THE MANAGEMENT OF INFORMATION SYSTEM WITHIN MULTINATIONAL COMPANIES

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Introduction

Management information systems encompass a broad and complex topic. To make this topic more manageable, boundaries will be defined. First, because of the vast number of activities relating to management information systems, a total review is not possible. Those discussed here is only a partial sampling of activities, reflecting the author's viewpoint of the more common and interesting developments. Likewise where there were multiple effects in a similar area of development, only selected ones will be used to illustrate concepts.

This is not to imply one effort is more important than another. Also, the main focus of this chapter will be on information systems for use at the firms level and to some lesser extent systems used to support researchers addressing company level problems (e.g., simulation or optimization models, geographic information systems, etc.) and those used to support business firms that supply goods and services to consumers and the supply chain beyond the production phase.

Secondly, there are several frameworks that can be used to define and describe management information systems. More than one will be used to discuss important concepts. Because more than one is used, it indicates the difficult of capturing the key concepts of what is a management information system. Indeed, what is viewed as an effective and useful management information system is one environment may not be of use or value in another.

This paper reviews the Management Information Systems concept within multinational companies' relevant research on MIS and IT productivity. Results are organized on three parts by answering to the following questions:

What is Management Information Systems?

How we can make a successful use of information technology in multinational companies?

What do to develop management information system?

Results show that IT has the potential to lead to productivity increases.

This paper tries to identify the conditions under which IT does have a positive contribution. Among these conditions, we note the required changes that must be implemented along with the new technology. We also pay particular attention to project level actions that members of the governance team can take to increase their chances of a successful project.

A – Management Information Systems

1– Management Functions and MIS :

Management is the act or skill of transforming resources (land, labor, capital and information) onto output to accomplish a desired result or objective.

The facilitator shows the overhead on management functions. Information is gathered around critical functions of management such as planning, organizing, staffing, controlling and communicating. Among these functions, MIS is closer to the controlling function as it provides feedback on organizational performance and helps in monitoring.

- **Planning –** establishing goals and developing policies, procedures, and programs to achieve them.
- **Organizing –** grouping activities and establishing organizational structures and procedures to ensure that the activities are performed.
- **Staffing –** obtaining and training personnel to work in the organization in order to achieve goals and objectives.
- **Controlling –** measuring performance against goals and objectives and developing procedures for adjusting goals, procedures, or activities.
- **Communicating –** transferring information on goals, objectives, and performance to personnel throughout the organization and the environment.

GRAPH N° 1 : Diagram of management functions



Source: the searcher

2– Information and system : towards the definition of the two principal concepts :

Before tackling the notion of information system, it's important to agree about the notions that compose this concept such as that of "information" and that of "system". This understanding is as important as that of that of the "information system" concept itself.

2–1– Data, information and knowledge :

In the domain of information theory adopted in the discipline of social sciences, or still in the cognition domain, or more recently, in that of knowledge management, researchers and professionals relatively agree to distinguish or rather nuance these three main notions regarding information management, such as data, information and knowledge.

One of the references that can be cited in this sense is the knowledge pyramid introduced by Ackoff (1989), and reused by a certain number of work types such a Davenport and Prusack (1989), Blumentritt and Johnston (1999), Jacob and Patriat (2000) or still Earl (2006), which present the nuance between these notions as a graduation passing via an evolution process which starts with data, evolves toward information, then towards knowledge to end in wisdom or rather intelligence.

In our case, we're going to just make the distinction among these three notions, knowing that the third is more or less abstract. Data are defined as "a set of distinctive facts and objectives relative to a set of events"[1]. In other words, it is a set of written signals, sono, visual or others which are not linked among them and which have an informative value relatively reduced. For Laudon. "data are values in a crude state representing events which happened in or outside organizations. They're not yet organized in a way that users can understand or help themselves with."[2] In other words, data is generally, in an organizational context, collected and stored in data bases in order to be accessible in case of need. They're not necessarily useful or used instantaneously, but combined with other data, they can have a character more or strategic. The organizations' objective is generally to have the maximum data to use them afterwards for operational, organizational, structural or strategic purposes. However, it's important to note the fact that excessive data in terms of quantity can have a negative impact on performance because they generate costs, prolong composition time of useful information, consume the company's time.

For its part, information "recovers data which are presented in a useful form and which is usable by people."[3]

1 Davenport and Prusack, 1998, p.2

2 Laudon et al. (2006, p.14)

3 Idem

In fact, it results from the integration of data inside a significant content, generally in form of a message ,Information represents an association more or less synergic between a set of data: the link or interaction between these different data add value to the former. Information tends to change, for the receiver, the way of perceiving something, or their judgment over their behavior[4]. Information is relatively volatile, because it is generally linked to a given spatiotemporal context, but it is also linked to its users.

Knowledge is what individuals believe and valorize on the basis of a significant and organized accumulation of information (messages) from experience, communication or inference[5]. Lastly, knowledge is information or a set of contextualized or organized information structured regarding reasoning or thought relative to a theme that is more or less precise. Knowledge is directly usable, has a relatively direct operational utility in that it is explicit. It can, however, be integrated in action, in other words, used in the framework of an activity to be carried out, that may be operational or for decision making. Knowledge integration in the action is one of the elements of competence coming from "tacit" knowledge.

From here, we can treat information in its relatively crude form, ie, "data" in its initial form "information", or still in its contextualized and structured form around an oriented reasoning, in other words "knowledge". This nuance enables us to evaluate information in its real value for the good use.

2–2– System :

The system theory presents a very interesting analysis framework which is at the same time very important with regard to the environment in which organizations evolve today, which is characterized mainly by considerable uncertainty and complexity.

First, we have to make it clear that in this point, we are not going to try to go into the details of a systemic thought. However, it'll be interesting to show how this thought can add value to the analysis and management of an organization. For Senge (1990), this discipline presents itself as a corner stone of other disciplines, because it integrates them all by uniting them in a set of coherent theories and practices. The systemic thought enables us to treat and understand "all" and also examine all the parties it is composed of, as well as the interrelations which are produced among themselves.

Therefore, Rosney defines the system as "a set of elements in a dynamic interaction, organized in function of a goal"[6], he adds the fact that a system is "a set of elements composing an entity or a global unit with a limit". Also, O'Brien defines a system as " a group of related components for a common objective in

4 (Davenport and Prusack, 1998).

5 (Blackler, 1995; Kakabadse et al., 2003)

6 Rosney (1975, p.101)

n organized transformation process which uses resources, and transforms them into final products."[7]

Based on this, we can simply say that a system is a set of elements having mutual actions and reactions, involving resources, and constituting a global entity operating toward a common goal. We can also highlight the difference existing between a structure and a system stating that a structure is static by its relations while a system is dynamic by its actions and reactions. A system is also characterized by a degree of complexity which summarizes itself in the concept of a system variety, and which is defined as the number of elements and possible interactions among themselves. Finally, every system involves inputs, a transformation and outputs.

A systemic approach enables individuals who constitute the organization to have a vision which is beyond the immediate context, and to integrate the impact of their proper actions over other elements (individuals or others), but also those of other elements themselves. Besides, because the construction of the components of a systemic thought is relatively simple, it enables individuals, contrary to what organizations are doing today, to design models which are relatively complex and sophisticated. Senge (1990) stipulates that for complex systems, the use of simple models can bar the vision linked to the real situation of the organization.

Because of this, when we have a good vision of everything, which is superior to that of all the parties, taking into consideration the interrelations between them; and also when we adopt a complex vision, and not a simple one, regarding reality, we can have the best appreciation of the systems that constitute the organization, and which will enable it to use the appropriate resources.

2–3– Definition of the Information System concept :

After having a precise idea regarding information and system, we are going to tackle the notion of information system.

First, we need to note that the concepts "information technologies" and "information systems" are totally different. Information technologies concern a managerial field which is narrower than that of information systems, because information technologies represent a set of technologies dedicated to the collect, treatment, storage and emission of information, and which evoke one of the elements of the information systems of an enterprise. Information technologies are essential in the implementation of an information system but can be omitted in certain organizations which favour face to face, meetings, or the use of other relatively "classic" means of treating information and other means of communication.

7 O'Brien (1995, p.14)

Now, if we move closer to the notion of information systems, we can say that it has been defined by many researchers and professionals, agreeing to the simple use of technologies to the organizational learning. First, we can say that the evolution of these definitions from simple applications (purely technical design) to systems enabling decision making and knowledge management (social and technical design) are relatively linked to the evolution of information and communication technologies, but also to the managerial practices. For our research, we are only going to use the academic definitions.

Thus, Reix defined the information system as "an organized set of resources: hardware, software, personnel, data, procedures ... to acquire, process, store information (in form of data, text, images, sounds, ect.) within and between organizations."[8] From this definition, we can already establish an information system is not only comprised of hardware or software, and is also composed of people and organizational procedures. We can also say that it can be designed for a single company but also between two companies, see.

Laudon et al define information system as a "set of interrelated components that collect (or retrieve) information, treat, store and distribute to help in decision-making, coordination and control within an organization."[9]

From a systematic perspective, this definition requires us to highlight a number of elements 20, to the necessary relationships between various elements of the systems, and is an important feature since the system is generally supposed to pretend a "whole greater than all parties," another important element of this definition and teleonomy, or in simpler term view of information system that is oriented towards helping those involved in decision-making, the coordination and control within an organization. To complete the definition is the concept of organization should be taken in this case in a very broad sense, including one or more entities (companies service department,)

In this line, Hieschheim. (distinguishes between two definitions of perspective on information systems in structural perspective by referring to the work of Davis and Olson (defines information systems as a "combination of people process data model of technology and partly formalized language forming a cohesive structure which covers a number of organizational goals and functions"[10], and a functional perspective, such as that, and Goldkuhl lyyinen ,defining the information systems as "a technologically implemented medium for the purpose of recording, storage and dissemination of linguistic expressions..." [11]

8 Reix (2004, p.3)

9 K. Laudon and J. Laudon , essentials of Management Information Systems, 5th ed. (Upper Saddle River, NJ: Prentice Hall, 2003), p.7.

10 Davis and Olson (1985)

11 Goldkuhl lyyinen (1982)

In the same parentage of the latter definition, Hieschheim et al. define an information system as "a social interaction system technically supported, intended to create, manage to interpret a wide variety of meanings"[12] in this definition we can understand information systems from social perspectives to bring out not expected for such systems, namely the establishment of the exchange and interpretation of a set of meanings without the goals of creating a common sense approach in from "sensmaking" under Weick et al. (2005)

If you go digging further by incorporating the concept of network, we will find that, depending on the work of Reix ,(the informational contribution of information systems that goes beyond the enterprise itself, that is to say network, and richer than the one provided by ICT alone. Indeed, the network presents itself as a coordinating body, but also and especially an area of strong collaboration and thus learning. Learning is technology, emerging from local knowledge emerging from the trust and ethics of members.

In sum, we can say that an information system can be defined as a set of Elements Technologic ,Human and Organizational In Interrelated And in Interacting with each other To Ensure with a synergic manner the Transactional Functions, decisional ,of control and of learning .

2–4– Types of Management Information:

Seven types of information are necessary for top-level managers:

1– Comfort information: informs about current situation or achievement levels that are tuned to expectations. (Clients served, target achieved, patients treated, operations conducted, etc.)

2– Status information or progress information: keeps abreast of current problem study, labor negotiation, grant application)

3– Warning information: signals that change for good or worse are occurring (stock price, turn over, client complaints, etc.)

4– Planning information: descriptions of projects/programs due in future, knowledge of anticipated developments(future of funding, future of federal/provincial support)

5– Internal operations information: indicators on how organization/ program is performing.

6– External intelligence: information, gossip, and opinions about activities in the environment of the agency. Competition, funding policies, political changes, emerging social policies, etc.

7– Externally distributed information: annual report before release, quarterly progress report for donors, press releases about the agency, publicity material before printing, etc.

12 Hieschheim et al. (1995, p.13)

3– Definition and types of Management Information System

3–1– Definition :

A majority of workers today are knowledge workers – they spend time creating, distributing, or using information. Example:

bankers, coordinators, caseworkers, counselors, community organizers, programmers, etc

About 80% of an executive's time are devoted to information receiving, communicating, and using it.

- Information is the basis for virtually all activities performed in an organization;
- Best use of two key ingredients in organizations – people and information;
- Effective utilization of information systems in management;
- Productive use of information;
- Information is a resource to increase efficiency, effectiveness and competitiveness of an enterprise.

This is why the MIS is still a crucial process to make an effective growth within organization.

Management Information System (M.I.S.) is basically concerned with processing data into information. which is then communicated to the various departments in an organization for appropriate decision-making.

GRAPH N° 2 : The m.i.s process



Source: the searcher

Data collection involves the use of Information Technology (IT) comprising computers and telecommunications networks (E-Mail, Voice Mail, Internet, telephone, etc.)

Computers are important for more quantitative, than qualitative, data collection, storage and retrieval; Special features are speed Telecommunications provide the means for one-way or two-way communication and for the transmission of messages. A combination of IT is used: telephone, computer, processor, printer, etc. A lot of time and money are saved and the security of data and messages is ensured.

MIS provides several benefits to the business organization: the means of effective and efficient coordination between Departments; quick and reliable referencing; access to relevant data and documents; use of less labour; improvement in organizational and departmental techniques; management of day-to-day activities (as accounts, stock control, payroll, etc.); day-to-day assistance in a Department and closer contact with the rest of the world.

It is important to note that whatever IT is installed must be appropriate to the organization, and to each department by looking to the 'Functional Areas'.

3-2- Types of Information System :

Information system aims at processing data: to capture details of transactions, to enable people to make decisions, and/or to communicate between people and locations.

- **Transaction processing system** : Reasons for TP are recording, classification, sorting, calculation, summarization, storage and display of results
- **Management Information System** : (Management reporting system)Provide information for decision support where information requirements that can be identified in advance Decisions supported by this frequently occur.
- **Decision Support System**: Assist with unique and non-recurring decisions, which are relatively unstructured. Mainly what factors to consider and what information are needed.
- **Office Information system**: Combines word processing, telecommunications and data processing to automate office information. Draws on stored data as a result of data processing. Includes handling of correspondence, reports and documents.

B – The successful use of information technology in multinational companies

1– Definition of information use

Before the use of formal information can be examined in more details , the construct information use must first be defined .This is considered important as the question what is meant by term "information use" is a major issue.[13]

Due to the lack of formal definitions for the differing constructs of information use, a review of operationalizations of the construct shall provide a deeper understanding of the content of a construct should always be reflected in its measurement .

First, managerial use of formal information can be conceptualized in terms of the extent to which information is used (in the decision – making process).[14] Rahman/Mc cosh ,provided a typical example for such operationalization .there searchers differentiate between managers assuming a high–use , a medium–use style , and a low –use style of information , according to the importance a manager attaches to accounting information and accounting criteria in his decision–making and evaluative behaviour.[15]

Another class of operationalizations is more concerned how and/or why information is used.[16] Irrespective of the intensity of information use, such operationalizations distinguish certain types of information use, thereby adopting a behavioural perspective. Diamantopoulos/souchon add that, in addition to differentiating different types of information use , there are two other dimensions of information use; one is the temporal perspective , which encompasses the immediate and the future use of formal information, and the second is the counter–perspective , which reflects the non–use of formal information .[17]

Hence, the variety of approaches used to define managerial information use is reflected by a broad range of operationalizations of the construct that differ in their focus, scope, process, and scale characteristics (Table below).[18]

13 See Deshpandé/Zaltman (1982),p.15

14 See Menon/Varadarajan (1992),p.61.

15 See Rahman /McCosh (1976),p.340.

16 Idem ,p.61.

17 See Diamantopoulos /Souchon (1999),p.2

18

Primary focus of analysis	Measurement
Focus	• Extent (degrees; levels) of information use • Type of information use • Extent and context of information use • Extent and form of information use
Scope	• One dimension measures • Multiple dimensions measures (disaggregated) • Multiple dimensions measures (disaggregated and aggregated)
Process	• Objective • Subjective
Scale property	• Nominal- binary • Nominal-multiple categories • Ordinal • Interval ratio Interval measures converted to categorical measures

Source: the searcher

Table 1: Approaches to Measurement of Information use[19]

The term "information use" refers to the way in which managers use information.

Nevertheless, it seems useful to differentiate the term "information use" from some related concepts. Usability and usefulness are concepts sometimes used interchangeably.[20] The usability of information expresses the likelihood that the information will be used, while usefulness of information reflects the potential of the information for producing effective outcomes.[21] Both usability and usefulness can be assessed prior to the actual use of formal information,[22] whereas, by contrast, the "use of formal information" is understood in this research is a purely descriptive concept.

19 Based on Idem p.55.

20 See Souchon/Diamantopoulos (1996),p.53.

21 See Kilmann/Slevin/Thomas (1983),p.5.

22 Idem .

2– The conditions for success of IT projects at the firm level

By Measuring the contribution of IT to the productivity of the firm offers challenges. However, most studies now tend to agree that there is a contribution. Over time, the focus of the studies has changed. Where before researchers searched for IT's contribution, now the main goal of studies is to understand how IT can generate the highest value.

Most studies on the contribution of IT projects to a firm's productivity present similar findings regarding the conditionality of the relationship. It is therefore important to highlight the necessary conditions in order to maximize the contribution of new IT investments to productivity or financial performance. These conditions are summarized in the table below.

Table 2 : Conditions Such that it can Contribute to the Productivity of the Firm Level

Author(s)	Terms	Implications
Gregor (2006), Peslak (2007)	Returns to IT projects depend on the quality of the planning and the extent to which the project ties in with the firm's mission.	The project must be accompanied by organizational changes in order to fully take advantage of the investments in IT.
Ko and Ossei-Bryson (2006)	The yield to IT projects is contingent on complementary investments in areas related to IT.	The investment in IT must account for the firm's other capital projects. – E.g. In training the staff for the new technology.
Stratopoulos (2000)	The yield to IT projects depends on the organizational expertise in using IT and previously acquired IT assets.	The implementation of new technologies must be coordinated with the technologies that are already present in the firm and pre-existing expertise
Thomas (2008)	The yield to IT projects requires the elaboration of formally defined and quantifiable criteria of success. These criteria make a better use of resources possible throughout the project.	• The need to define clear and tangible criteria for success. • Ensure rigorous follow-up to rapidly correct for unforeseeable events. • Prior to beginning develop measures to quantify the benefits generated by the project.
Ashurst et al. (2008)	The benefits depend on the commitment and on emphasizing the gains that will follow rather than the technology itself during the development, implementation, and use.	• Establish yield targets before starting the project. • Closely monitor the impacts throughout the implementation of the project.
Markus (2004)	IT projects can deliver high value if project deliverables are combined with organizational change in iterative chunks. Benefits have to be realized, not just planned.	The 3 key elements of an IT project – the IT team, the change target, and the executive sponsors need to collaborate closely to achieve value through IT projects.

Source: www.cirano.qu.ca

These conditions have vital implications for the organization and must guide the process of implementing IT projects. Aligning technological change with the firm's fundamental mission is a basic premise for successful projects. A global vision for development of the project that accounts for past and complementary investments will promote a balance between new technologies and value creation processes within the firm. However, it is important that various criteria for success be known early in the implementation process and that measures are developed to quantify the benefits and focus the efforts on the objectives of the project.

The conditions under which IT can generate the highest impact can be grouped into four categories. The first one is the conditions that are under the control of the project manager and team, responsible for implementing the technology. The second category encompasses the elements that fall under the responsibility of the managers of the organization. The third group contains the actions that the executives should consider. Finally, the last group encompasses the items that should be addressed by the Board.

2–1– Project Manager

The literature on project management is abundant and many of its contribution are now well understood and applied in organizations. The rise in the implementation of project management practices in organizations explains in part the increased success rates, in terms of meeting schedule and budgets, that IT projects are experiencing. Project managers are better trained, better supported and have a recognized career path in many organizations. They have evolved clear processes to identify and manage risk; thereby increasing the probability that value will be delivered.

In recent years, there has also been a change in the understanding of the skills that project managers need to be successful in highly complex, multi-organizational projects[23]. In addition to technical and organizational skills, there needs to be leadership, negotiation, and general business skills. This change has increased the likelihood that project managers will deliver projects of value to the organization.

A recent international study on the business value of project management [24]found moderate support for a tangible ROI from project management. However, their surveys and case studies found strong support for the finding that a consistent application of project management techniques and processes results in improved communication, decision making, and effectiveness within organizations. So, although many organizations do not measure ROI from their project management activities, none would abandon them.

23 Sauer and Reich, 2009

24 Thomas and Mullaly, 2008

Apart from the rise in awareness and implementation of project management principles, many organizations are taking a further step in order to derive value from IT projects. Many are creating a unit called the IT Project Office. These units offer methodologies, quality control, education, and intervention when required. Project management offices also advocate the elaboration of clear goals and performance reporting. They attempt to balance the tensions between change, as embodied in IT projects, and the steady-state operations of the organization.

2-2- Organizational Managers:

When implementing information technology, users have to be fully involved, especially if the project is expected to change the processes, skills, or structures of business units. Activities and assignments performed by users reflect overall leadership or accountability for the project. Hands-on specific design and implementation tasks will increase the likelihood that users will ensure that the system design fits their reality and that they will be committed to a successful implementation. This is an especially challenging aspect when implementing very large systems. The large number of users forces the project teams to be more creative in finding ways to generate user participation.

When dealing with the user community, change management is an important item of project management. A sense of urgency has to be created in the organization. A rationale for change is provided and project teams ensure that people are involved early on in the project. The messages, measures, management behavior, and rewards are organized to match the change initiative. Ideally, change leaders help people make sense of change in relation to their day-to-day lives.

One thing that emerges from the literature is that technology can be seen as a necessary but not a sufficient condition for increased productivity. Studies have shown that when technology was implemented without corresponding organizational changes, only limited benefits were achieved. The full range of benefits was obtained when complementary investments (and change) were conducted in parallel with the development of the technology. In these cases companies can align technology with their strategy and realize benefits.[25]

In order to achieve expected benefits, managers have their responsibilities, just like project managers have theirs. Managers have to design and actively manage the required organizational changes in order to capture the benefits of the technology. They also need to make the complementary investments in human capital to be able to take advantage of the IT assets. Finally, managers should focus on the links between investment, use and impact, not simply between investment and impact. These elements will be detailed in the next paragraphs.

25 Aubert and Bourdeau, 2007

Ko and Osei-Bryson (2006) insist that the IT investment has to take into account other investments of the firm. For managers, looking at IT as an asset requiring complementary investments is very important. For too long IT was seen as a tool that had to be deployed and used by the employees. In order to use it, the employees simply needed training on how to use the technology.

Managers should:

- Conduct process transformation projects in parallel with the IT project, not waiting until the IT artifact is implemented. Map externalities (positive and negative) on their business – understand spill-over effects. IT often generates unplanned consequences, outside the project boundaries. These effects can distort the incentives to invest in IT (for e xample when a technology shifts costs from one department to another. The department reducing its costs will have an incentive to pursue the project, even if it is not desirable for the organization).
- Assess the business risks (not the IT project risks) associated with the business transformation.
- Adjust their incentives and reporting tools with the new business rulesand processes.
- Be the person responsible for the productivity gains (because they are associated with business change). IT cannot be responsible. IT is providing assets. Management uses the assets.

This is a tall order, but it is not enough. Very often, there are "unintended consequences" of IT projects. These are outcomes that have not been envisaged or planned for. If they are positive, managers should be ready to enhance, extend, or alter the project to capture new benefits. If they are negative, managers need to provide the leadership to work through the issues, while keeping an eye on the end game. For example, knowing that implementation usually leads to initial productivity declines allows a manager to be calm during the frantic implementation period. The more experience a manager has with IT projects, the better he or she is at providing this critical leadership. Training in project management is a good investment.

2–3– Implications for Executives

Executives approve the large projects. They ensure that these projects fit into the overall strategic initiatives and they act in the role of sponsor for individual projects. Sponsors are thought to be the most important element in project success; it is generally recognized that a high level of business-line participation and cooperation is important for project success.

More and more organizations are building comprehensive business cases when thinking about IT projects. These business cases should lay out clearly the benefits envisioned. Moreover, a causal chain linking the IT artifact with the

expected business outcome should be developed and monitored throughout the project. As changes occur in the technology, organizational or strategic domains, the link between project and business value can be checked and re-checked. This visualization and monitoring of benefits realization has to be systematic.

During the project, executives as sponsors will provide resources and "cover" from political interference and persuade their peers to support the project. When the project is implemented, executives must be responsible for obtaining the business value from projects. Often the project can be successful from a time and budget perspective and the organization may redesign processes and structures to implement the technology, but there still are no measurable benefits. A classic case is the 'saving time' objective – is the time reinvested or wasted? Another example is an increase in quality without a commensurate increase in sales or revenue. Executives need to establish a clear "line of sight" between investment and value, taking into account the costs of implementation. They should make this causal chain visible and help the organization monitor it as the project proceeds

Executives, in their role as sponsors or steering committee members, have another key role and that is one of boundary spanner.

2–4– Implications for Boards :

The Board, and with key suppliers, customers, competitors and regulators, they are in a unique position to provide early warning to the project of impending changes. Often we see projects derailed by a merger, a new product implementation, or a restructuring within the company. Sometimes, cancelling the project is the prudent decision; in other cases a change in direction or in scope is called for. In any event, early warning of these changes can stop the waste of resources, both monetary and human.

Board members approve the large projects and track key activities in the company. When significant IT investments are made, boards have a responsibility that goes beyond approving the business case.

They should assess:

- If ongoing IT investments are critical to organizational success, does the Board have the knowledge to provide oversight? Is there a lead director for IT (as there is for legal, audit, investment, supplier or customer issues)?
- Is the company positioned to be successful with this investment? If the company has a poor track record with organizational change and IT projects, what new mechanisms will be in place to ensure success? One example might be a Project Office or consulting support;

- What are the key indicators that the Board can track to ensure that the project is progressing satisfactorily? These indicators should not be limited to budget and schedule; they should include the complementary changes that will be made within the organization;
- Ask for a regular report (a form of score card) to monitor these indicators;
- How does the investment fit with current and past investments; how does it open up new ventures, new possibilities;
- The major risks of the project – destabilization of operations with escalation;
- Ensure that appropriate risk management practices are in place for both the IT project and the business transformation project

3– Understanding the contribution of IT to productivity :

Information Technologies (IT) have had a profound impact throughout the economy. They are now integrated into a majority of production activities. However, as we have seen, it is difficult to establish a clear relationship between investments in IT and companies' financial performance of productivity gains.

Several reasons have been proposed to explain difficulties observing this relationship. One of the first authors to explore this paradox was Brynjolfsson (1993). He classified potential sources of the paradox of investments in information technology into four distinct groups. These four groups are: (1) measurement error, (2) a lag in the return to investments, (3) the existence of a phenomenon of redistribution, and (4) the presence of systematic error in the management of IT.

The first three are closely related to the methodological choices made in empirical research. However, methodological problems are not the only explanation for the difficulties understanding the impact of IT on productivity.

3–1– Measurement Issues :

The first group can be described simply. If a large number of benefits are expected from investments in information technologies but there is no way to quantify them, then their impact cannot be measured. Traditional measures are not suitable for capturing non-traditional sources of value creation like IT. One line of reasoning having been put forward in favor of this argument is that the benefits most commonly associated with IT are precisely those aspects of outputs that are most difficult to quantify, such as increased product variety, quality, speed, and customer services. These difficulties in finding good measures are principally concentrated in the services sector and in evaluating the productivity of white-collar workers.

One of the main problems in quantifying the outputs of these sectors is the difficulty in assigning accurate costs to them in order to obtain reliable coefficients to control for inflation and variations in output quality.[26] Without these reliable coefficients comparisons between output levels are impossible. another problem is that the theory of wages suggests that, if the introduction of information technology increases the quality of working life, workers will find that their wages are cut in proportion. Brynjolfsson (1993) suggests that the modest salary increases received by the clerks might be explained by the increased in their quality of working life. This trade-off cannot be measured by government statistics. This corresponds to our expectations, though it does not allow a robust relationship to be established.

The argument for the presence of measurement error is difficult to prove, especially in the output of white-collar workers. Measurement is much easier in a physical process. For example, Mukhopadhayay et al. (1997) demonstrate a positive link between the use of information technology and quality of work. They examine the impact of using optical character recognition and barcode sorting technologies on mail sorting in the United States Postal Service (USPS). This allows them to measure both output and the amount invested in IT with precision; thus addressing a main criticism of other research in this field. This type of analysis at the project level allows potential measurement errors to be contained. Mukhopadhayay et al. are very cautious regarding the possibility of generalizing their results. They point out that the relationship observed in their study could be biased by the presence of characteristics inherent in their project which may be unobservable in other projects.

3–2– The Lag Between Investing and Reaping the Benefits :

Some authors talk about the existence of a lag in the return to investments made in information technology. If there is a lag between the time of the IT investments and the appearance of profits, it is quite possible that results observed in the short term will show no positive link between IT investments and financial performance. Conversely, a long-term study might reveal a positive correlation and strong performance. This situation might arise when the new technology imposes a learning curve on the workers or the implementation requires restructuring the company in order to fully benefit from this new technology.

This perception is consistent with the study by Brynjolfsson , who find that a period of two to three years is required before the full impact of IT on the organization is observed. In addition, McAfee finds that implementing an Enterprise Resource Planning (ERP) system without changing the firm's processes results in a decline in performance in the short term. However, after several months performance rises significantly above the initial level. Therefore,

26 Brynjolfsson, 1993

managers who are aware of this lag phenomenon may very well continue to invest as much in information technology, even though non- longitudinal studies show no financial gains from these investments.

3–3– The Redistribution of Benefits

A third explanation for the inconclusive results is redistribution. This explanation suggests that IT investments can be profitable for some companies in a sector, but from the perspective of the industry as a whole they are unproductive. This somewhat more pessimistic explanation of the paradox says that information technology "redistributes the pieces of the pie" to the benefit of some firms," without actually increasing its total size." This explanation springs from the observation made by certain economists that compared to other goods; information is particularly vulnerable to the obtained rents being dissipated among firms.[27] Thus, rather than arising from the creation of new value, gains from investments in IT come at the expense of other firms on the market.

3–4– The Management of IT

The aforementioned explanations mainly address problems encountered by some studies at the methodological level. These last explanations are based on theory that encompasses all aspects of the firm and IT investments the first of these explanations is from the theory of required technology stock accumulation developed by Oliner and Sichel (2005). This explanation suggests that even if there has been some spending on information technology in recent years, IT capital stocks are still modest. This could be explained by the fact that companies have only recently decided to invest heavily in IT and that technology stocks tend to become obsolete quickly compared to certain other asset groups. Consequently, it is difficult for these stocks to make a mark on the performance of the firm.

The second, more theoretical explanation, which would explain some part of the productivity paradox of information technology, might be the presence of systematic error in the management of IT.

This hypothesis can be summarized as follows: Investments in IT are not productive because the managers who invest in these assets are not pursuing the best interest of their firm. Moreover, a further aspect of this explanation is that IT investments are unproductive if companies do not undertake an organizational transformation in tandem with the investment in IT (Porter and Millar, 1985; Santos and Sussman, 2000; Stratopoulosa and Dehning, 2000).

Several authors have evoked this hypothesis to explain the paradox. Dos Santos and Sussman (2000) argue that "The reason for delays in obtaining the benefits is due to management's failure to strategically leverage the full potential of IT and their failure to overcome resistance to change." According

27 Brynjolfsson, 1993

to them, the reason why the benefits of IT investments are not transmitted to companies' financial results is that they fail to reorganize their organizational structure and that management is unable to overcome resistance to change. Dos Santos et al. advocate, among other things, that the role of IT be reframed to integrate it into the culture of the organization and that multidisciplinary teams be created to fully capitalize on the benefits of IT and to facilitate the transfer of pertinent knowledge amongst employees according to Porter and Millar (1985), information technology is the pipeline that links the processes within the organization. In consequence, superior financial performance will only be achieved by companies that have not only completed implementation of IT projects, but who have also managed to integrate IT into their processes.

These companies then build a competitive advantage through better control of this technology Stratopoulos and Dehning (2000) speculate that the paradox is rooted in the fact that many businesses are ineffectual in their implementation of IT projects. Of the numerous companies that invest in the same technology, only those who manage to integrate IT into business processes will be able to add value to it. Their empirical results therefore support the argument that solid investments in IT lead to superior financial performance. However, this performance boost yields a benefit in the medium term, as it tends to be eroded over time as competitors copy the IT investment and the method of implementation used others highlight the link that may exist between IT and organizational change.

This is the backdrop for the study by Gregor et al. (2006) investigating potential relationships between IT and associated organizational changes. Working with a survey of 1050 firms they came to the following conclusions:

"Factor analyses showed organizational transformational benefits were recognized as a separate category of benefit, distinct from informational, strategic and transactional benefits. A single factor solution was also readily interpretable, showing that the four categories of benefit were all components of one overarching factor, IT business value."

Their results also reveal that organizations believe that benefits will increase if they improve the flow of information by using IT. These gains are achieved through quicker and more convenient access to information. According to their analysis, the benefits obtained from these organizational changes are highly correlated with the total value of companies' IT assets. This reinforces the notion that IT investments made in conjunction with organizational changes have a much greater impact on companies' financial performance and productivity than they would on their own.

Finally, the last theoretical explanation is summarized by Ataay as follows: "From a theoretical viewpoint, researchers have argued that, while IT investments have served to increase firms' productivity and consumer value,

they have also lowered entry barriers, eliminated market inefficiencies that enable a firm to maintain monopoly power and intensified market competition, thereby failing to create any lasting return to the investing firm (Bakos, 1991; Hitt and Brynjolfsson, 1996)."[28]

In addition, certain studies, such as Pinsonneault and Rivard (1998), seek to empirically verify these assertions. Their study of 59 managers in 3 companies (a bank, a telecommunications company, and a manufacturing company) suggests that when the firm level is undergoing strategic changes, IT is used to strengthen and support specific roles perceived as critical by management. Moreover, their results show the importance of focusing on work processes (not only on outputs). These concepts lead us to reflect on the foundations underpinning models of organizations on markets.

Although some studies still raise doubts about the contribution of IT to productivity, the empirical literature in recent years has tended to draw a positive conclusion. The paradox of the 1980s appears to have made way for a positive impact of IT on productivity, at all levels of analysis. That is why Kohli and Grover (2008) can assert that we have now gathered sufficient empirical evidence to refute Solow's productivity paradox.

At the end of this section we can put this conclusion with respect to the contribution of IT to productivity do not solve all problems. At the firm level, we must understand the circumstances that allow the organization to generate productivity gains. IT thus has the potential to contribute—it is up to the firm to make it happen.

E – Developing Management Information System

1– The role of MIS Coordinator to develop the MIS :

- Interact with user groups;
- Identify the needs of users of MIS;
- Designing of reporting formats;
- Identify systems of information flow;
- Ensure smooth flow of information within and outside the organization;
- Time management – tracking inputs/reports;
- Act as interface among sections and management tiers;
- Identify training needs of staff in MIS jointly with application developer;
- Organize monthly/periodic meetings to assess performance, maintain minutes and follow-up on the decisions;
- Interface with the various divisions/units in the organization for information sharing.

28 Ataay (2011)

2– Steps to build an effective Management Information System:

It is my experience that when a company attempts to establish its management systems for the first time, it takes longer than expected, involves more people than planned, and grows in complexity. To control this trend, I advocate dividing the process into five (5) distinct phases, each with clear objectives:

1– Discovery

2– Planning

3– Development

4– Implementation

5– Rediscovery

The Complete Five Phase Process are ;

2–1– Phase I – Discovery :

Imagine what a professional football team would be like without a regimen of practice drills? Now take away their playbook and player statistics. What you have in this extreme scenario are highly talented (and perhaps overpaid) individuals participating in organized chaos. They might actually win a game or two, but in the long run, this team is doomed.

I offer this illustration to drive home the point of why any organization needs to examine the existence and effectiveness of its management systems. If there are weaknesses or holes in your documented procedures (playbook), or benchmark measurements (stats), then you will want to take corrective action.

2-1-1- Discovery Procedures

Think of this initiation phase as all the things the coaching staff does up to and including the first pre-season team meeting. It is where the overall missions and goals are set, with clear effectiveness criteria established. Certainly the team may set it sights on the championship, but what about the kicking team or linemen? Each part of your organization must have meaningful and measurable performance criteria mapped out in this phase.

2-1-2- Management Procedures

Establishing objectives and criteria requires close scrutiny by management of what really contributes to the overall company mission. Departmental goals must be aligned with company goals. To illustrate with our football analogy: running backs may propose a goal of 5,000 total yards rushing in a season. This may or may not be beneficial to the team goal, whereas an aligned goal might be to achieve an average of +5 yards per run. The latter may be more appropriate for a highly pass-oriented offense.

In your discovery phase, once your objectives and effectiveness criteria are agreed upon, you can create your action plan. This step is simply the broad roadmap covering the remaining 4 phases of building your management system.

The Discovery Phase generally takes from 2-4 weeks, and represents approximately 12% of the total process. Onto the next stage;

2–2– Phase II – Planning

Have you ever had the opportunity to watch the construction of a large building? The daily progress from foundation to top floor is truly amazing, and if you're like me, you wonder "how does it all happen?" The answer: it takes a lot of planning.

A complex construction job clearly requires project planning in excruciating detail to orchestrate materials and manpower. Inadequate project planning can result in waste, delays and a shoddy end-product.

Building an effective management system is equally dependent on executing a strong planning phase.

2-2-1- Planning the Management System

The planning stage is arguably the most important step in any large-scale project. If you fail to plan properly, everything else will likely follow this failure.

Just as a construction contractor wouldn't dare start ordering materials or pounding nails without a plan, your firm must avoid moving too quickly into the actual development phase of writing procedures that are the basis of an effective management system.

2-2-2- Business Assessment

Using the construction analogy, the first step is typically a survey of the parcel of land on which to construct your building. You'll examine such conditions as utilities, roads, property grade and soil. In a management system development project, we call this step a GAP Analysis, or Business Assessment, because it articulates what the "gap" between current reality in your organization and your stated objectives. Recall that the objectives and measurable effectiveness criteria were established in Phase I – Discovery.

The results of the Gap Analysis, or Business Assessment, are used as inputs to produce a project plan.

2-2-3- Planning the Project

The Project Plan details the materials and tools that will help management control the project as well set budgets and schedules. Most of us are familiar with the components necessary to manage the conversion of a bare piece of land into the architect's vision: drawings, bids, permits, contracts, work orders, and inspections. But what is required to develop a management system?

2-2-4- The Complete Process

Your project planning phase includes producing these components that will greatly ease the Development and Implementation Phases (III and IV, respectively) and make for an overall solid structure:

- Project roles and responsibilities ;
- Organization chart ;
- Activities, resources, dates ;
- Reviews structure ;
- Status reports ;
- Document control and format ;
- Process map ;
- Compliance requirements ;
- Training, implementation, testing and audit plans.

2-2-5- Review the Process Map

Before concluding the Planning Phase, a review is conducted of each component with emphasis on the process map and effectiveness criteria to ensure alignment with identified organizational goals. This check will help eliminate project drift in the coming phases.

The Planning Phase takes from 2–4 weeks, and leads us to the Development phase.

2–3– Phase III – Development

Now, I'm no entertainment mogul, but The Development Phase reminds me of producing a Hollywood movie. When we sit in a theater and watch the latest blockbuster, we see a finished product and assume it was made pretty much as it looks. But we would be wrong. Making a movie, much like the process of building a strong policy and procedure system, is a non–linear process with a tremendous amount of "behind the scenes" support.

2-3-1- Management Systems and the Development Process

Just as every great movie is guided by a talented Director; your effort to build an effective management system requires a skilled Project Manager. The role is especially critical in the Development Phase because it is during this stage that the time, effort and expense of the entire project cast is involved, and much like the actual shooting phase of a film production, it can consume up to 50% of your project cost.

2-3-2- Policy and Procedures Expertise

What skills make a strong Project Manager? Besides the obvious qualities of good organizational, communication and time management skills, I include policy and procedure or process development expertise. Depending on your staff, this may require an outside resource.

2-3-3- Related Development Processes

You might be surprised to learn that movies are seldom shot in "linear sequence"… that is, from start to finish. For a number of reasons, the director will organize scenes into groups that are filmed "out of sequence," then edited into their correct place. Similarly, your firm will want to conduct the Development Phase by organizing related processes into a grouping and then completing these before going on to the next set.

2-3-4- Policy and Procedure Document Control

Your development work will begin by establishing a policy and procedures document control flow and format. (Think of these as setting the stage). Next your assigned writers will craft the actual documents from base materials. (Refining the script). Then a process walk through is performed and tested for a) compliance and b) effectiveness. (Dress rehearsal) Once this process grouping is completed, you move on to another set.

2-3-5- Supporting Documents for the Process

At the end of a film, I'm always amazed at the long scroll of credits after the actors' names. It takes a tremendous amount of resources to make it all happen, and your development process is no different. You'll rely on valuable support documents such as job descriptions, forms, technical manuals, training programs and reference material to develop your new management system.

2-3-6- Process Review for the Completed System

A motion picture can't be released until all the scenes are shot and edited. Likewise, you will want to complete the process documentation and a review of ALL your processes as a completed system before moving on to the next phase – Implementation.

The Development Phase should take 2–4 months, depending on the number of processes, compliance requirements and skills of the writers/reviewers. And now you're ready to put your management system into the action.

2–4– Phase IV – Implementation

Before we discuss Implementation, a quick recap:

In Phase I (Discovery) we learned how your organization specifies the project mission, objectives and effectiveness criteria. Phase II (Planning) entailed setting requirements for project tools, budgets and schedules to manage your project. Phase III (Development) taught us about identifying and testing processes within the system.

With all of that behind us, next it's time to learn about "learning".

2-4-1- Implementing the Management System

Implementing an effective management system is much like the first day of school. When young children walk into that big new classroom for the first time, the effect can be intimidating, even overwhelming. New students are like

blank slates: intelligent, capable, but completely untested and unschooled in the challenges that lie ahead. By the time the final bell rings on their academic careers (many lectures, raised hands, and exams later) those same students have grown into talented experts in their chosen fields. The difference between "before" and "after" is training, testing, and time.

2-4-2- Training and Assessment

In the same way, implementation is all about information and assessment. Your class must be educated, indoctrinated, tested, and graded in the ways of your management system in order to graduate to effectiveness. No one ever said it was easy, but with studying and hard work, your organization is sure to score straight A's.

2-4-3- Skills and Business Assessment

The first assignment for Effectiveness 101 is a pop quiz to see exactly where the focus of your improvement efforts will need to be. A preliminary assessment of your employees' skills and competencies will help determine the training gaps your people need to close.

2-4-4- On-site Process Training

Once you have identified your training needs, then your lesson plan can begin in earnest. Your training program will introduce your employees to the job descriptions, processes, and procedures that compose the management system. Just as importantly, your employees must be trained on the relationships between themselves and your objectives and effectiveness.

2-4-5- Internal Audit

Once the coursework has been taught, it's time to do some grading. A top-to-bottom audit should be conducted of your entire system against your objectives and compliance requirements. With this audit completed, you will be able to graduate from where you've been to where you want to be.

2-4-6- Total Implementation Time

No one goes from kindergarten to college overnight. You are working toward a stable system, and it will take time. Roughly 50% of the project's total time, in fact; implementation usually takes a three- to six-month "semester" to complete. The exact amount of time you'll spend will depend on how many employees, locations, and processes you have.

2–5– Phase V – Re–Discovery

Now we turn the corner to our final phase: Re-Discovery.

This year marks the 200th anniversary of the expedition of Lewis & Clark, and much has been written about their remarkable journey up the Missouri River and on to the Pacific. This band of explorers was aptly named The Corps of Discovery. In reality, The Corps made two trips, the second being their

return. It is likely that the unheralded return journey was more revealing and insightful than the outbound leg, offering them a chance to re-discover with clearer vision what they had already seen. It is in this frame of mind that your organization will embark on the Re-Discovery Phase of building an effective management system.

The procedure and user manuals are developed and personnel are oriented in using MIS. The software is installed once it is tested and debugged.

GRAPH N° 3: Steps to build an effective management information system



E – Business contribution of ERP systems in multinational companies

1– System Evaluation :

The actual process of evaluating and selecting an ERP System is never the same for any two companies. Unique internal conditions are going to determine exactly what work needs to be done. There are, however, common steps and exercises that a company and its evaluation team should take. Some of these steps include:

1- Selection and empowerment of a cross-functional Evaluation Team that includes the best and the brightest individuals from each functional area of the company.

These individuals should understand the inner workings of their respective departments thoroughly.

As the evaluation moves forward, they can fairly and accurately represent and communicate the needs of the functional unit regarding a new enterprise system. They also need to understand the importance of information sharing and integration, as well as embrace and champion positive change. The team should have as its leader an individual from the company's executive management team who reports directly to the CEO.

2- The members of the team need to learn the reasons and conditions that exist within the company that have led to the decision to evaluate potential enterprise systems; they also need to know what the final solution might look like.

Additionally, each member of the team will need to educate the other members about the functional area of the company they represent.

3- The company's resources need to be identified and assessed. The intention here is to evaluate the areas that are most critical to the business's ongoing growth.

In addition to those areas that may be unique to your business, the following also need to be assessed:

- Personnel – determine how the company presently uses its personnel; define the organization's strengths and key areas that need improvement.
- Technology – understand what the business's current information management infrastructure is. Looking inward, it is important to identify how the current IT infrastructure may be limiting the company's growth. The key will be to target those areas where potential enhancements can most profoundly affect the business in order to facilitate the desired growth. The end result will be an outline of the current technology infrastructure and what it will need to be in the future.
- Workflow – The critical processes and workflow issues within the company have to be analyzed. The critical operating decisions that are made on a daily or ongoing basis need to be identified. Consideration needs to be given to not only how these processes actually work today, but also how they should work as the company grows.
- Performance Measurements – A business model for success needs to be defined along with the metrics that will be used to measure business performance.

Establishing these measurements is critical not only to define the organization's growth potential, but also to help identify the path that needs to be followed in order to achieve the desired degree of growth.

4- The elements required to meet the company's goals have to be defined. This can be accomplished by identifying the requirements for success. These requirements will then be used as the guideline for selecting an ERP solutions provider. The steps involved in this process include:

- Identify the limitations or problems with the current business approach, and pinpoint those situations that create the greatest barriers to the company's success.
- Identify the organization's core competencies – those factors that give the organization a distinct advantage over its competition.
- Identify the requirements for a solutions partner regarding implementation, features, functionality, service, tools, ongoing customer care, and support.

5- Identify the most important system functionality when evaluating and selecting the right enterprise solution for the organization.

6- Additional items that need to be considered when evaluating potential solutions:

• Will a solution that is industry-specific in design be a better fit than one that is generic?

• Is the vendor's product scaleable to accommodate rapid or unexpected growth?

• Are the solutions that are under consideration configurable to meet the specific needs and business processes that exist now, as well as new ones in the future?

• Is the solution flexible, so that it can operate on a variety of IT platforms to accommodate possible changes in the future?

• Are the product functions and features available now? If not, when will they be available and how important is it to have that function or feature?

2- Drivers, Benefits and Barriers :

The characteristics of today's competitive environment put a great deal of pressure upon organizations for greater levels of organizational integration. The geographical expansion of competition and markets that are increasingly global create a greater need to integrate operations around the world. In addition, many of today's customers increasingly expect products to fit their specific needs, as well as requiring faster delivery times. Satisfying these demands frequently entails tightly linked supply chains with a multitude of suppliers and distributors.

Further, firms are more and more concentrating on core competencies, sub-contracting or outsourcing other parts of their operations, which in turn can also lead to tight couplings between their business processes. Moreover, increasing numbers of strategic alliances between business partners such as just-in-time inventories, also require that operational processes of otherwise independent firms be tightly coordinated. Finally, increased reliance on e-commerce business models requires not only well-integrated technological infrastructures, but also the integration of an organization's processes with those of suppliers of products and services, as well as with those of their distributors.

In addition to the pressures of the business environment, organizational integration also provides companies with sizeable potential benefits. For example, integration has been found to lead to significant and difficult-to-imitate strategic advantages based on improved manufacturing productivity and overall firm competitiveness

Integration is also thought to provide important operational benefits by more tightly coupling activities across the value chain. Williamson argues that integration of functional processes can lead to lower production costs through savings in transportation, inventory, and energy (e.g., thermal economies), and that integration into peripheral activities (e.g., forward into distribution, backward into suppliers and raw materials, and lateral into components and parts) can generate significant economies of scale and of scope.

Malone, Yates and Benjamin (1987) suggest that integration of value added activities can save time, reduce errors in entering data, facilitate the coordination of activities between design and manufacturing, and reduce total inventory cost. Empirical evidence indicates that better integration of business processes in the value chain such as R&D, manufacturing, and sales, can lead to products and services that are more attuned to the market, with better communication and inter-functional synergy leading to greater new product success and higher rates of innovation[29], to significant reductions in shipment discrepancy levels, and to more rapid design and delivery of products, lower inventory cost, and higher throughput.

Others also suggest that integration can facilitate the redesign of a firm's economic production and exchange relationships, and enable new forms of industrial organizations such as network enterprises and virtual firms.

In fact, organizational integration might not only facilitate the transformation of traditional firms into virtual or network firms, but it might also be a key to the efficient operation and management of dot-com companies[30]. No doubt fuelled by the pressures of the new competitive environment, as well as the hoped-for benefits of integration, it is not surprising that firms have been striving to achieve higher levels of organizational integration. During the last couple of decades, these efforts have particularly focused on the development or implementation of integrated software solutions.

29 Cooper and Kleinschmidt, 1987; Florida and Kenney, 1990

30 Venkatraman, 2000

Well known examples of firms which gained important competitive advantages through such efforts include: Baxter Health care, which electronically integrated itself with many hospitals through its ASAP system; and Federal Express, which integrated most of its important clients into its processes by giving them access to its order processing, dispatching, and tracking systems.

However, achieving higher levels of organizational integration appears to be far from being simple and easy. For one thing, implementing integrated software and achieving organizational integration is not necessarily the same thing. Software such as ERP systems are frequently advertised as providing a seamless integration of a range of industry best-practices.

However, integrating a multitude of organizational processes and technologies entails much more than the purchasing of an ERP software as their implementations often require major transformations and adjustments to the software, to the organization,

These difficulties may in part stem from what Hitt, Hoskisson, and Nixon (1993) identified as the three main barriers to inter-functional integration.

First is functional specialization, which impairs the ability to achieve overall understanding and coordination, and reduces the efficiency and effectiveness of communicating information across functions.

Second, and related to the first barrier, is the presence of distinct frames of reference among people who work in different functions, as manifested by their individual cognitive biases, heuristics and tacit knowledge. Moreover, the communicating of information and coordination of activities across functions is rendered more difficult by their different languages, which tend to be specialized, hermetic, and non-standardized.

Third, certain power and political considerations are also likely to interfere with inter-functional integration. For example, some managers might feel that participation in integration activities could result in reduced resources for their units. Similarly, sharing information, which is a prerequisite to integration, might also be seen as a potential threat to functional territoriality. Those who control information might not only be reluctant to share it, but they might also use it to further their political agendas and increase their organizational power, further countering integration efforts.

In fact, research evidence indicates that those who controlled information about computing in organizations used it to further increase their control over IT and reinforce their power basis.

Given the strong competitive pressures that drive organizations towards greater degrees of integration, the wide range of benefits that greater organizational integration can potentially generate, and the difficulties that organizational integration efforts usually entail, a better understanding of this concept is needed.

2–1– The Effect on the Organization

Most captains of industry would agree with NESTLE's Peter Brabeck–Lemathe when he says "Nestle is more people oriented than systems oriented. Systems are necessary and useful but should never be an end in themselves … Maybe some organizations are drive by systems. We are not. The I.T. system is there to support an organization and not the other way around. We do not create an I.T. system first and then adapt our organization to our I.T. system"[31]

However, as a paradox, ERP implementation does often result in a need for Business Process Re–Engineering in parallel. Early on it was realized that forcing the ERP to match existing Business Processes meant heavily customizing the solution, a handicap when a new version had to be assimilated at a later date. Emphasis shifted to choosing the right package with the best fit, and then to adapt Business Processes.

Another factor is that ERP tends to break down division and hierarchical barriers. Information shared across the Organization has only to be keyed in once.

This 'arrogance' on the part of the ERP solution, i.e. to run roughshod over existing processes, hierarchies and functional divisions shakes up the organization and creates a climate of perpetual change. Who says "change" says "resistance to change" (either overt or latent).This needs exploring.

C. Leana and B. Barry comment that organizations and individual employees increasingly are pursuing change in how work is organized, how it is managed and in who is carrying it out. The advantage of change to the organization is the ability to quickly adapt to environmental changes, explore new ideas or processes, reduce fixed costs, and in the end have an advantage over competitors. Change also stimulates the individual providing variety in their work, fulfilling self development needs, maintaining interest in and satisfaction with their jobs.

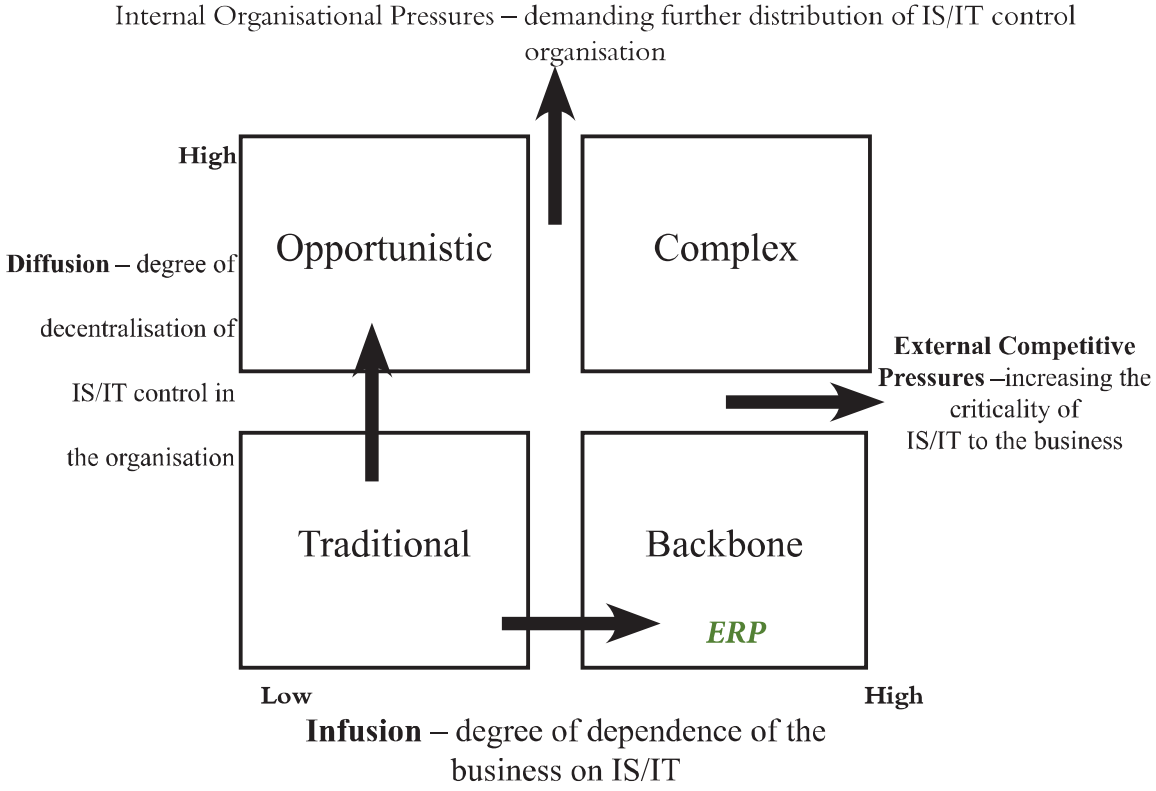
Their contention is that change and stability are simultaneous experiences in organizations, and that some level of tension is an inevitable part of any organizational life. Furthermore, stability enables rather than impedes change. Stability and change are both necessary for organizations to function effectively. Stable patterns of behaviour evoke perceptions of interpersonal trust which in turn clears the way for more flexible and adaptive subsequent behaviour.

In a surprising article, S. Piderit discusses the positive as well as negative aspects of resistance to change. Successful organizational adaptation is increasingly reliant on generating employee support and enthusiasm for proposed changes, rather than merely overcoming resistance. In addition, we need to see the reasons behind resistance, especially if they are unselfish, and not just the resistance as a threat. The article is not on the theme of ERP solutions, but it is interesting that one of three concrete examples results from an inter–view with

31 interview in BURRUS-BARBEY 2000

a middle manager in a large, diversified company, describing his response to the restructuring and centralization of his company around a new enterprise-wide software system. In this instance, the employee started off enthusiastic but became ambivalent due to lack of top management support, co-workers' laxity and what he perceived as the dangers of a behemoth project.

GRAPH N°9 : ENVIRONMENTS OF IS / IT PLANNING IN WARD & GRIFFITHS



Source : Fergal Carton,Analysing the Impact of Enterprise Resource Planning Systems Roll-outs in Multi-National Companies

These articles and comments suggest the following :

The ERP solution needs to be put in perspective: it is to support rather than to drive the business. However, the consequences on the organization are very far reaching, the ERP implementation challenges processes, functions and hierarchies and fosters a climate of perpetual change. One factor in reducing the failure rate is the maintaining of a balance between stability and change; and the need for accompanying of change.

2–2– The Effect on the Workplace and Individuals at Work:

During an ERP implementation in a multinational company there is a profound effect on the workplace and on the individuals at work.

Often it is difficult to situate the project. Is it an I.T. project? Enlightened companies position the project from the outset as an enterprise project. A project team is created, composed of a Project Manager and a multidiscipline team comprised of Key Users, I.T. specialists, outside Consultants. In a multinational company, Head Office personnel may be much in evidence in the local countries, and a corporate model with for example global product codes, a common chart of accounts.

A balance has to be driven between the interests of a corporate model and the local legal, fiscal and business practice imperatives.

Often a new way of working is required. M. Marks, J. Mathieu and S. Zaccaro in an article on team processes note that much of the work in organizations is completed through teamwork: people working together to achieve something beyond the capabilities of individuals working alone. Success is not only a function of team members' talents and the available resources but also the processes team members use to interact with each other to accomplish the work.

They define team process as members' interdependent acts that convert inputs to outcomes through cognitive, verbal and behavioural activities directed towards organizing task work to achieve collective goals.

Work teams strive toward collective goals that incorporate time as a component. Transition to action via a mission, specifications, strategy and planning, progress monitoring, coordination, conflict management, motivating and confidence building.

In the case of ERP implementation, the tasks are setup, conversion, interfaces, modifications and extensive testing to validate the system prior to end user training and "Go Live". These tasks are associated with modules and module components : for example for Finance - Accounts Payable, Accounts Receivable, General Ledger, Fixed Assets etc. Throughout the project there is a need for frequent dialogue and theme meetings to con-front Finance impact on Logistics or Manufacturing and vice versa.

In addition a whole part of the operation for example Order to Cash will be scripted for testing with test steps alternately executed by different functions across divisions.

One difficulty in implementing ERP is this switch from a functional to a process orientation, due to the fact that modules cut across traditional departmental lines. There is a value to educating all stakeholders, not just end users. P. Schneider suggests that there is no right way to implement ERP but that active and engaged leadership is vital.[32]

There is an analogy drawn between networks and recent Project team organization. M. Castells asks why Information Technologies networks are so efficient : because they are supple, are able to evolve and survive. They are supple

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because they can recongraph in function of modifications to their environment, they conserve their objectives but modify their elements, avoiding interrupters and finding new connectors. They are capable of evolution, because they can grow or shrink without ceasing to function.

Finally they are able to survive, since they have no centre and can call upon an infinite choice of reconfiguration possibilities.

Castells concludes that a networked world is not exempt of power or conflicts. It is a decentralized world where power is exercised and contested not by institutions grabbing power but by the impact on society symbols and on economic information.[33]

Currently in multinational ERP implementations, the project team functions along these lines; in perpetual movement and calling upon resources and methods as and when needed and like an organism that breathes. No one person dominates other than to make a concrete contribution and retire until the next time his or her knowledge adds value.

One reason for continued project failure is the notion of management. We talk of "change" or "knowledge" as though we can 'manage' it. We can accompany change and promote knowledge, but to suggest change and knowledge management is presumptuous.

Peter Drucker in a survey of the near future for The Economist shows knowledge workers as the new capitalists – knowledge the key resource and the only scarce one. Knowledge is non–hierarchical. Either it is relevant in a given situation or it is not.[34]

Drucker gives some characteristics of knowledge workers:

- Professionals rather than employees;
- Interdependent on other knowledge professionals;
- The need for continuing education;
- Identification with their knowledge (rather than to any particular company);
- Unlimited upward mobility.

Drucker also helps us to understand project failure "Experience has shown that grafting innovation on to a traditional enterprise does not work. The enterprise has to become a change agent… Instead of seeing change as a threat, its people will come to see it as an opportunity."

The people focus is often missing and may explain a part of project failure. As Ann Miller points out : "People are always key to any process improvement, so methods to help staff ramp up on the learning curve of a technology or process are extremely important."[35]

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This means helping the 45 or 50 year old key user with 15 or 20 years hands on business experience to become an internal consultant in SAP, JDE, or PeopleSoft, etc.

To summarize, ERP implementation impact on the workplace and on individuals at work is pervasive. In the context of a multinational, the project implies working not only with existing colleagues, but also with Head Office project people and outside Consultants with their own culture and languages. It means an upheaval of existing work methods – the breaking down of barriers between countries, sites, functional divisions and hierarchies. Self-interest, defending of turf, internal politics, and problems of person can of course continue to predominate and derail a project, but the successful project will push these intangibles to the background or eradicate them toward a greater good, project success and win-win for organization and individuals alike.

What will characterize the successful project is the synergy of a new generation of knowledge workers only interested in project advancement coming together, separating, regrouping as the project dictates. We can identify a key success factor as the ability of traditional management to give free reign to this new way of interacting. In other words the centralizing of data and processes, the repudiation (decentralization) of non added value functional or hierarchical divisions and the admittance of an 'unmanaged' project team which manages itself.

The standards of measure should be increased productivity and competitiveness, increased flexibility and adaptability and continuous change.

2–3– The significance and benefits of ERP software and systems

The significance of ERP lies in its many benefits. Recall that integrated information system scan lead to efficient business processes that cost less than those in unite grated systems. In addition, ERP systems offer the following benefits:

- ERP allows easier global integration: Barriers of currency exchange r ates, language. And culture can be bridged automatically, so data can be integrated across international borders.
- ERP integrates people and data while eliminating the need to update and repair many separate computer systems, For example, Boeing had 450 data systems that fed data into its production process. The company now has a single way to record production data.
- ERP allows management to manage operations, not just monitor them, for example, without ERP, getting an answer to « how are we doing ? » requires getting data from each business unit and then analyzing that data for a comprehensive, integrated picture, the ERP system already has all the data, allowing the manager to focus on improving processes. This focus enhances management of the company as a whole, and makes the organization more adapter when change is required

- An ERP system can dramatically reduce costs and improve operational efficiency. For example, Rohm and Haax, the chemical company, claims to have doubled revenue per employee over the past six years through productivity improvements due to an SAP implementation. These improvements can lead to lower costs and more satisfied customers, Toyota anticipates saving of 87 million from its new ERP system, which allows employees to access their own human resource records and gives group leaders access to shop floor information on employees Toyota is saving an additional S50000 annually by providing access to HR software through a web browser, meaning that the company does not have to install or support HR software on worker's desktops.

3– About resistance to change in an ERP:

It is a recognized fact today that if a technical solution such as an ERP does not induce necessarily the expected changes; it is not because of the technology. In other words, it is not because an organization implements a computerized system that social changes will necessarily occur. Technology itself does not induce the social game, the collective process which is necessary for a successful ERP implementation. Only people together are able to make a success, or a failure, or neutralize technical systems, especially complex ones such as ERPs.

Firstly, facing change, one should remain modest because the collective game builds itself without obeying to any single will or to any predefined planning. Actors have to build the story together.

Secondly, one should not start from the ERP technical solutions, but from problems to solve, that is to identify actual needs before making an adapted and robust technical offer.

Thirdly, in order to be able to analyze problems and evaluate needs, one should remain attentive to people and social behaviour so that help in educating people can be provided : both individual education (learning what the ERP modules are doing and how to use them) and collective education (learning how to integrate the ERP in each department or service operational practices). For example, mastering all the new accounting capabilities of the ERP Finance module requires to build a new knowledge base among all the individuals first, then in the Accounting Department(s) as a whole.

Actually, any success will depend on the collective evolution of the organization.

As far as resistance to change is concerned, the most problematic issue is that there is no resistance to change per se, neither because of habits gained, nor because of any "social inertia".

However, resistance to change does occur and has got a twofold origin : technology resists and social organizations too. Technology resists because it has got its own principle of reality: for example an ERP by itself will never be

able to deliver manufactured goods, only a coordinated organization can. Social organizations themselves have their own principle of reality. They do not resist just for the sake of resisting, but build their needs depending on their goals and evolution of beliefs. When technology meets a market ready to pay for it, there is no resistance. Just to make sure, see the speed with which such technologies as fax or mobile phones have spread.

Most of the time, the legitimacy of I.T. comes from a discourse about the technological innovation/modernity combination. This discourse was the basis for the rise of the I.T. staff in the organizations until the 1980's (Freeman and Mendras 1995). Since then, there was a reverse trend due to an internal legitimacy crisis and to a change in users attitude. For sure, this was caused by being tired of forced computerization failures and tired of forced obsolescence of hardware, software and I.T. concepts. Operational users are fed up with this ongoing race to innovation, since the situation they are living in is not yet stabilized. The discourse about the "technological plus" has come to some discredit among users who do not hesitate any more to express their concern.

Technology evolves at such a pace that it generates what is called "techno-stress" among staff at all levels of an organization. In fact, workers say they are "techno-stressed" because they have to learn, know and use technologies that are constantly evolving. Moreover, they consider they have little control over the choice of technologies to use and they lack training on them.

Five major factors have been identified as generating "techno-stress" :

- System problems,
- Computing errors,
- Learning time for getting used to new technologies due to the fact that techno-logies said to be "time-saving", increase tasks more than they alleviate them,
- The difficulty of following the fast evolving technologies.
- To this, one can add the "technology-aided employee scrutiny" which is the supplemental control exerted by employers in reading employees' files or e-mail.

Besides, according to various surveys, it seems that "techno-stress" is more and more affecting executives and managers. They fear I.T. generates a loss of privacy, an information overload, a lack of personal contacts, a need for a continuous learning of new skills and the missing of promotion due to a lack of knowledge.

Managers who frequently avoid technologies and suffer from a lack of technical knowledge, have nevertheless to make decisions about buying expensive I.T. equipment and have to manage investment, education and support budgets. Moreover, it seems that managers who are familiar with technologies also suffer

some "techno-stress" because of the fast changing pace of I.T.

In short, the preceding human factors are paramount when it comes to ERP implementation and may explain to some extend why an ERP needs a lot of care and support when deployed in an organization both by internal management and external consultants.

4- Additional capabilities within ERP

Sales production, data analysis, and internet connectivity are a few areas where ERP vendors are expanding ERP capabilities. As discussed previously. ERP vendors and other software companies are continuing to develop Customer Relationship. Management (CRM) that applications increase the efficiency of the sales force. For example, if salespeople can target the most profitable customers-actual and potential- they'll have a competitive advantage. Other software focuses on detecting changes in customer satisfaction and responding quickly to remedy any problems.

Supply Chain Management (SCM) is one area that can benefit from ERP. SCM application help to translate customer demand into production plans more efficiently. For example, SAP's Advanced Planner and Optimizer module provides sales representatives with a Global Available-to-Promise (ATP) capability. Global ATP allows the sales representatives to instantly cheek all available plants and warehouse in the company to find the best option for meeting a customer order in a timely and cost-efficient way.

Conclusion

An 'MIS' is a planned system of the collecting, processing, storing and disseminating data in the form of information needed to carry out the functions of management. In a way it is a documented report of the activities that were planned and executed. According to Philip Kotler "A marketing information system consists of people, equipment, and procedures to gather, sort, analyze, evaluate, and distribute needed, timely, and accurate information to marketing decision makers."

The terms MIS and information system are often confused. Information systems include systems that are not intended for decision making. The area of study called MIS is sometimes referred to, in a restrictive sense, as information technology management. That area of study should not be confused with computer science. IT service management is a practitioner-focused discipline. MIS has also some differences with Enterprise Resource Planning (ERP) as ERP incorporates elements that are not necessarily focused on decision support.

Any successful MIS must support a business Five Year Plan or its equivalent. It must provide for reports based up performance analysis in areas critical to that plan, with feedback loops that allow for titivation of every aspect of the business, including recruitment and training regimens. In effect, MIS must not only indicate how things are going, but why they are not going as well as planned where that is the case., and so what's the impact of the ERP on the MIS ? in next chapter we try to develop it , and do so in such a way that indentifies individual accountability, and in virtual real-time.

Nowadays, with the fast developing of industries and the need for managing procedures and resources, it has become very important to have a tool which can help you coordinate several activities, and the best one is ERP. The advantages of having ERP are many. It gives you the opportunity of integrating every procedure of your business while improving the quality of several areas simultaneously. These areas include human resources, accounting and operations. In addition, ERP helps to increase your production levels and to control your costs more efficiently, and this means that you will be able to control the whole enterprise more efficiently.

A very important facility of the ERP systems is that they increase the availability of the information, helping companies to have information in real time to make decisions and accurate prognostics regarding the organization. It is important to mention that ERP systems are a very powerful tool when it comes to processing and organizing financial data. It improves the development of the commercial activity in the short and long term.

In the enterprise management module you can perform integral strategic planning, keeping an eye on the daily activities and having fluent communication with the investors. The human resources module allows you to make decisions and optimize the company's investments regarding employees. With all of this we can see that an ERP system brings visible advantages. You might find that implementing an ERP could be expensive, or that only big organizations can reach it.

Another important consideration to make is that the implementation of ERP takes time and generates deep changes in the way you do business. But the important thing to remember is that every enterprise can see the benefits of the ERP systems, although for the first period it may only seem like an investment. The benefits indeed are really bigger than the costs, and it is very valuable to invest in an ERP system.