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GENERIC STRATEGIES FOR THE EFFICIENT AND EFFECTIVE USE OF INFORMATION SYSTEMS IN BUSINESS

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Abstract

This research looks into the business areas that constitute Management Information Systems (MIS) management and attempts to identify the various generic approaches that can be used in each of these areas. The areas in question are MIS strategic management, MIS cost management, MIS people management, MIS data management, MIS technology management and MIS systems management. Using statistical as well as empirical methods, an attempt is made to test the generic theories and approaches, which were identified in the research, under enterprise MIS conditions.

The objective is to identify the generic theories that, if used, will improve the efficiency and/or effectiveness of the MIS function in business. A survey of 310 MIS divisions in medium to large UK companies was undertaken. The outcome of the survey was analyzed using ANOVA and other statistical methods. The questions that were put forward in the survey fell into two categories. The first was to identify from the respondents how their MIS divisions were being managed. The second category of questions was used to gain insight into the level of efficiency and effectiveness that they perceived to exist in their MIS division.

The authors believe that the key result highlighted by the research is the fact that there is 'no silver bullet' in delivery efficient and effective MIS solutions – the phrase is taken from Brooks' (1987) paper 'No Silver Bullet – Essence and Accidents of Software Engineering'. With that in mind, the research produced some evidence that at time may not have been conclusive. The highlights of the findings suggest that MIS should combine the use of deductive as well as inductive thinking in their strategic management. In the cost management area, the research identified the use of activity based costing (ABC) as being the best practice in order to achieve a higher level of efficiency and effectiveness. The empowerment strategy of people management was identified as being a more efficient and effective strategy to manage the human resource of MIS. The research produced evidence to suggest that there is a misconception by MIS management as to the value of the strategic information systems (SIS) that they deliver. The research also produced evidence to suggest that the data management practices that currently exist are ineffective for present day business needs.

Introduction

It is becoming increasingly clear that investment in Information Technology (IT) is costing organizations far more than they can justify. Over half of every dollar that was invested in US business in the last two decades was invested in IT, Schrage (1997). Moreover, competitively weak organizations are finding it hard to keep up with this investment. Studies have shown, Liebenau and Backhouse (1989), that these organizations often become worse off after the installation of new computer based information systems. According to a report published by Construx Software Builders, Construx (1996), entitled 'Controlling Runaway Projects', about 25 percent of software projects will be cancelled because they are late, over budget, of unacceptably low quality or experience some combination of these problems. The report quoted a Standish Group survey of 8,000 software projects. The survey found that the average project exceeded its planned budget by 90 percent and its schedule by 120 percent. According to the report, several industry studies have reported that fewer than half of all software projects finish within their allotted schedule and budgets.

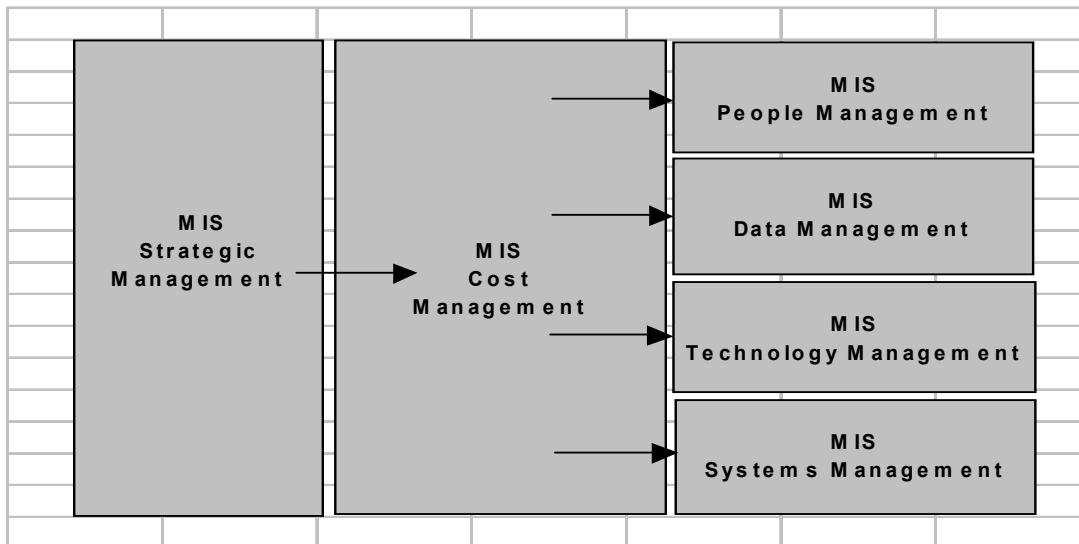
Could better MIS management practices help improve the efficiency and effectiveness of MIS? Or is the problem due to the fact that developing information system is the process of trying to solve a rapidly changing problem with tools that are also rapidly changing? This research attempts to examine MIS from a management perspective as opposed to a technical perspective and to identify the generic management practices that can be applied to MIS management. The aim is to improve the efficiency and effectiveness of the MIS function in the enterprise.

Research Method

Mason et al (1997) suggest that historical research offers perspectives that are difficult to achieve using other methodological means. Mason et al (1997) suggest a seven-step methodology for historical research methods. The steps suggested are: (1) begin with focusing questions, (2) specify the domain, (3) gather evidence, (4) critique the evidence, (5) determine patterns, (6) tell the story; and (7) write the transcript. This research has taken this historical approach and the work accomplished fits Mason et al’s (1997) seven-step framework.

The approach that this research used was (1) to identify and segment what the authors believe to be the broad areas that constitute the management of enterprise information systems as shown in Table 1.

Table 1. Areas of Enterprise Information Systems Management



The next step was (2) to review the general literature and theories that describe each segment. From the general theories the authors then (3) identified the different generic theories that can be applied within each segment. The generic theories were introduced and literature describing these theories was reviewed. These management theories were then (4) analyzed using the literature survey as well as the results of the questionnaire that was conducted for this research. The general theories that were non-MIS specific were tested under MIS conditions. The outcome of the analysis (5) was then presented (6&7).

The Research Survey

The object of this section is to explain the process that was used in obtaining the statistical data needed for the research. The data collected was used in order to test the hypotheses presented in the research. The usefulness of any statistical enquiry depends entirely on how the results of the enquiry are interpreted. Since emphasis in this research is on the interpretation of the data, below is an explanation of the method chosen in obtaining the data and the validity of the data that has been selected.

The Data Collection Phase

After considering the options available for data collection, a survey was prepared and tested on a small group of MIS professionals. As a result, the survey was then adjusted in both content and size: a number of questions were modified and the survey was shortened. The survey was then published on the Internet and in hard copy form. The Internet proved to be ineffective in terms of getting a potential sample of the population to complete the survey. Hundreds of e-mails were sent to potential respondents but, despite an incentive being offered, very few actually completed the questionnaire. The method then deployed was to contact a number of IS event organisers and request their help in passing the hard copy questionnaire to IS professionals. The UK Computer Users Association agreed to help in this matter. However, despite the circulation of several hundred surveys at a number of events, only seven completed questionnaires were actually received. The survey was also published on a number of enterprise IS web sites, most notably Xephon and IS World. Again, the response was not encouraging.

The next avenue explored in an attempt to ensure that the authors received reliable data for the research was to commission the services of a tele-marketing company which was willing to let the authors use its telephone interviewers to aid in the data collection. A company was selected, RS&M, on the basis that they had had experience in working with academic researchers. After a number of meetings with RS&M, and after testing their interviewers by conducting a mock telephone survey, it became evident that RS&M general approach was professional. Their telephone survey unit at London Bridge appeared to be competent to handle the task. Although the questionnaire had already been prepared, the fact that the survey needed to be conducted over the phone meant that it needed revising. In particular, the questionnaire needed to be reworded in some parts for telephone interview. The original time that it took for one interview was 20 minutes. This was considered to be too long. Following the advice of RS&M, the authors adjusted the questionnaire so that it could be completed in 15 minutes, which was considered to be a more acceptable time-frame.

The experienced telephone interviewers ensured that the interview was conducted during a period when the respondent had sufficient time to answer fully. This was accomplished by explaining to the respondent the nature of the questionnaire and the approximate time it would take to complete. Thereafter the interviewer agreed a convenient time to call back and conduct the interview. Nevertheless, given the time period that it took to complete the interview, some of the information received may not have been properly thought out. In retrospect, this could apply to any situation where a survey is being conducted whether it is on the street, by mail, handed over in a business seminar or by telephone. The critical factor for all these types of surveys is in choosing a period where the respondent is not pushed for time. With that in mind, the belief is that the interviewers worked hard to ensure that this criterion was fulfilled.

The final issues that needed addressing were to find corporate sponsors prepared to contribute the 4,500 pounds sterling costs submitted by RS&M for conducting the telephone survey on 300 organisations and to decide on the sampling frame for the survey. After approaching and meeting a number of organisations, two organisations agreed to sponsor this exclusive survey IBM and Siemens. RS&M were commissioned on the basis that interview were fully supervised at all times. An interviewer briefing covering the handling of the questionnaire was also conducted. All jargon that needed explanation was documented and discussed. The interviewers who were assigned to this survey attended a training session that included probing, questionnaire routing and interviewing techniques. Furthermore, an independent 10 percent back-check was conducted on this project.

The Sample Frame and Size

MIS divisions in medium to large UK organizations, with medium companies having between 249 and 500 employees and large companies having over 500 employees, were considered for the sample frame. The sample size for the survey was 310 companies.

Sample Source

Information for the sample frame was obtained from UK commercial directories. The sample was sourced from relevant UK business directories (e.g. Kompass, Dun & Bradstreet, etc.). A systematic sampling technique ensured a good geographical spread as well as a good spread by company type.

Qualifications for Interview

MIS professional in medium/large UK organization (i.e. 249-500 employees / 500+ employees). The qualifying job titles included MIS manager, operations manager, project manager, systems manager, systems programming manager, etc. A screener questionnaire ensured that only qualified respondents were interviewed.

Research Highlights and Results Summary

The four years of research concluded that, it is difficult to prescribe with certainty one magic potion that, if applied, would turn an MIS function around. Some of the generic theories tested are theories that can be applied in the management of any organization. Testing them under MIS conditions presented some new findings that may contradict general assumptions. Other theories identified, however, are specific to the management of information systems. A brief summary of the findings and the contribution that this research may have presented follow.

Examination of Enterprise MIS Generic Strategic Management Practices

When asked whether the MIS division was represented at board level, 183 out of the 310 companies surveyed stated it was, whilst 125 did not have MIS board level representation. This result, the authors believe is significant, as all the modern teachings identify a well developed and utilized MIS as giving an organization a competitive advantage. Yet, 40 percent of the organizations surveyed did not have this important strategic resource represented in the boardroom. This response poses a further question: Are we certain that companies with MIS board level representation perform better than the ones that do not? Further analysis proved that MIS divisions who have board level representation are more likely to be efficient and effective than the ones that do not.

Looking at strategic alignment from a different perspective, aligning MIS to the business strategy is a misconception, Ciborra (1999). Ciborra suggests that the word 'alignment' should be replaced by a new language, the being 'care', 'hospitality' and 'cultivation'. Ciborra goes on to say: "Paradoxically, the better we understand alignment, the less we will be able to represent it in our daily activities." Whilst Ciborra's paper explains the difficulty of aligning MIS to the business strategy, the authors believe that alignment is still important and can be achieved by closer communication between business and MIS. For example, if the firm chooses a differentiation strategy, the MIS function can develop systems that place more emphasis on quality and service, and perhaps less on cost. With that in mind, the following question was posed in the survey: *Is the business strategy explicitly defined?* The survey respondents were also asked whether their organizations had a formal MIS strategy. Surprisingly, 60 percent responded yes, and 40 percent no. Again, this begs the questions as to why such a divide exists today, given what we know about the importance of MIS, and the way in which MIS has moved from delivering automated procedures and improvement to clerical functions to being a strategic business tool offering strategic information systems. Further analysis proved that organizations that have an explicit MIS strategy have a more effective MIS division.

The research also compared and contrasted the application of inductive and deductive thinking in MIS. Different arguments, highlighting the strengths and weaknesses, were presented for each approach. There was some evidence of the importance of using both approaches, as opposed to the use of either deductive or inductive thinking alone, and the need to balance their adoption.

Examination of Enterprise MIS Generic Cost Management Practices

Looking at the cost management of MIS, the research presented evidence to show that a large proportion of the MIS divisions surveyed were under funded – 43 percent. This finding counters the general assumption in business that MIS costs are increasing, despite the fact that the price/performance of technology is decreasing. Costing methods were reviewed and activity based costing (ABC) was identified as being the best practice in cost management and control. Despite that, the research highlighted that more than half of the organizations surveyed did not use ABC. Statistical findings showed that organizations that used ABC had better project cost management than the ones that did not. Whilst it is generally believed that project cost management problems in MIS are a result of external factors, such as a change in user requirements, the research presented evidence to suggest that the problems may be resolved from within the MIS division.

The survey asked the MIS decision-makers to identify what they believed to be the better approach to MIS funding: operating MIS as a cost or a profit center. Most chose profit center as the better option, yet when asked how their own centers operated, 85 percent of them said that they ran as a cost center. This highlights the fact that when companies make decisions about MIS funding they are not necessarily influenced by MIS managers. There is a general feeling, observed by the authors, that organizations operating inductive MIS strategies often have difficulty raising the necessary funds, since justifying inductive type projects can be difficult. The research could not link this issue to the organizations that are thought to operate inductively.

The final question relates directly to cost management was to find out whether MIS divisions surveyed allocated a separate budget item for MIS research. Only 88 (28 percent) respondents replied positively, but a vast majority, 220 (71 percent) respondents did not have a research budget. Does this mean that these organizations do not perform any research on new hardware and software,

and its potential ability to help the organization gain a competitive edge? Or are the research costs sunk into other projects and therefore not quantifiable?

Examination of Enterprise MIS Generic People Management Practices

Regarding the people management aspect of the research, a review of best practices was presented for this vital area of MIS management. Two generic approaches were identified: the control theory and the empowerment theory. The survey findings highlighted the widely held view that the control theory of people management should be applied in the support areas of MIS such as operations, network services, technical authors, system programmers and MIS consultants, whilst MIS management, the R&D function and business analysts should be managed using the empowerment theory. Is this what is happening at present? Are MIS divisions empowering the functions with strategic implications and controlling the non-strategic ones?

When the respondents in the 310 companies surveyed were asked whether they had profit sharing or performance related pay schemes, 142 (42 percent) said that they did not have any incentive scheme, 57 (18 percent) had both types of scheme in operation, 73 (24 percent) operated a performance related pay scheme and 32 (10 percent) operated a profit sharing scheme. It is proven that a well-designed incentive scheme increase the productivity of people. Why is that almost half of the organizations surveyed do not operate an incentive scheme for their MIS divisions? Could it be due to management's inability to devise a properly planned scheme? Or in their inability to sell the scheme to the board?

The survey also presented evidence that many MIS divisions did not offer performance related pay and profit sharing schemes to their employees, despite the linkage between these schemes and productivity. Out of the three areas of people management – staff recruitment, staff training and staff retaining, training was identified by 42 percent of the respondents as the weakest area. Overall the research showed evidence to suggest that empowered MIS divisions appear to be more efficient and effective than controlled ones.

Examination of Enterprise MIS Generic Data Management Practices

On the subject of data management, the research reviewed current and emerging data management practices. The focus was on data used for helping at the management control and strategic decision-making levels. Data warehousing, data mining and on-line analytical processing were reviewed. It was evident from the research that most organizations provided internal data as the only source of input for control and strategic management reporting. The research highlighted that many organizations overrated these systems, even though they only provide limited sources of information. In common business practice the principal role of a senior executive is to look for opportunities and overcome the threats to the organization. The information on opportunities and threats is found mostly outside the organization, in the external environment. Yet the information that these executives were receiving was internal and by and large dealt with the strengths and weaknesses of the organization and not the opportunities and threats. Given this finding, and in the absence of the appropriate data, the research has questioned the significance of the strategic information systems and tools that are presently available to senior executives.

The literature research suggested that it is not good practice for the operational and informational systems to use the same database. Yet the survey revealed that in 65 percent of the organizations surveyed these two types of systems share a database. These findings highlight a significant level of bad data management practice. The survey also showed that the majority of organizations have not installed a data warehouse of any kind, which leads to other questions about the MIS function in these organizations. Is it helping to manage the business, or is it simply managing the operation side of the business and the transaction workflow? Overall, the authors believe that the data management aspect of MIS appears to be the weakest of all the areas identified. This is due to the misconception that currently exists in MIS about the strategic value of this function to the enterprise. Whilst all the data management indicators point in the opposite direction, MIS management appear to be unaware of these important strategic data management parameters and their limitations.

Examination of Enterprise MIS Generic Technology Management Practices

Technology, in the context of this research, refers to the computer hardware needed in the enterprise. The research discussed the various categories of technology: base technology, key technology and emerging technology. The focus in this part of the research was on identifying the generic hardware management theories applied in enterprise computing. Two concepts were identified: centralized technology management and decentralized technology management. Both strategies were compared and contrasted in an effort to identify best practices that, if applied, could increase the efficiency and effectiveness of the MIS division. The

literature research pointed to the fact that centralization appears to be more efficient in its application than decentralization. However, there was no reference in the literature research to centralization being more effective. Traditionally, centralization has been linked to the operation of a central mainframe running, what are known as, legacy applications.

The significant improvement in the telecommunications industry, in terms of increased band width and the standardization of network protocols, has presented an opportunity for traditional distributed systems, which provide a more appealing end user interface, to operate from a centralized facility. This new dimension to centralization is beginning to emerge in the form of server farms. The research, with which the authors agree, suggests that the traditional view of centralization may be efficient, but not necessarily effective. The authors' view, however, is that the new interpretation of centralization can result in higher efficiency levels than were achieved through decentralization, as well as delivering more effective solutions through the grouping together of IT specialists in close proximity. Bringing IT specialists together can lead to better coordination and communication, and the end result should be an improvement in the effectiveness of MIS.

There is a saying: *'I like the old, I like the new, but I don't like the bit in the middle.'* That bit in the middle is change. Many organizations find themselves trapped in out of date methods of operation simply because they are not receptive to change. Respondents were asked whether their organization was receptive to change. Surprisingly, 257 (83 percent) said yes, 50 (16 percent) said no and 3 (2 percent) did not say. Can this be a true representation of the population? Or is it, once again, a syndrome of the bounded rationality of management?

Examination of Enterprise MIS Generic Systems Management Practices

MIS development projects were often criticized for the time they took to implement and for not meeting user requirements. A question was put to the respondents asking them whether the MIS projects implemented in their organizations completed on time and to specification. Only 18 (6 percent) said that their projects always completed on time and to specification, 165 (53 percent) said most of the time, 108 (35 percent) said some of the time, whilst 17 (5 percent) said never. Given that the IT industry is no longer in its infancy and that expectations are those of a mature technology, the fact that as many as 40 percent of the organizations surveyed have problems with IT projects is alarming.

A series of questions were put to the respondents dealing with system management best practices. The first asked whether the organizations surveyed measured the cost of individual system maintenance. 142 (46 percent) respondents said they did and 163 (53 percent) said they did not. Without being able to measure the cost of individual systems maintenance, it is difficult for management to identify the systems that have been rigidly developed. The authors believe that the good systems are the ones that require minimum maintenance, despite the changes in user requirements.

The research also presented other variables that may contribute to the success or failure of a system. These variables were identified as being the platform in terms of the hardware and software that the system needs to run and the limitations that it may present. In addition, the end user was identified as being a critical ingredient to the success or failure of a system. Finally, the role of the systems designer was also identified as vital to the success of a system. A note of caution was sounded about systems designers who should not apply old solutions to new problems. They should ensure that know-how acquired from previous projects is translated into knowledge that helps them to find new solutions to new problems.

The systems management research presented a number of approaches to the software development process and identified two generic approaches to systems design: the hard systems methodology (HSM) and the soft systems methodology (SSM). HSM seeks to develop a technical solution to a business problem, based on the understanding that the present situation is clear and the desired state of affairs is well communicated. SSM, on the other hand, assumes that it is not easy to specify the desired system, since different people may see things differently. Information drawn from the part of the questionnaire that dealt with systems management issues showed that over half of the respondents applied SSM to their systems development; the remainder were either unsure or used HSM.

Finally, the respondents were asked whether the system design process used sequential or concurrent engineering. 85 (27 percent) replied that their system design process was sequential, 181 (58 percent) said concurrent and 44 (14 percent) did not reply. These results appear to be encouraging as concurrent engineering is considered to be significantly more efficient than sequential engineering. However, it requires tighter project controls.

Conclusions

The research identified that almost 40 percent of the organizations surveyed did not have a quality control function as part of their development process. This raises serious doubts about the reliability and maintainability of many applications developed in-house. The research highlighted that nearly half of the organizations with quality control built into their development cycle used the same development team to perform the quality check. The authors believe that this practice is not as effective as the use of an independent quality control function. Business justification for systems was discussed and the survey highlighted that the process of performing a cost/benefit or a risk analysis is not standard practice in many organizations. Finally, the research presented evidence to suggest that, on the whole, organizations operate inefficient and ineffective software management practices.

In addition to the issues previously highlighted, this research has underlined the fact that in order to manage MIS efficiently and effectively, it is necessary to bring together strategic, operational and technological business disciplines. The research also emphasized that MIS management should not only be technologically orientated; it should give equal importance to management accounting, strategic thinking from a business perspective and, last but not least, pay considerable attention to the human resource function. After all, technology is not about hardware and software; it is about hardware, software and people.

Throughout this work there were a number of findings that were presented as a result of empirical work. Other findings came about from the statistical analysis. Despite the fact that the findings from this research may not be conclusive, the issues raised are important and warrant consideration. In the authors' view, the six most significant findings from this research are:

- The importance of finding the right balance between applying deductive and inductive strategic thinking in enterprise MIS management.
- That training given to MIS professionals appears, by and large, to be inadequate.
- That almost half of the organizations surveyed did not operate an incentive scheme at their MIS divisions, despite clear evidence to show that the introduction of such a scheme greatly improves productivity.
- Most MIS divisions were inward focused and did not incorporate any external information in their strategic, control and planning systems.
- There is a misconception about the value of the strategic systems offered by many MIS divisions to their end users. The research highlighted that many MIS divisions were unaware that the IT value they offer can be attributed to the data processing era of computing as opposed to the present strategic information systems era.
- There is insufficient application of a standard quality control procedure in the software development process.

Achieving efficiency and effectiveness in MIS, which is the ultimate aim of this research, necessitated looking into strategy, cost, people, data, technology and systems, since they directly relate to the subject matter. All of these sub-MIS management functions needed to be identified, since MIS efficiency and effectiveness cannot be achieved if any of these areas become dysfunctional. Braa and Vidgen (1999) explain:

We see much of the difficulty with IS knowledge as being rooted in the objective/subjective divide and the separation of people (organizations) and things (technology).

The authors believe that this research has attempted to combine the people and technology aspects of MIS management in one framework.

References

- Braa, K. and Vidgen, R. Interpretation, intervention and reduction in the organizational laboratory: a framework for in-context information systems research, *Accounting, Management and Information Technologies* (9), 1999, pp.25-47.
- Brooks, F.P.Jr. o Silver Bullet Essence and Accidents of Software Engineering, *Computer Magazine*, April 1987.
- Ciborra, C. U. De Profodunis? Deconstructing the concept of strategic alignment, *IRIS20 Conference*, August 1999, Hanko, Norway.
- Liebenau, J. and Backhouse, J. nformation Systems and the Misguided Emphasis on Technology, *Department of Information Systems*, London School of Economics, 1989, London.
- Mason R. O., Mckenney J. L. and Copeland D. G. (1997): Historical Method for MIS Research: Steps and Assumptions *MIS Quarterly*; September.
- Schrage M. he Real Problem with Computers, *Harvard Business Review*, (75:5), September-October 1997, pp.178-188.