INFORMATION SYSTEMS AS A BUSINESS RESOURCE

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Abstract

Current research indicates that the significant global expenditure on information systems (IS) is increasing and will continue to grow. It is very likely that in the future, organization will continue to invest heavily in IS. It has been suggested that IS will further expand so that societies and organizationsin the future will depend on global IS infrastructures, that knowledge management will become the key to managerial and professional knowledge and that telecommunication networks will create virtual organizations, businesses, markets and opportunities.

Against this background there is a concern that many IS projects do not meet business objectives. Consequently, we analysie a model of IS business success as a solution for both responsible evaluation of alternate investments and realistic project management.

Key words: *information systems, information technology, success models*

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1. Introduction

Nowadays organizations continue to increase spending on information technology (IT) and their budgets continue to rise, even in the face of potential economic downturns […]. Despite that, fears about economic conditions and increasing competition create pressures to cut costs, which require organizations to become interested in the return on technological investments. The impacts of IT are often indirect and influenced by human, organizational, and environmental factors; therefore, measurement of success is both complex and illusive.

The IT investement is inextricably linked to the expenditure on **Information Systems (IS)**. IS is the study of complementary networks of hardware and software that people and organizations use to collect, filter, process, create, and distribute data. The study bridges business and computer science using the theoretical foundations of information and computation to study various business models and related algorithmic processes within a computer science discipline. A **Computer(-Based) Information System** is essentially an IS using computer technology to carry out some or all of its planned tasks. The basic components of computer based information system are:

- *Hardware*- these are the devices like the monitor, processor, printer and keyboard, all of which work together to accept, process, show data and information.
- *Software*- are the programs that allow the hardware to process the data.
- *Databases*- are the gathering of associated files or tables containing related data.
- *Networks*- are a connecting system that allows diverse computers to distribute resources.
- *Procedures*- are the commands for combining the components above to process information and produce the preferred output.

The first four components (hardware, software, database and network) make up what is known as the information technology platform. Information technology workers could then use these components to create information systems that watch over safety measures, risk and the management of data. These actions are known as information technology services.

Certain information systems support parts of organizations, others support entire organizations, and still others, support groups of organizations. Recall that each department or functional area within an organization has its own collection of application programs, or information systems. These functional area information systems (FAIS) are supporting pillars for more general IS namely, business intelligence systems.

As the name suggest, each FAIS support a particular function are within the organization, e.g.: accounting IS, finance IS, production/operation management (POM) IS, marketing IS, and human resources IS. In finance and

accounting, managers use IT systems to forecast revenues and business activity, to determine the best sources and uses of funds, and to perform audits to ensure that the organization is fundamentally sound and that all financial reports and documents are accurate.

2. Considerations on IS as a business resource

IS are developed using IT to aid an individual in performing a task. Given the relatively short life-span of the IS field, it is quite remarkable the number and variety of applications and systems that have been deployed. Organizations focus on developing, using, and evaluating utilitarian IS. There is a plethora of utilitarian IS used in organizations, such as decision support systems, computer-mediated communications, e-commerce, knowledge management systems, as well as many others.

However, there is a widespread concern that investment in the IS does not deliver value and that many IS projects do not meet business objectives. That is to say, although the implementation of IS has generally been welcomed by most business participants, organizations and observers, there has also been a certain amount of skepticism about is real benefit […]. Among the criticism we list the following points:

- For every claim of IS delivering value, there are seemingly an equal number of claims of poor IS investment;
- IS can deliver dis-benefits and actually put an organization at disadvantage;
- IS investments grow far more than profits;
- Top management is becoming more frustrated with the casual approach to the high level of IS expenditure.

In response to this state of things, this paper provides a brief summary of the current ideas pertaining to IS investment and business impact and aims to describe a model of success for IS, despite the economic hurdles it now faces. The 5 components that must come together in order to produce a Computer-Based Information System that can operate seamlessly in a business environment are […]:

1. Hardware - the term hardware refers to machinery.This category includes the computer itself, which is often referred to as the central processing unit (CPU), and all of its support equipments. Among the support equipments are input and output devices, storage devices and communications devices.
2. Software - the term software refers to computer programs and the manuals (if any) that support them. Computer programs are machine-readable instructions that direct the circuitry within the hardware parts of the system to function in ways that produce useful information from data. Programs are generally stored on some input / output medium,often a disk or tape.
3. Data - data are facts that are used by programs to produce useful information.Like programs,data are generally stored in machine-readable form on disk or tape until the computer needs them.
4. Procedures - procedures are the policies that govern the operation of a computer system. "Procedures are to people what software is to hardware" is a common analogy that is used to illustrate the role of procedures in a system.
5. People - every system needs people if it is to be useful. Often the most over-looked element of the system are the people, probably the component that most influence the success or failure of information systems.

The type of IS described above is one frequently seen in enterprises. Enterprise systems create a standard data structure and are invaluable in eliminating the problem of information fragmentation caused by multiple information systems within an organization. An enterprise IS differentiates itself from legacy systems (i.e. any corporate computer system that isn't Internet-dependent) in that it self-transactional, self-helping and adaptable to general and specialist conditions. Unlike an enterprise information system, legacy systems are limited to department wide communications. A typical enterprise information system would be housed in one or more data centers, would run enterprise software, and could include applications that typically cross organizational borders such as content management systems.

Enterprise information systems provide a technology platform that enables organizations to integrate and coordinate their business processes on a robust foundation. An enterprise information system provides a single system that is central to the organization and that ensures information can be shared across all functional levels and management hierarchies.

An EIS can be used to increase business productivity and reduce service cycles, product development cycles and marketing life cycles. It may be used to amalgamate existing applications. Other outcomes include higher operational efficiency and cost savings.

Evaluation of information systems has come to be an important topic for study as well as practice […]. One topic that indicated the importance of evaluation is the "IT productivity paradox". In the early 1990s the debate on the IT productivity paradox questioned the connection between investments in IT and the output productivity at firm level. The question of value for IT money concerns inadequate evaluation in two ways. Firstly poor evaluations could be a base for poor statistics and therefore question the existence of the reported paradox. Secondly poor evaluation practices could lead to wrong decisions when choosing IT projects for implementation resulting in low productivity.

However, there is a case to be made for IS investement in business, provided that a professionally carried out model of success is applied. A business case represents a new way of thinking about IS expenditure/investment, which is a major step in the professionalization of IS project development by providing a platform from which to measure IS success.

3. A model of IS success

Researchers have derived a number of models to explain what makes some IS 'successful' […]. Technology Acceptance Model (TAM) used the Theory of Reasoned Action and Theory of Planned Behavior to explain why some IS are more readily accepted by users than others. Acceptance, however, is not equivalent to success, although acceptance of an information system is a necessary precondition to success.

Therefore, a successful model of justly evaluating IS and its impact on the business should focus on the following aspects:

- *System quality* – the desirable characteristics of an information system. For example: ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times.

- *Information quality* – the desirable characteristics of the system outputs; that is, management reports and Web pages. For example: relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability.

- *Service quality* – the quality of the support that system users receive from the IS department and IT support personnel. For example: responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff. SERVQUAL, adapted from the field of marketing, is a popular instrument for measuring IS service quality .

- *System use* – the degree and manner in which staff and customers utilize the capabilities of an information system. For example: amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use.

- *User satisfaction* – users' level of satisfaction with reports, Web sites, and support services.

- *Net benefits* – the extent to which IS are contributing to the success of individuals, groups, organizations, industries, and nations. For example: improved decision-making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, and economic development.

Practitioners consistently acknowledge the importance of measuring the value of their IS investments. However, practitioner IS-effectiveness measurement methods are often one-dimensional and over-simplified. Practitioners tend to focus on net impacts or benefits but fail to consider system, information, and service quality as well as the nature and intensity of system use.

The constructs of the IS success model have different degrees of importance depending on the firm characteristics […]. Firms with more centralized computing place emphasis on performance measures in the following order: system quality, information quality, user satisfaction, use, organizational impact, and individual impact.

Firms with decentralized computing environments emphasize information quality and system quality highly; emphasize user satisfaction, individual impact, and organizational impact moderately; and information use as the least important measure. For firms with centralized cooperative computing, organizational impact and system quality were the most important measures, followed by information quality, user satisfaction, individual impact, and use. For firms with distributed cooperative computing, organizational impact is the most important factor as well as individual impact and information quality. Use was found to be the least appropriate measure for this group.

Another study of the importance of various IS success factors to managers […] found that accuracy of output, reliability of output, relationship between users and the CBIS staff, user's confidence in the systems, and timeliness of output were the most important factors. The five least important factors were the chargeback method, volume of output, competition between CBIS and non-CBIS units, features of the computer language used, and job effects of computer-based support.

Practitioners are advised to deploy success measurement programs that incorporate all six dimensions of IS success: system quality, information quality, service quality, objective (as opposed to subjective) measures of system use, user satisfaction, and net benefits. The context, purpose, unit of analysis (individual *vs* organizational), and importance of systems should dictate the relative weights to place on each of these success dimensions and measures. An IS balanced scorecard should also be considered as a way of measuring net benefits.

4. Conclusions

The emerging information society will determine an increasing need for realistic, responsible IS evaluation. To measure and manage IS business value and benefits professionally is a complex, multi-faceted and therefore difficult task. It is a subject which traditionally has not been significan attention, but, which with growing concern to both improve corporate efficiency and effectiveness, and to control IS expenditure, will continue to attract a growing level of interest.

While recent research [….] has provided strong support for many of the proposed interrelationships among success dimensions in the model presented in chapter 3, more research is needed to explore the relationships that have not been adequately researched. Empirical research is also needed to establish the strength of interrelationships across different contextual boundaries.

This paper takes a first step by parsing out the results based on individual *vs* organizational units of analysis and found that there is insufficient empirical evidence to evaluate most of the relationships at the organizational level. However, there could be other, more complex effects that could explain the relationship between these success constructs at either the individual or organizational levels of analysis. Researchers may want to consider complex functions, such as curvilinear effects, that affect the relationships among IS success constructs.

There are also a number of other boundary conditions that deserve attention, such as the voluntariness of the system, the timing of success measurement (i.e., the difference between the time of the implementation of the system and the time of measurement), and the type of information system examined. Secondly, more research is needed on the relationships between information quality and use, user satisfaction, and net benefits. Finally, IS researchers still struggle with system use as a measure of IS success. Future studies must apply more comprehensive and consistent measures of use in order to better understand the effect of use on user satisfaction and net benefits.

The science of measuring information success or performance in empirical studies has seen little improvement over the past decade [….]. Researchers and practitioners still tend to focus on single dimensions of IS success and therefore do not get a clear picture of the impacts of their systems and methods. Progress in measuring the individual success dimensions has also been slow. Valid and reliable measures have yet to be developed and consistently applied for system quality, information quality, use, and net benefits. The success model presented here is a useful framework for understanding the key success dimensions and their interrelationships. However, researchers must take a step further and apply rigorous success measurement methods to create comprehensive, replicable, and informative measures of IS success.

5. References

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