information available.

process, ... will lead to decisions which are taken more efficiently. Also, O'Leary (2000) believes that ERPS will lead to an improvement in decision making.

²³ They also referred to the possible impact of the new technology on the cost model and cost estimation method, which seems less interesting in this study

²⁴ Nevertheless, we have to consider the valuable arguments put forward by Granlund (2001, p. 201), that question the validity of the results in this paper.

²⁵ "*The quality of IS information refers to the reliability, relevance, accuracy, precision and completeness of IS information (Bailey and Pearson, 1983; Teng et al., 1995; Wang and Strong, 1996)*" (Dunk, 2000, p. 5).

²⁶ A prerequisite for this effective use is of course a thorough understanding by the implementors of the way decisions are made currently in the organisation, as has also been demonstrated in the previous hypothesis.

Furthermore, the effective use of the information is of course dependent on the flexibility the manager has in changing his actions due to the new information, as has been illustrated by Abernethy and Bouwens (2001).

Therefore we can hypothesize that although the decision-making process will certainly be affected by the introduction of the new technology, the new information, provided by the ERPS, will not be used effectively in the decision process, unless one can effectively act upon the new information (H2).

As the performance evaluation system - which is used, among others, as a basis for promotion in the "internal labor market"²⁷ (Foster and Ward, 1994) - is concerned, people value the rigidity²⁸ even more (Tiessen and Waterhouse, 1983), since many managers fear their performance will be reflected less positively²⁹ by the new system (Foster and Ward, 1994, p. 407). Therefore it may be advisable to reach some sort of prior agreement before changing the performance measurement system (Tiessen and Waterhouse, 1983, p. 262).

Following again Scapens' institutional framework, it is logical that people will resist changes in their assessment procedures, as this will introduce additional uncertainty (see also Granlund, 2001, p. 158).

This resistance can also be explained from an agency perspective, as the agent will be reluctant to reveal more information about his performance, in case for instance slack³⁰ was introduced into the budgets. Malmi (1997) already identified the visibility of introduced slack as a cause for the limited use of ABC.

²⁷ "This managerial internal labor market hierarchy can be also be viewed as a power structure within the firm." (Foster and Ward, 1994, p. 409) (vide infra).

²⁸ Nevertheless, this rigidity may be necessary when specialized experience and knowledge become important, in order to on the one hand, ensure the commitment of the employee to the firm, and on the other hand to provide the employee with recognizable advancement possibilities. (Tiessen and Waterhouse, 1983, p. 261).

²⁹ Hereby we especially avoid to use the term accurately, since it may very well be that the new system reflects performance more accurately, and consequently in some cases less positively than the existing system (vide infra).

³⁰ "In conformance with Merchant (1985), Lukka (1988), and Young (1985), budgetary slack is defined as the express incorporation of budget amounts that make it easier to attain." (Dunk, 1993, p. 400)

On the other hand, if the agent is performing well, he will embrace the dispersion of additional information to the principal, so the relation is not entirely clear³¹ (Abernethy and Bouwens, 2001).

Nevertheless, it should be clear that once again the agent has to be able to control the factors he is being assessed on, and strongly dislikes subjective evaluations (Merchant and Manzoni, 1989, p. 554). Therefore it seems also logical that managers in more decentralized organizations will easier embrace the eventual changes that are brought about by the new system, since they - as opposed to their colleagues in more centralized management structures - can participate in the actual decisions concerning these factors.

Therefore, we might presume that the agent will embrace information that reduces this subjectivity concerning his assessment, as this will enhance the fairness and equitability of the system (Foster and Ward, 1994, p. 408).

Furthermore, apart from individual attitudes, it may be necessary to maintain stability in the performance evaluation system in order not to lose perspective entirely during the various changes in the organization due to the implementation of the new system (Burns and Scapens, 2000, p. 22). Nevertheless, Foster and Ward (1994, p. 404, [following Kaplan]) point out that the disadvantages of having inaccurate information, may very well outweigh the desired stability.

This attitude can also be defended on a more general level : "*As O'Connor (1995) emphasized, one of the great management paradoxes involves the fact that while managers should be able to allow flexibility and change, their fundamental interest or task is simultaneously to generate and maintain control, predictability, and economic results: a balance between change and stability has to be found (see also March, 1994)*" (Granlund, 2001, p. 158).

³¹ The principal will of course always embrace the reduction of information asymmetry, since he is always "*interested in any signals that reveal new information on the agent's effort*" (Holmström, 1979).

This is why change, certainly in this field, will most likely occur very slowly, and after (all) the other changes are effectively being implemented, so management accounting change has to be defined as an enduring process (Burns and Scapens, 2000, p. 4), which is explained by Argyris and Kaplan (1994) as the need to build commitment. This assertion can also be defended following Evan's (1966) concept of organizational lag to accounting, which states that administrative innovations lag technical innovations, since the benefits that can be derived from the latter are being considered more tangible and consequently more related to profitability.

According to Scapens (1994, p. 311) organizational change can be either revolutionary or evolutionary and since accounting is usually slow to change because accounting practices are an institutionalized routine - combined with the habitual and routine nature of organizational behavior - (Scapens, 1994, p. 317), the change is most likely to occur "evolutionary"³².

Therefore, Burns and Scapens (2000) advocate to start exploring management accounting change as a process (rather than as an outcome). Furthermore, it may also be desirable that this change does not occur radically because "*radical accounting innovations and resulting changes would initially impart uncertainty and complexity within the organization*" (Foster and Ward, 1994, p. 408), which would be in violent contrast with the intention to implement ERPS in order to reduce the uncertainty (vide supra).

Nevertheless, we may not forget the impact of the degree of centralization on management control, since a decentralized organization will experience much more changes due to the introduction of the ERP-system, which is characterized by a more central structure³³. Clearly, these changes will not manifest themselves immediately, but they will certainly appear after a period of time, when the ERP-system is also effectively used in the performance evaluation processes.

³² "Revolutionary change is likely to be possible only as a result of major external change, e.g. take-over, economic recession, market collapse, and so on". (Burns and Scapens, 2000, p. 13)

Furthermore, evidence from Libby and Waterhouse (1996) also confirms the rather incremental change in MAS in the organizations under study.

³³ Whereby we are not saying that a decentral organisation will become more centralized (and vice versa), as has already been rightly remarked by Huber (1990, p. 57), because it may very well be that

Thus, the early stage of implementation - where most organizations are still in - has received very much attention in previous literature and can be considered as a plausible explanation for the lack of apparent changes not only in management controls³⁴, but also in management accounting methods, as early evidence from Granlund and Malmi (2000a, p. 433) suggests.

Another possible explanation could be the complexity of present-day ERPS which causes the resources to be concentrated on effective implementation instead of on the development of new methods. Argyris (1977, p. 113) already identified the complexity associated with MIS-implementations as one plausible explanation for the often unmet a-priori expectations.

Consequently, we can expect a growing (as time goes by) direct impact of these new ERPS on management control (depending upon the degree of centralization) (H3).

Although ERPS may not drive the adoption of new management accounting innovations for now - although many of them are present in contemporary ERP-packages (Granlund and Malmi, 2000a) - they are certainly driving changes in organizational structures and lines of responsibility³⁵, which on his turn relates to social conflicts and power struggles within the organization (Granlund and Malmi, 2000, p. 436), as innovation can seem threatening to the firm's existing power structure (Foster and Ward, 1994, p. 409).

This is entirely natural, since new accounting systems usually incur conflict and resistance within the organization³⁶ (Scapens and Roberts, 1993, p. 314), as has already been discussed.

the increased information will enable a (de)central organisation to operate in an even more (de)centralized manner.

³⁴ These management controls can be considered part of the larger organizational control system, that "comprises a combination of control mechanisms designed and implemented by management to increase the probability that organizational actors will behave in ways consistent with the objectives of the dominant organizational coalition (Otley and Berry, 1980; Flamholtz et al., 1985)" (Abernethy and Chua, 1996, p. 573).

³⁵ And the relationship is clearly not the other way around, as the early evidence by Granlund and Malmi (2000a, p. 426) suggests. So although ERPS are driving changes in corporate culture and bring about organizational resistance, these factors are not responsible for the lack of ERP adoption. The exploratory factors for this are rather the lack of resources and the current system complexity.

³⁶ Burns and Scapens (2000, p. 23) refer also to the importance of recognizing the role of power in change processes.

Nevertheless, power relations in the organisation can of course also shift due to other factors, which have to be isolated from the effects caused by the introduction of the new system.

While maybe natural, one should certainly try to avoid it as much as possible since "*competition for power and control may confuse well-motivated projects resulting in inertia regarding accounting systems*" (Granlund, 2001, p. 162).

Certainly if the proposed system was imposed by some central authority or senior level, without consulting the other organizational echelons (Scapens and Roberts, 1993, p. 29), this execution of power asymmetry³⁷ may invoke power elsewhere in the organization to resist the intended improvements (Burns and Scapens, 2000, p. 23).

This confirms once more the importance of the human factor in the adoption of the new system. Purely organizational factors are also important in understanding the adoption of the new system, but rather they are more likely to influence individual behavior via their impact on the operating context itself (Abernethy and Bouwens, 2001, p. 18).

As indicated by Scapens and Roberts (1993) it may take only a single unit or even one single person (Granlund, 2001, p. 162) to maintain stability in accounting procedures. If, for instance, a person feels his specific knowledge - which is a potentially valuable resource - would be externalized by the new system³⁸, he could very well - however completely unnecessary - fear for his unique position in the organization and consequently oppose, although probably completely irrational - the adoption of the ERPS.

Furthermore, on the subunit level, it is important not only to take care of the different needs of the various departments and/or subsidiaries during the implementation stage - a solution optimal for one department, does not necessarily have to be so for the others (cf. Birch paper case about transfer pricing)-, but information about their

³⁷ As already mentioned, this power asymmetry is extensively discussed and studied in De Brabandere and Thiers (1984).

³⁸ Which would be very difficult, since most specific knowledge unfortunately remains tacit, and can not be captured effectively in an automated system.

possibly differing objectives should also be stored in the ERPS-database in order to avoid interdivisional conflict.

Otherwise, *"if information is not available concerning other departments' objectives and if departmental objectives conflict, interdependencies between departments may result in significant amounts of uncertainty over how best to achieve their objectives (Earl and Hopwood, 1981; Macintosh, 1995)"* (Bouwens and Abernethy, 2000, p. 226).

And since one of the main benefits of ERPS is the high degree of integration, the organization could benefit from the storage of such information, if we follow Bouwens and Abernethy (2000, p. 226)³⁹ : *"Integrated information reduces uncertainty relating to cause and effect relations within departments as it encourages learning and the generation of ideas."* This way intra-organizational conflicts can be, if not eliminated, at least suspended.

In this regard it is of course important to study the existing relationships - for example how do the IT and accounting departments relate to each other - in the organization and their influence on the implementation and adoption process (Chenhall and Langfield-Smith, 1998, p. 371), in order to be able to assess the actual change in them. Of course, it is always very difficult to gather evidence about this (Luft, 1997, p. 178).

Although, ERPS may result in various power struggles, reducing on their turn the impact of the new system (previous research). They can also, through the introduction of integrated information, introduce more coherence and cooperation between the different departments due to the reduction of uncertainty about each other's objectives. Therefore, we leave this issue to be resolved in the actual empirical investigation⁴⁰ (H4).

³⁹ Also, Chenhall and Morris (1986, p. 22) already pointed out - based on the research of Baumler (1971) and Galbraith (1973) - the importance of highly integrated information in organizations characterized by high interdependence, such as our contemporary global multinationals.

This restructuring of power relations among key interest groups may very well alter organizational forms and control mixes, as has been demonstrated by the field study of Abernethy and Chua (1996).

As already mentioned before, the ERPS are certainly driving changes in the organizational structures and lines of responsibility (e.g. again more centralized), because often it is too difficult or not advisable to adapt the ERPS to the organization, which results in the need to adapt the organization to the new system (Abernethy and Bouwens, 2001, p. 20).

This way, the introduction of the new ERPS and its (expected) resulting decrease in uncertainty, might very well allow for more centralization, since the need for decentralization is very often linked to the degree of uncertainty present in the organization (Galbraith, 1973). On the other hand, it may be necessary to allow for more decentralization in the organization in order to provide managers with the required flexibility to be able to effectively act upon the "new" information (vide supra).

This is also pointed out by Tiessen and Waterhouse (1983, p. 266) : "*An accounting method change may necessitate compensatory changes to other aspects of the organization's structure in order to promote a cooperative equilibrium.*" For instance, it may be necessary to allow for more decentralization in the organization in order to provide managers with the required flexibility to be able to effectively act upon the "new" information (vide supra). In this regard, it is important to verify the a-priori presence of these factors that are already in line with the actual ERP-system and which facilitate consequently the adoption of the new system.

Moreover, their introduction is usually part of or brings about a larger reengineering process in the organization. Once more, it has to be stressed that the reassurance of the people affected by this reorganization process (e.g. job security) is vital to the successful development of the reorganization.

⁴⁰ This ambiguity is also illustrated by Granlund (2001, p. 163) who points out that all accounting development projects ultimately involve "*contests for power, organizational politics, complex settings of interaction, and unintended consequences*"

Furthermore, as ERPS facilitate the vertical distribution of information, their adoption can also very well entail a reduction in organizational levels (Huber, 1990, p. 58).

The loss or reduction of informal relations and face-to-face contacts - associated with the world-wide adoption of these ERPS - in the new (partly) virtual organization (Chapman and Chua, 2000, p. 8), are also a driver for inevitable changes to the organizational structures. The importance of these so-called "social networks" for the contemporary organization is also stressed in the strategic management literature.

The standardization and globalization, introduced by the new ERPS, largely enhance the possible contacts and relations one can address and this may bring about new organizational forms such as the network organization (Chapman and Chua, 2000, p. 10). In this concept, the individual organization has to be viewed as a link in the entire value chain, whereby the learning and innovating skills of the organization will be very important (Jorissen, 2001).

Therefore, it is clear that we can hypothesize that the ERPS will bring about significant changes to the organizational structures (e.g. "the network organization") (H5).

This "new" network enterprise - where the emphasis will be on value creation, and even inter-organizational accounting may become necessary (Jorissen, 2001) - will require considerable analytical and interpretative skills from the management accountant, as the other more routine tasks will be carried out by the system and simple parameters can be easily adjusted by the managers themselves (Chapman and Chua, 2000, p. 11).

For instance, concerning the enhanced decision support, Granlund and Lukka (1998a, p. 195) mention the following (which is the emerging belief among Finnish accountants) : *"... the modern integrated accounting systems might relieve the pressures caused by current reporting routines and give room for more profound analysis and genuine decision support."*

So the new management accountant will carry out more business advisory tasks, become an actual change agent and a value adding business partner in a changing career structure. Therefore it will be crucial for him to have a thorough understanding of IT. In this regard, Robert Elliott (1994) insists that the very survival of the accounting profession may rest with its ability to integrate new and increasingly sophisticated IT into accounting practice.

If the new management accountant should not be able to effectively fulfill these new tasks, someone else will carry them out and he will simply disappear from the organization.

This latter view corresponds with the more supporting - instead of leadership - role Cooper (1996) envisages for him.

The following citation from Chapman and Chua (2000, p. 14) captures the immanent danger very well : *"ERP-type technologies enhance and support the structured representation and management of activity, and so would seem to increase the organizational significance of accounting, however at the same time these technologies raise serious questions as to whether or not such accounting activity will be carried out by accountants."*

Chapman and Chua (2000, p. 11), along with evidence from previous experiences concerning the changing role of management accountants due to the introduction of new information systems, on the contrary, expects an increase in his status within the organization. Also, Granlund and Lukka (1998a, p. 187) describe in their study the expansion of the management accountants' job description - and consequently his increase in status within the organization - over the years.

Furthermore the “new” management accountant has to possess the right amount of emotional and social skills (Chenhall and Langfield-Smith, 1998,p. 383) - so he has to have not only a high IQ, but also a high EQ⁴¹ (Goleman, 1998) - in order to become part of the organization's value adding team.

⁴¹ Emotional Quotient

According to Granlund and Lukka (1998a, p. 199) *"modern business oriented management accountants, called controllers for instance, are required to have - in addition to the knowledge of the principles of financial analysis - a good understanding of the business the firm is in⁴², fluent communication skills and an ability to run change projects, too."*⁴³

So he has to become more future-oriented instead of being focused on the past as he used to be, and consequently cross-functional communication becomes also very important (Granlund and Malmi, 2000, p. 426 & Granlund and Lukka, 1998a, p. 202). Furthermore he has *"to replace the functional or departmental approaches of management with the process-oriented one"* (Granlund and Lukka, 1998a, p. 197), and has to adopt a customer-oriented perspective.

Since this trend is a typical contemporary general management change pattern and management accounting is part of organizational management (Granlund and Lukka, 1998a, p. 195), this evolution is rather obvious⁴⁴.

Therefore, we expect that the introduction of the ERPS will bring about a redefinition in the management accountant's tasks and responsibilities, which on his turn will require various new skills from him. Whether this change will be beneficial for him or not, remains to be seen (H6).

⁴² The importance of a good knowledge of the business and production languages of the firm is also indicated by Scapens and Roberts (1993, p. 30).

⁴³ A good comparison between the typical characteristics of the past "bean-counter" and the present-day "controller" can be found in Granlund and Lukka (1998a, p. 202).

⁴⁴ This also stems with the current focus on Customer Relationship Management (CRM) in the marketing and IT-literature and the professional magazines.

3. Theoretical framework & research design

3.1. Introduction

Since "*laboratories can not simulate the complex settings, relationships and structures where the most important of new management ideas must be implemented*" (Kaplan, 1998, p. 103), it is clear that a field study is required to study the phenomena mentioned above.

Moreover, "*the call for more field studies in accounting is hardly new⁴⁵, however the development and increasing spread of ERP-type technologies, with their potential to radically alter the field of accounting, does add a new urgency.*" (Chapman and Chua, 2000, p. 14).

Because the actual explanation of the phenomena under study usually has to be derived from the field itself, it is clear that you should allow the constructs to emerge from the field, certainly if you are trying to discover novelties.

In this regard, Atkinson and Shaffir (1998, p. 50) point out that "*field research is particularly useful when there is strong reason to believe that existing theory cannot explain phenomena, because it either ignores or misrepresents the environment in which the behavior is observed.*" Therefore, Baxter and Chua (1998, p. 74) believe that flexible problems are a more common starting point for field studies than strong hypotheses.

Nevertheless Miles and Huberman (1998) argue that this open-ended inductive approach may lead to a postponement of the decision between what is relevant and what is not, sometimes aggravating these difficulties, which confirms the necessity to adopt a well-established approach. Ezzamel and Bourn (1990, p. 401) also point out the usefulness of having an a priori analytical framework.

⁴⁵ Langfield-Smith (1997, p. 228) remarks in this regard that "*calls have been made for a greater commitment to more in-depth (case-based) research (Hopwood, 1983; Kaplan, 1986).*"

Therefore, we share in this paper the viewpoint of Johnsön (1998, p. 14) who recommends "*not to impose some theoretical construction upon the organization, but to use theory to explain the phenomena.*"

3.2. Theoretical framework

Apart from the neo-classical economic theory⁴⁶, management accounting can also be studied from an organizational and behavioral perspective.

The neo-classical approach to management accounting, "*which forms the basis of management accounting's conventional wisdom*" (Scapens, 1994, p. 301), assumes that all needed information is available at zero-cost, all alternatives are known with certainty and the entrepreneur acts rationally (Ezzamel and Hart, 1987, p. 2-3 & Kaplan and Atkinson, 1989, p. 9). Consequently, "*it has difficulty in analyzing processes of change (see Hodgson, 1993a)*" (Burns and Scapens, 2000, p. 4).

Furthermore, various concerns have been expressed about this neo-classical theory. In particular, Nelson and Winter (1982, p. 5) complained about "*the inability of the prevailing theory to come to grips with uncertainty, or bounded rationality, or the presence of large corporations, or institutional complexity, or the dynamics of actual adjustment processes.*"⁴⁷

As a reaction to this, information-economics is introduced (Jorissen, 1993, p. 557). This theory also takes into consideration the cost of information used in the decision processes and is actually the bridge between the traditional economic viewpoint and the agency theory. Since the object of this approach is to "*study the situations in which agents attempt to overcome their ignorance about some relevant information by taking decisions designed to acquire new information or to avoid some of the costs of their ignorance*" (Macho-Stadler and Pérez-Castrillo, 1997), it is particularly applicable to the research at hand.

⁴⁶ "A theory may be defined as a set of related propositions that specify relationships among variables (cf. Blalock, 1969, p. 2; Kerlinger, 1986, p. 9)" (Huber, 1990, p. 64).

⁴⁷ More critiques can be found in the paper "Never Mind The Gap" of Scapens (1994).

The principal-agent theory⁴⁸ incorporates the uncertainty factor within the information as well, as it introduces the concepts of information asymmetry and moral hazard (Jorissen, 1993, p. 557 & p. 581).

Consequently, as the economic part is concerned, the information-economics and principal-agent theory will be used to explain the research findings, rather than the neo-classical theory.

Moreover, the framework used in this paper will also use insights from organization and behavioral theory. Within the field of organization theory, we can distinguish the classical organization theory - where a more mechanical and formal view on the organization and money as the only motivational factor is advocated - and the neo-classical organization theory that studies people and their informal relations within the organization (Ezzamel and Hart, 1987, p. 16). Again this latter approach seems most applicable to the research question developed in this paper.

The behavioral management research even extends this path by stressing the study of motivation itself and human information processing (Jorissen, 1993, p. 580).

The human information processing approach to behavioral management accounting studies the way people gather and process information in the decision process. (Ezzamel and Hart, 1987, p. 113), and will prove very useful for the support of the hypotheses developed in this paper.

Contingency theory⁴⁹ is the third approach to this area of research.

It is most often directed to discuss differences between companies, and shows less interest in differences among subsidiaries in the same company⁵⁰, as Nohria and Ghoshal (1997) have pointed out. Therefore, it will not be immediately applicable to the first stage of our research, namely an exploratory case study in a single organization. However, later on, when carrying out a survey, this approach might prove very useful.

⁴⁸ A more general discussion of this concept, lies outside the scope of this discussion. However, a good summary can be found in Jorissen (1993, p. 581).

⁴⁹ Lillis (1999), for instance, is a good illustration of a research study that applies contingency theory.

⁵⁰ A more detailed overview of the methodological limitations of contingency research studies can be found in Langfield-Smith (1997, p. 225-228).

Although there is virtually no published material that studies the ERPS technology and its consequences⁵¹ (Chapman and Chua, 2000, p. 14), it is clear that we can draw upon a rich variety of previous studies and theoretical perspectives, - based on the above different basic theories - in order to study the issues at hand.

In this regard, we can identify the diverse management accounting and control literature, the innovation-diffusion-adoption literature⁵², the organizational change and decision making literature⁵³ and the various implementation studies⁵⁴.

Moreover, the model developed by Hopwood (1987, p. 222) offers us a good starting point to explain the coherence between the various hypotheses developed here. A slight adaptation that situates the hypotheses within the framework is described in figure 1⁵⁵.

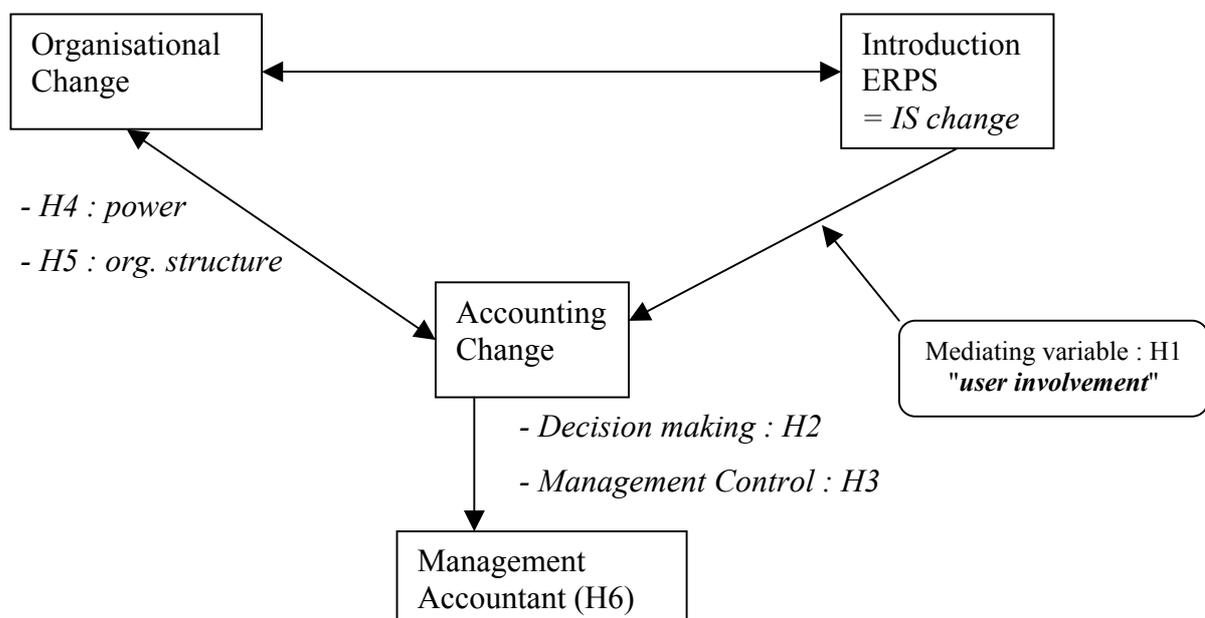


Figure 1

⁵¹ "Extensive organizational use of advanced information technologies is too new, and systematic investigation of their use is too limited, for a theory of their effects to have evolved and received general acceptance." (Huber, 1990, p. 64)

⁵² Abrahamson (1991) published a highly influential paper on this topic, which offers us valuable insights herein.

⁵³ Anderson and Young (1999) and Scapens and Roberts (1993) provide us with good examples of studies that are based on organizational change theory, and consequently a good overview of papers in this area can be found there

⁵⁴ Krumwiede for instance (1998, p. 251) indicates in his study about the implementation stages of ABC, the importance of organizational (such as top management support, the adequacy of resources, ...) and contextual (such as the relevance to managerial decisions, the compatibility with the existing system, ...) factors. He also gives an overview of prior ABC implementation research (p. 244 etc.). The impact of these contextual and process factors on the evaluation of activity-based costing systems is discussed by Anderson and Young (1999) too.

But apart from the literature that is grounded in the various management accounting theories, the MIS theories and literature⁵⁶ also offers us a good starting point to explain the developed hypotheses (Foster and Young, 1997, p. 65).

Moreover, the various sources of literature are also interrelated with each other. The study of McGowan and Klammer (1998) about ABC implementation seeks valuable insights into the factors that contribute to implementation success in the MIS, organizational change and implementation literatures.

Consequently, it should be clear that the hypotheses developed before can not be explained by one single theory - as is also emphasized by Ahrens and Dent (1998, p. 33) : "*If organizations follow the predictions of single theories, nobody would demand rich field studies*" -, but that they require a more broader approach.

According to Atkinson and Shaffir (1998, p. 47) field research can be used to describe practice⁵⁷, to test a theory developed elsewhere⁵⁸ or to develop a new theory⁵⁹, and Keating (1995) on his turn provides us with "a framework for classifying and evaluating the theoretical contributions of case research in management accounting". He also makes the distinction between theory development, refinement and testing studies and provides us with some good case study examples of each of these categories.

This paper will start by describing practice, which will most likely lead to the testing of some theories developed elsewhere, and can eventually ultimately result in the development of a new theory.

⁵⁵ We suppose a reciprocal relationship between organisational change and accounting change (in contrast to Hopwood), since ERPS might cause accounting changes, which on their turn may require changes to the organization, as already explained before.

⁵⁶ For instance, the already cited study of De Brabandere and Thiers (1984) belongs to this literature stream.

⁵⁷ Patell (1987) who provided a comprehensive description of a computer manufacturing process, is a good example of this type of research.

⁵⁸ Young and Selto (1993) who tested predictions about performance in a JIT environment, is a good example of this type of research.

⁵⁹ Anderson (1995) who identified the factors that influence the implementation of an ABC system at General Motors, is a good example of this type of research.

3.3. Research sample : some notes

According to Kaplan (1998, p. 89) "*field research is generally associated with (1) cross-sectional research, the systematic collection and analysis of data from multiple sites at a point in time, (2) time-series research, collecting and analyzing longitudinal data studies from one or a small number of organizations, and (3) case studies, in-depth, intense study experiences of a single organization at a single point in time.*"

Although, as mentioned by Scapens (1994, p. 310), longitudinal studies are especially useful to study organizational change, since this process usually takes a long time (vide supra), this paper will start - in order to gain a thorough understanding of ERPS in contemporary organizations - by conducting an exploratory⁶⁰ case study in a single organization. Later on, a more longitudinal approach may be adopted.

This is probably also the most rational option, as Otley and Pollanen (2000, p. 494) confirm : "*Given that accounting controls form only a small part of a wider set of organizational controls that differ significantly across organizations, it would seem wise initially to restrict consideration to single organizations so as to control for this effect.*"

Also, Langley (1999, p. 699) makes the following remark : "*Although some researchers have counseled against using single case studies in process research because of the lack of material for replication and comparison (Eisenhardt, 1989b; Pettigrew, 1990), this strategy provides a powerful means of deriving insight from a single rich case because the different theoretical interpretations provide the base for comparison needed (Lee, 1989; Yin, 1994)*". And further, Granlund (2001, p. 144) also mentions that "*although a single firm case study is limited with respect to statistical generalizability, it offers opportunities for in-depth observation and analysis of a complicated research phenomenon that permits contextual generalizability (Lukka and Kasanen, 1995)*".

⁶⁰ Yin (1994) states that research strategies can be used in general for three purposes : exploration, description and explanation.

And with regard to an exploratory study, Atkinson and Shaffir (1998, p. 49) point out the following : "*Though it may follow for some that qualitative research is most valuable in exploratory studies, where the relationship between the events in question and their environment is not well-understood, there is persuasive evidence to claim that such research need not be seen as a precursor to more serious or credible research, but is valuable on its own for its accurate description of social life.*"

Another advantage regarding case studies in general, is pointed out by Langfield-Smith (1997, p. 221) : "*Case study research offers the potential for a deeper examination of the processes involved in the relationship between Management Control Systems (MCS) and strategy formulation and implementation.*"

In order to draw valid conclusions and encompass them within a theoretical framework, Langley (1999) provides us with a good overview of the different strategies that can be used to theorize from process data. Not only does she give a rather extensive description with examples for each of the seven sensemaking-strategies (Langley, 1999, table 1, p. 696), but she also provides us with a comparison between simplicity, accuracy and generality for each of these strategies (Langley, 1999, table 2, p. 706).

Since we will start with a single exploratory case study, consequently the "narrative" and "alternate templates" strategies are most applicable in the beginning. Based on previous literature, the "narrative" strategy seems best suited to describe practice. Nevertheless, one may not forget that in case study research one "*must measure abstract, theoretical constructs with less than perfect proxies*" (Abernethy et al., 1999, p. 8), which renders, for instance, replication of the study difficult. Furthermore, Ahrens and Dent (1998, p. 33) point out that the case study researcher cannot "hide" behind the statistical results, since the burden of inference lies with him, due to the absence of such a methodology for qualitative data.

Therefore, proper attention should be given to the various validity issues. Some of them will already be briefly discussed in the last section of this paper.

The following section will specify some a-priori measurements for the flexible problems formulated in section 2.

3.4. Measurement of Variables

As already mentioned, the lack of research in this relatively new area also brings about various difficulties associated with the measurement of the different variables, since often no validated research methods and research variables exist yet.

This apparent problematic lack of previous scientific evidence and adequate measurement methods has also already been mentioned by Granlund and Malmi (2000), Abernethy and Bouwens (2001) and Otley and Fakiolas (2000, p. 507).

Nevertheless, we try to refer to the ABC and MIS-literature as often as possible, to limit the construction of entirely new measurement instruments, and consequently to enhance the reliability and validity of our measures⁶¹.

Furthermore, based on the previous theoretical discussion a number of relevant variables will be identified in order to study the direct, as well as the indirect, effects on the dependent variable in each hypothesis.

Hypothesis 1 : ***user involvement => greater impact on MA (individual level)***⁶²

In order to study this hypothesis, we have to verify the positive relation between user involvement during the design and implementation of the ERPS and the reduction of resistance towards the changes in management accounting afterwards.

The resistance towards accounting changes has already been operationalized in the study of Abernethy and Bouwens (2001, p. 11), based on various previous ABC studies.

And in order to measure the amount of user involvement the Hartwick and Barki - model (1994), based also on a review of relevant previous research, seems appropriate, if we look at the introduction of ERPS as a change to the organization's

⁶¹ A description of the actual measurement instruments can be found in the appendix.

⁶² Between brackets, the unit of analysis is mentioned each time, following the paper of Luft and Shields (2001) that distinguishes between four levels : individual, subunit, organizational, and beyond-organizational.

IT-system. Furthermore, McGowan and Klammer (1997) offer us also two good more general questions to further assess the level of user involvement.

Additionally, we also have to verify the negative relationship between user involvement and the complexity of the system to the user, as well as the positive effect user involvement has on the quality of information.

The complexity of the system can be measured based on the research of Anderson (1995) and Innes and Mitchell (1995).

The quality of the IS information can be measured following Teng et al. (1995).

Finally, as previous research suggests, we also have to control for the number of times the accounting system may have changed before and the previous experiences with change programs.

Hypothesis 2 : ***ERPS and decision making*** (subunit and eventually organizational)

Here we try to assess to what extent the new information provided by the new system changes the decision making process, whereby we assume that the new information will be useful⁶³ and the use of it is contingent upon the possibility to act upon it. This possibility to act upon the new information can be considered dependent on, or even part of, the organisational structure in general.

In order to measure the possibility to act upon the new information⁶⁴, we can apply the measurement of redeployment flexibility used in the paper of Abernethy and Bouwens (2001, p. 12).

The actual change to decision making can be measured based on the framework developed by Foster and Swenson (1997, p. 110) to measure the ABCM success, if we consider the effect of the introduction of ERPS on information comparable to this invoked by the introduction of ABC.

⁶³ The usefulness of the information could be measured following the Seddon and Kiew (1995) evaluation of the DeLone and McLean model (1992), but this measurement lies outside the scope of this research. Nevertheless, it may prove interesting to verify the perceived utility of the system, which can be done following Bailey and Pearson (1984).

⁶⁴ We leave the direction of influence to be determined in the actual empirical investigation here.

They identified four a-priori types of measures, where two of them can be used for the research at hand :

1. Measure based on the *use* of "ERPS-provided" information in decision making.
2. Measure based on *decision actions* taken with "ERPS-provided" information.

The difficulty in using these measures lies in the definition of "ERPS-provided"⁶⁵ information, which has to be left partially to the self-assessment of the respondent⁶⁶. Of course, one has to consider the biases that may result from the self-assessment that is sometimes asked of the respondents, although Venkatraman and Ramanujan (1987) found support for the proposition that managers' self-ratings of performance are less biased than researchers typically give them credit for.

Another way to measure the impact of ERPS on decision making would be to use "user satisfaction" with the new system as a proxy, because this factor will actually drive changes in decision making and use patterns (Cerullo, 1980). Also Ives et al. (1983, p. 785) confirm that "*satisfaction of users with their information systems is a potentially measurable, and generally acceptable, surrogate for utility in decision making*".

Furthermore, the actual change to the decision making process is also dependent upon various variables - which are directly or indirectly moderated by the introduction of the new system- , such as the quality of the information⁶⁷ (measurement, vide supra), the more general organisational structure⁶⁸ (central or decentral decision making, vide infra), the task uncertainty, ...

This task uncertainty⁶⁹ - the reduction of which we suppose to have a positive impact upon decision making - can be measured following Anderson and Young (1999)

⁶⁵ ERPS-provided information could be considered information that results from integrated software packages, such as SAP, Oracle, Baan, ...

⁶⁶ Hereby we follow the approach of Shields (1995) who also had problems providing an adequate definition of success in his ABC implementation study.

⁶⁷ A positive influence is expected.

⁶⁸ The direction of the influence is dependent upon the state of the variable in question and has to be left to the empirical investigation.

⁶⁹ Task uncertainty is "*defined as the uncertainty due to the complexity and diversity of the task performed*" (Moers, 2001).

based on Krumwiede (1998), Anderson (1995) and Foster and Swenson (1997), Withey et al. (1983) or it can also be taken from Hartmann (1997).

Also the time that has passed after the actual implementation - measured following Krumwiede (1998) -, can be of considerable influence, whereby we assume - completely in accordance with previous literature - that the more time has passed, the greater the impact will be.

Finally, previous literature mentions clearly that better informed decisions lead to a reduction in information asymmetry, which can be measured based on the papers of Abernethy and Bouwens (2001), Chia (1995, p. 614) and Dunk (1993, p. 403).

Hypothesis 3 : ***ERPS and management control*** (subunit and organizational)

Since we lack an adequate instrument to measure the impact on management control, we will use performance evaluation as a proxy for management control.

And although we could limit ourselves to the application of the Shields (1995) model to measure the impact of ERPS on performance evaluation, this method seems too superficial for the research at hand. Therefore, we chose to add also the instrument developed by Moers (2001) to measure performance measure characteristics and consequently also the changes to it.

Furthermore, we have to assess the expected negative influence of the complexity of the system, the positive influence of the factor time, and the a-priori undetermined influence of information asymmetry⁷⁰, ...

Also the presence of budget slack which decreases the desirability to change the present performance measurement system, can be verified using the instrument developed by Dunk (1993, p. 402).

Finally, we also have to verify the level of centralisation⁷¹, for which the decision authority instrument by Gordon and Narayanan (1984) seems appropriate⁷².

⁷⁰ Measurement instruments for all these variables have already been discussed in previous hypotheses.

⁷¹ Also here, we leave the direction of influence to be determined in the actual empirical investigation.

Hypothesis 4 : ***ERPS => interdepartmental cooperation***

(between subunits, so organizational)

The resistance caused by the introduction of an ERPS has already been illustrated in previous research. Therefore, this paper tries to demonstrate how integrated information, provided by the ERPS, leads to a reduction of uncertainty (about each other's objectives), which will have a positive effect on the coherence and cooperation between the various departments.

In order to measure this enhanced coherence and cooperation, Bushman et al. (1995) used intrafirm sales activity as a proxy, arguing that "*more intrafirm sales activity indicates a higher level of interdependence among business units*".

Furthermore, the possible enhanced interdepartmental cooperation can also be measured based on the "interdependence" measure used by Bouwens and Abernethy (2000).

In order to measure the reduction of uncertainty - which will of course have a positive effect on coherence and cooperation between the various subunits -, we have to combine the already established instruments on task and environmental uncertainty - an overview of which can be found in Anderson and Young (1999)⁷³ -, whereby we use task uncertainty to assess the knowledge of one department relating to the task that has to be performed in another, and when measuring environmental uncertainty we define whatever that is outside the department as the environment.

Although we can base ourselves on previous literature, such as the studies of Bailey and Pearson (1983), Chenhall and Morris (1986) and Bouwens and Abernethy (2001) to measure the integration of information - which, as already stated, should decrease the uncertainty within and between the various subunits -, we will have to develop a new instrument to measure the actual impact in the context at hand. The exploratory case evidence we will gather, should be used to refine the preliminary version of the instrument that is described in the appendix.

⁷² Chow et al. (1999) provide us with a similar instrument.

⁷³ Gordon and Narayanan (1984) also offer us valuable insights to develop an adequate measurement instrument herefore.

Hypothesis 5: *ERPS* => *organizational structures (organizational)*

The measurement of this hypothesis is actually threefold, since we not only have to verify the direct influence of ERPS on organizational structures, but also the indirect one via the changes it causes to management accounting itself - namely to decision making and management controls -, which on his turn will have an impact on organisational structures. Furthermore, it is also advisable to verify the influence of the current globalisation on organisational structures.

To measure organisational structure, we can use the overview of Anderson and Young (1999), whereby the research of Gosselin (1997) seems most applicable. Gosselin (1997) provided us with three major dimensions of organisational structure, namely the degree of centralisation⁷⁴, vertical differentiation and formalisation⁷⁵.

Although other research - Libby and Waterhouse (1996), Chia (1995, p. 615), Chow et al. (1999, p. 458), ... - usually only mentions only decentralisation as an adequate proxy for organisational structure, the operationalisation applied here seems more appropriate for the research at hand.

Measurements of the changes to decision making and management control have already been mentioned in the discussion of hypothesis 2 and 3.

Finally, in order to measure globalisation, we can use the Meek et al. (1995) multinationality-instrument, which looks at the ratio of sales outside the multinational's home country related to total sales, based on information in the annual report.

All these variables are expected to be positively related to changes in organisation structures.

⁷⁴ Note that we have already formulated an instrument to measure the degree of centralisation in the description of hypothesis 3, namely the decision authority as described by Gordon and Narayanan (1984). However, the instrument employed by Gosselin (1997) seems more appropriate to assess the impact in the context of this specific hypothesis.

⁷⁵ According to Huber (1990, p. 61) "*the long-term effect of new technology on formalization might be nil*". He only expects high formalization in the early phases of the introduction of the new technology.

Hypothesis 6: *ERPS => management accountant*

(individual, subunit & organizational)

This last hypothesis supposes that ERPS, due to their high degree of integration & automation and their effect on organizational structure, will bring about a redefinition of the management accountant's tasks and responsibilities which may require new skills or introduce new responsibilities.

Although measurement instruments for organizational structure and integration of information (though preliminary) have already been described in the discussion of the previous hypothesis, and one for degree of automation could also be easily constructed, we will allow the constructs to emerge from the field in this case. Chenhall and Langfield-Smith (1998) and Granlund and Lukka (1998a) already provided us with some good examples on how to conduct this kind of research. And although they mention the use of semi-structured interviews, unfortunately enough they neglect to formulate exhaustively the questions effectively asked.

Clearly, the research at hand is a multi-level model (Luft and Shields, 2001, p. 56), as can be verified from the specified levels of analysis with each hypothesis.

Other variables

Apart from the variables which are of direct interest to verify the established hypotheses, there are also some other variables which might prove interesting later on, and will be included in the survey : the perceived utility of the system, the flexibility of the system, the timeliness of the information, the number of different IS that still exist and are employed in the organization apart from the ERPS system, ...

4. Discussion and limitations

First of all, it should be clear that a case study has less external validity than a survey, but greater internal validity than the latter : *"Contrasted to case study methods that collect 'in-depth' data relating to one or a small number of cases, surveys enable greater scope that, by necessity, limits its depth."* (Roberts, 1999, p. 55).

Therefore, after gaining "in-depth" insights into the factors associated with the research question at hand due to the execution of an exploratory case study, a survey might be the appropriate method to gain some more extensive knowledge about these factors across different organizations. Hereby we definitely will have to include certain control variables, such as the industry, firm size, firm health, the package and number of modules adopted, ...

But in order to enhance the external validity of case studies, one has to document very well the proceedings and methods used to arrive at the results, so as to enhance the reliability and especially the possibility to replicate the study (Otley and Pollanen, 2000, p. 484). Therefore, for instance, one has to select the organization under study as representative as possible.

Nevertheless, choices will have to be made according to the data one wants to gather. Hereby, one may not forget that internal validity is always very critical, so that *"claiming high external validity is no defense against low internal validity, as there is no justification in attempting to generalize questionable or spurious results."* (Abernethy et al., 1999, p. 23).

That is why a case study researcher in particular, has to give enormous attention to the development of his constructs, in order to achieve sufficient internal validity, which unfortunately usually is very difficult, as the following statement of Ahrens and Dent (1998, p. 24) points out : *"People in organizations have different backgrounds, sets of experience and motivations. They interpret problems differently, have different frames of reference and see different options and solutions. Representing this complexity in text is not easy."*

Although all the methodological limitations discussed by Cook and Campbell (1979) will be considered in evaluating the results, we can already mention the caution a case study researcher has to apply in order to avoid subjectivity bias.

Another problem that he might be confronted with is the mortality threat (Cook and Campbell, 1979, p. 53), where it can very well be possible that the research champion or some other key person in the research site resigns (or dies) from the organization and whereby - in the worst scenario - the researcher could be denied further access to the organization under study.

Furthermore, as has already been advocated before, our research period should be extended⁷⁶ in order to capture viable data about the possible evolutionary change. Because, if one studies the effects of an ERPS implementation, for instance, just after the actual implementation, the results might be quite different from those that can be obtained three years later, as has also been suggested by Luft (1997, p. 179) :

"Perhaps the techniques were adopted because they were expected to be profitable - and in the long run, though not the short run, they were."

This expectation has also been confirmed by the research of Hunton and Flowers (1997, p. 31) : *"Findings from this research suggest that, in the long run, business organizations might not be wasting valuable time and resources by integrating more sophisticated use of information technology in corporate accounting environments."*

In conclusion, concerning the discussion above, the following citation from Cook and Campbell (1979, p. 83) seems appropriate : *"However, since some trade-offs are inevitable, we think it is unrealistic to expect that a single piece of research will effectively answer all of the validity questions surrounding even the simplest causal relationship."*

Therefore it could be interesting to conduct a comparison of the problems studied here between actual ERP-adopters and non-adopters. Also, experiments could add additional insights into the research question at hand.

⁷⁶ Consequently, a longitudinal framework should be adopted.

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APPENDIX : Description of the measurement instruments

Hypothesis 1

1. To verify the level of user involvement we can base ourselves on the study of Hartwick and Barki (1994).

a) Indicate your thoughts concerning the new system (Hartwick and Barki, 1994); I consider the system to be ...

1. Important/unimportant

2. Not needed/needed

3. Essential/nonessential

4. Trivial/fundamental

5. Significant/insignificant

6. Means nothing to me/means a lot to me

7. Of no concern to me/of concern to me

8. Irrelevant to me/relevant to me

9. Matters to me/doesn't matter to me

b) Their instrument can be extended by two questions derived from the McGowan and Klammer (1997) study, to be rated on a five-point Likert scale indicating the level of agreement.

1. I was highly involved in the implementation of the ERPS

2. People in this organization are receiving proper training and

orientation.

2. The Quality of Information (Teng et al., 1995) is measured using a seven-point Likert scale (ranging between extremely/quite/slightly/neither or equally/slightly/quite/extremely) with respect to :

a) accuracy : The correctness of the output information

accurate vs inaccurate

high vs low

consistent vs inconsistent

sufficient vs insufficient

b) precision : The variability of the output information from that which it purports to measure

sufficient vs insufficient

consistent vs inconsistent

high vs low

definite vs uncertain

c) reliability : The consistency and dependability of the output information

consistent vs inconsistent

high vs low

superior vs inferior

sufficient vs insufficient

d) completeness : The comprehensiveness of the output information content

complete vs incomplete

consistent vs inconsistent

sufficient vs insufficient

adequate vs inadequate

e) relevancy : The degree of congruence between what the user wants or requires and what is provided by the ERPS

useful vs useless

relevant vs irrelevant

clear vs hazy

good vs bad

3. Resistance to accounting change is also measured using a seven-point Likert scale ranging from strongly disagree to strongly agree, with also the "non-applicable" possibility. The following questions will be asked :
- a) I think the change in systems is excellent
 - b) I am one of the initiators of the AIS change
 - c) I believe that my business unit has done a great job in bringing about the change, indicate business unit here :

Hypothesis 2

4. The Impact on Decision Making can be measured based on the use and decision actions taken on "ERPS-provided information", following Foster & Swenson (1997) :

a) Three categories relating to **decision use** can be distinguished :

1. Decision use of the current ERPS system : Respondents will be asked to "rate their current system" on the use of information in the following 14 specific decision areas, on the basis of a five-point Likert scale ranging from excellent/good/average/fair to poor (there will also be a "non applicable" category) : *Identify opportunities for improvement, product management decisions, driving process improvement decisions, outsourcing decisions, process/operating management, product development strategies and decisions, budget and planning, restructuring or reorganization decisions, forecasting, capacity management and capital investment decisions, performance measures, value-based management tools, manage working capital, reward/recognition system.*

2. The frequency with which each of the 12 following business functional areas use the ERPS-provided information to make decisions : *accounting and finance, manufacturing and production, product management, engineering, sales and marketing, quality, research and development, purchasing and procurement, information services, customer service, distribution, personnel and HR.*

The five-point scale is : all the time, most of the time, half of the time, sometimes and never.

3. The frequency with which each of five manager groups use ERPS-provided information to make decisions : *operation managers, department managers, senior management, supervisors/team leaders, line personnel.* The five-point scale is : all the time, most of the time, half of the time, sometimes and never.

b) Regarding to the **decision actions** based on the new information, respondents will be asked to indicate the significance of the changes in 11 decision areas made as a result of the ERPS implementation : *changed process, changed pricing strategy, changed component parts/process steps, changed strategic focus, changed product mix, reorganized/restructured, changed customer support/service, outsourced activities/processes, changed customer segments, changed distribution channels, changed incentive compensation*. The five-point scale will be : very significant, significant, moderate, minor and no changes.

5. Flexibility is measured the same way as resistance to accounting change, with the following questions :

- a) Employees in this department can be easily deployed to work on other tasks
- b) Employees in this department are good at initiating and implementing new working methods
- c) It is relatively easy to obtain raw materials and other production inputs in response to changes in demand
- d) I can easily make changes in production scheduling to suit changes in delivery dates and/or changes in product specifications.
- e) I regularly outsource production if we are at operating capacity
- f) I regularly alter production methods in response to changes in demand
- g) I usually get quick responses to my proposals for new investment in production facilities
- h) We have sufficiently flexible staffing policies to enable use to reduce and expand our labor force to match changes in demand.

6. Although there exist various already established instruments to measure "task uncertainty", a new one (*very preliminary*) has to be developed - of course based as much as possible on the previous ones - in order to determine the actual level of it in the present context.

Indicate your level of agreement on a five-point Likert scale with the following statements :

1. Due to the ERPS-introduction, my tasks have become more routine
2. Due to the ERPS-introduction, the routine part of my job has been taken over by the system
3. Due to the ERPS-introduction, my tasks are now better defined and more transparent
4. The ERPS-introduction has provided me with an established framework I can easily rely on to carry out most of my tasks

7. In order to measure time, we can simply ask (following Krumwiede, 1998) :

What year did ERPS implementation begin (if known) ?

Hypothesis 3

8. Performance evaluation, as a proxy for management control, is verified by assessing the changes to performance measure characteristics - as developed by Moers (2001) - on a five-point fully anchored scale to indicate the level of agreement with the following statements :

- a) Many of the activities and tasks that I perform now⁷⁷ show better up in performance measures
- b) If I perform well as a manager, is now more directly reflected in better performance
- c) Working hard now is better reflected in performance measures
- d) Devoting and effort in my job now is better reflected in performance measures
- e) The measurement of performance now is more objective and verifiable
- f) My performance expressed in performance measures now is more strongly affected by

⁷⁷ "Now" relates to the situation after the ERPS-implementation

- ... 1. *Changes in economic conditions*
- ... 2. *Decisions made in other parts of the organization*
- ... 3. *Changes in the behavior of customers*
- ... 4. *Changes in the behavior of strategies of suppliers*
- ... 5. *Changes in the behavior or strategies of competitors*

The following more general questions described by Shields (1995) and McGowan and Klammer (1997) can also be added, using a five-point Likert scale (ranging from very much to almost not at all) :

- h) How would you rate your management control system on how ERPS-provided information is linked to performance measures
- i) How would you rate your management control system on how ERPS-provided information is linked to reward/recognition systems
- j) As a result of the ERPS-implementation, were there any changes made in incentive compensation (eventually, briefly sum up which ones).
- k) There is a strong linkage between the performance evaluation systems and the ERPS system (*McGowan and Klammer, 1997*)

9. To measure the degree of centralization in the organization the of decision authority instrument of Gordon and Narayanan (1984), based on a seven-point Likert-scale ranging from no to complete delegation, whereby we verify to what extent authority has been delegate to the appropriate senior managers for each of the following classes of decisions (actual, rather that stated, authority), can be used :

- a) Development of new products and services
- b) The hiring and firing of managerial personnel
- c) Selection of large investments
- d) Budget allocations
- e) Pricing decisions

10. The information asymmetry measure developed by Dunk (1993)⁷⁸ uses a seven-point Likert scale (ranging from my superior over equal to myself), asking the following questions :
- a) In comparison with your superior, who is in possession of better information regarding the activities undertaken in your area of responsibility ?
 - b) In comparison with your superior, who is more familiar with the input-output relationships inherent in the internal operations of your area of responsibility ?
 - c) In comparison with your superior, who is more certain of the performance potential of your area of responsibility ?
 - d) In comparison with your superior, who is more familiar technically with the work of your area of responsibility ?
 - e) In comparison with your superior, who is better able to assess the potential impact on your activities of factors external to your area of responsibility ?
 - f) In comparison with your superior, who has a better understanding of what can be achieved in your area of responsibility ?
11. And also the budget slack measure, used by Dunk (1993) uses a seven-point Likert scale ranging from strongly disagree to strongly agree, applied to the following questions :
- a) Standards set in the budget induce high productivity in my area of responsibility.
 - b) Budgets set for my area of responsibility are safely attainable.
 - c) I have to carefully monitor costs in my area of responsibility because of budgetary constraints.
 - d) Budgets for my area of responsibility are not particularly demanding.
 - e) Budgetary targets have not caused me to be particularly concerned with improving efficiency in my area of responsibility.
 - f) Targets incorporated in the budget are difficult to reach.

⁷⁸ Most likely this measurement instrument will have to be adapted to fit the unit of analysis, namely subunit instead of individual, as described here.

Hypothesis 4

12. To measure “coherence and cooperation” we can use the interdependence measure, developed by Bouwens and Abernethy (2001), who employ a five-point Likert scale ranging from almost none/some/about half/a lot/almost all to ask the following :

The following series of the questions deal with your perceptions of cooperation of your department and the department in joint activities you undertake with them. Please give your judgments on the typical relations that exists. Please indicate how much of the total work within your department flows in each of the ways, as described⁷⁹ under a), b), c), and d).

a) Independent work flow case : *Where work and activities are performed by your department independently and do not flow between them.*

b) Sequential work flow case from you to them : *Where work and activities flow between your department and the other department, but only from your to the other department*

c) Sequential work flow case 2 from them to you : *Where work and activities flow between your department and the other department, but only from their to your department*

d) Reciprocal work flow case : *Where work and activities flow between your department and the other department in a reciprocal ‘back and forth’ manner over a period of time until the work is done.*

13. To measure the reduction of uncertainty between the various subunits, we also have to develop a new instrument (*again very preliminary*), which can be based on the suggested previous literature on environmental as well as task uncertainty.

⁷⁹ In the description of the original instrument, Bouwens and Abernethy (2001) also use figures to illustrate the actual questions. Although these figures will be included in the actual survey questions later on, they are not repeated here since they can easily be verified from the original description.

a) How intense is the competition (cost reduction, price, ...) between the various departments in your organisation ? (7-point Likert scale ranging from negligible to extremely) And has this intensity increased after the introduction of the ERPS ? (yes/no)

b) How many new ideas/techniques have been developed and/or implemented in your department that the other departments are aware of ? (7-point Likert scale ranging from none to many) And has this increased after the introduction of the ERPS ? (yes/no)

c) How would you classify the activities of the other departments in your organization after the ERPS implementation ? (7-point Likert scale ranging from becoming more predictable to becoming less predictable)

d) After the introduction of the ERPS, have the responsibilities and objectives of the other departments in your organization become more clear and transparent to your department ? (7-point Likert scale ranging from remained about the same to have proliferated greatly)

14. To measure the integration of information a new instrument has to be developed that will of course be based as much as possible on previous literature, such as the studies of Bailey and Pearson (1983), Chenhall and Morris (1986) and Bouwens and Abernethy (2001), but the instrument will certainly have to be refined based on data gathered from the field itself. So, a preliminary version is formulated here.

a) The integration of systems is defined as the ability of systems to communicate/transmit data between systems servicing different functional areas (7-point Likert scale ranging between extremely/quite/slightly/neither or equally/slightly/quite/extremely).

complete vs incomplete

sufficient vs insufficient

successful vs unsuccessful

good vs bad

b) Indicate your level of agreement on a seven-point Likert scale with the following statements :

1. *The information provided by the ERPS better reveals the impact of a decision made by my department on the other's.*
2. *The information provided by the ERPS better reveals the impact of decisions made by other departments on mine.*
3. *The ERPS provide (better and/or more) information that relates to the objectives and responsibilities of other departments.*

Hypothesis 5

Since we do not have access to the measurement instruments of Gosselin (1997) yet, we can restrict our attention to the degree of centralization as measured in hypothesis 3 for the moment.

The measurement of the other variables relevant to this hypothesis, have already been formulated in the description of the other hypotheses, or have been adequately explained in the paper itself (f.in. "globalization" measure).

Hypothesis 6

As already mentioned, we will allow the constructs to emerge from the field.