Building Successful Information Systems – a Key for Successful Organization

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Abstract
An Information System (IS) can have a major impact on corporate strategy and organizational success. The involvement of managers and decision makers in all aspects of information systems is a major factor for organizational success, including higher profits and lower costs. Some of the benefits business organization seek to achieve through information systems include: better safety, competitive advantage, fewer errors, greater accuracy, higher quality products, improved communications, increased efficiency and productivity, more efficient administration, superior financial and managerial decision making.

Keywords: information system, management, software, organization

JEL Code: D80

1. Introduction

An IS can be defined as a set of interrelated elements or components that collect, manipulate and store and disseminate data and information as well as a feedback mechanism. Information systems take much more time and money to implement than originally anticipated or the completed systems does not work properly. Because so many information systems are trouble-ridden, designers, builders, and users of information systems should understand why they succeed or fail.

Management Information Systems (MIS) began to develop in the 1960s and are characterized by the use of information systems to produce managerial reports. In the most cases, these early reports were produced periodically (daily, monthly, or yearly). Because they occurred on a planned basis, they were called *scheduled report*s and helped managers to perform their duties. Other types of reports also developed during the early stages of management IS are *demand reports*. These reports were developed to give decision makers certain information upon request. *Exception reports* describe unusual or critical situation and are produced if a certain condition exists.

By the 1970s and 1980s dramatic improvements in technology resulted in IS that were les expensive but more powerful. The computer system could be used to support all aspects of decision making. This type of system, called a decision support system (DSS), supports and assists all aspects of problem specific decision making. A DSS can provide immediate assistance in solving complex problems and goes beyond a traditional MIS, which merely produced reports; a DSS can help by suggesting alternatives and assisting final decision making.

Information systems literacy goes beyond a knowledge of the fundamentals of computer systems and equipment. Most important it encompasses *how* and *why* this technology is applied in business; a knowledge of organizations are all important parts of IS literacy. [5]

2. The contribution of information systems to the total quality management

Is difficult to say what make a ***successful information system***. But if we had to generalize, a successful system will be accurate, reliable, will work as intended, and will be widely used. If IS are high quality it will help to promote overall quality throughout the organization.

A quality system will do the following:
- achieve the business goals articulated by the user department;
- operate at an acceptable cost, commensurate with the value produced for the firm;
- meet carefully defined performance standards (such as response time and system availability);
- produce accurate, reliable output;
- be easy to learn and use;
- be flexible.

Information systems are used in all ***functional areas*** (operating divisions) ***of business***:
- in *finance and accounting*, IS are used to forecast business activity, determine the best sources and uses of founds, manage cash and other financial resources, analyze investments and perform audits, ensure that all financial reports and documents are accurate;
- in *marketing*, IS are used to develop new goods and services (product analysis), determine the best location for production and distribution facilities, determine the best advertising and sales approaches (promotion analysis) and make price analysis;
- in manufacturing, IS are used to process customer orders, develop production schedules, control inventory levels and monitor product quality;
- in addition, IS are used to *design products* (CAD - computer assisted design) and *manufacture items* (CAM - computer assisted manufacturing).

Information systems are also used in almost every ***industry*** or field:
- *airline industry* uses IS to make seat reservation, to determine the best schedules, to determine which type of plane should fly which particular route;
- *investments firms* use IS to analyze stocks, options, the future market and other financial instruments;
- *banks* use IS to make good investments;
- *transportation industry* uses IS to schedule trucks and trains to deliver goods and services at the least cost;
- *health care organizations* use IS to diagnose illnesses, plan medical treatment and bill patients.

There was identified five types [1] of IS: *transaction processing systems* (TPS), *management information systems* (MIS), *office-automation systems* (OAS), *executive support systems* (ESS) and *decision-support system* (DSS). There are a strong relationship of these types of systems and the business activities.
Considering the use of information systems inside the organization, a number of researchers have identified *three levels or types of activity* that can benefit.

These three levels were defined [1] as:
- operational control - the process of assuring that specific tasks are carried out;
- management control - the process by which managers assure that resources are obtained and used effectively;
- strategic planning - the process of deciding on objectives of organization, on changes in these objectives, on the resources used in attainting these objectives.

Also, were identified *three degree of structure* involved in the process. By degree of structure is meant the amount of human judgment and evaluation required in the activity. Structured activity requires little judgment, evaluation, or insight; in structured activities, much of the decision

making can be automated. Unstructured activity requires considerable judgment, evaluation, and human creativity, and is very difficult to automate.

TPS are used primarily for structured operations and, to a lesser degree, management control applications. MIS are used primarily for semistructured management control applications, although it overlap into the operational and strategic planning as well. DSS are used primarily for unstructured decision making, whether that occurs at the operational, management or planning levels. ESS are used primarily for structured management and strategic planning. applications. OAS are used for office correspondence and communication and are used in all the domain (Fig. 1.).

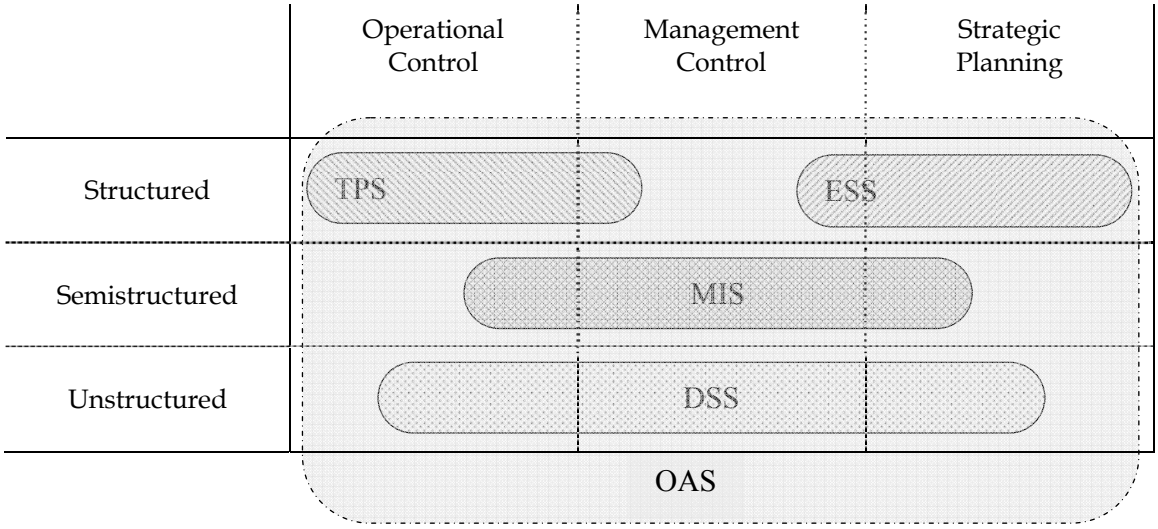

Figure 1. Relationship of system types and business activities

Increasingly, information systems are bringing about changes in business goals, relationships with customers and suppliers, and internal operations. Today, this process typically places thousands of terminals or microcomputers on the desks of employees who have little experience with them, connecting the devices to powerful communications networks, rearranging social relations in the office and work locations, changing reporting patterns and asking employees to achieve higher levels of productivity. The rapid growth in international trade and the emergence of a global economy call for information systems that can support both producing and selling goods in many different countries.

Information systems and organizations have a mutual influence on each other. Information systems must be aligned with the organization to provide information needed by important groups within the organization. At the same time, the organization must be aware of and open itself to the influences of IS to benefit from new technologies. This complex two-way relationship [3] is mediated by many factors (Fig. 2.).

An organization is a stable formal social structure that takes resources from the environment and processes them to produce outputs. The primary production factors provided by the environment - capital and labor - are transformed by the firm through the production process into products and services - outputs to the environment. The products and services are consumed by the environment which supplies additional capital and labor as inputs in the feedback loop. Organizational culture is a set of fundamental assumptions about what products the organization should produce, how and where it should produce them, and for whom they should be produced. Standard operating procedures are a precise, defined rules for accomplishing tasks that have been developed to cope with expected situations. People in organizations occupy different positions with different specialties, concerns, and perspectives. As a result, they naturally have divergent viewpoint about resources, rewards, and punishments should be distributed. These differences

matter to members of organizations, both managers and employees, and they result in political struggle, competition within every organization.

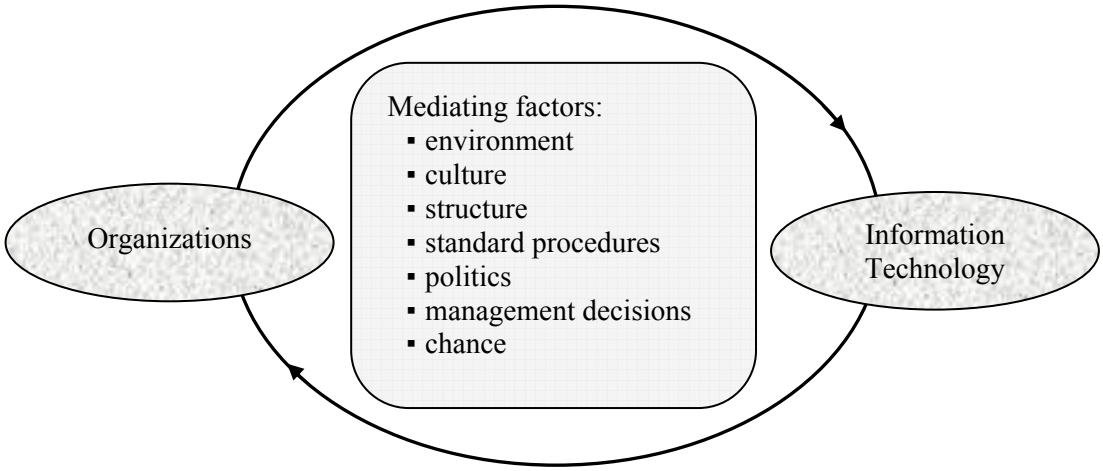

Figure 2. The two-way relationship between organizations and information technology

3. Identify successful information systems versus problem areas

The traditional answer to the question "*Why do organizations adopt information systems?*" was "To become more efficient, to save money, and to reduce the work force". Although this response may have been generally true in the past, now it is not the primary reason for adopting systems. IS have become vitally important simply to stay in business. Improvements in decision making (speed, accuracy, comprehensiveness), server ever higher customer and client expectations, coordinating dispersed groups in an organization have become important reasons for building systems.

External environmental factors and *internal institutional* factors influence the types of information systems the organizations select, develop, and use. Some external environmental factors are rising costs of labor or other resources, the competitive actions of other organizations, and changes in government regulations. These can be thought of as *environmental constraints*. At the same time, the environment also provides organizations with *opportunities*: new technologies, new sources of capital, the development of new production processes, or a new government program that increases the demand for certain products. Institutional factors influence the adoption and design of IS. They include values, norms, and vital interests that govern matters of strategic importance to the organization.

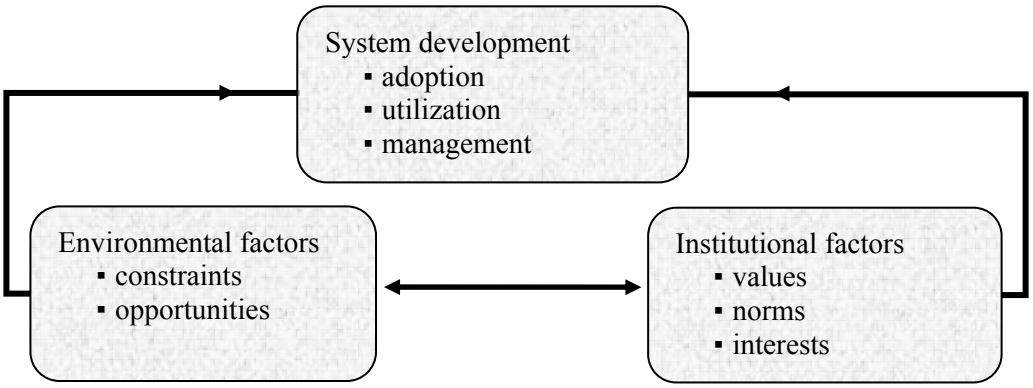

Figure 3. The system development process

In according with many developers projects it was identified numerous factors that contribute to good systems development. These factors include:

- support of top-level managers;

- involvement of users at all stages;
- use of a proven systems development methodology;
- clearly defined system goals and objectives;
- a focus on the most important problems and opportunities;
- good training programs for all involved;
- a well-defined and organized maintenance program.

Information systems quality can be minimized by using traditional and new systems development methodologies, software metrics, quality tools, through testing procedures, and by reallocating resources to put more emphasis on the early stages of systems development cycle. Structured analysis highlights the flow of data and the processes through which data are transformed. Its principal tool is the data flow diagram. Structured design and programming are software disciplines that produce reliable, well-documented software with a simple, clear structure that is easy for other to understand and maintain. System flowcharts are useful for documenting the physical aspects of system design.

Computer-aided software engineering (CASE) automates methodologies for systems development. It promotes standards and improves coordination and consistency during systems development. CASE tools help system builders build a better model of system and facilitate revision of design specifications to correct errors. Object-oriented software development is expected to reduce the time and cost of writing software and of making maintenance changes because it models a system as a series of reusable objects that combines both data and procedures. Software re-engineering helps system builders reconfigure aging software to conform to structured design principles, making it easier to maintain.

Communication problems between end users and designers are a major reason why user requirements are not properly incorporated into information systems and why users are driven out of the implementation process. Users and information system specialists tend to have different backgrounds, interests, and priorities, and often pursue different goals. This is referred to as the **user-designer communications gap**. Information system specialists, for example, often have a highly technical or machine orientation to problem solving. They look for elegant and sophisticated technical solutions in which hardware and software efficiency is optimized at the expense of easy of use or organizational effectiveness. Users, on the other hand, prefer systems that are oriented to solving business problems or facilitating organizational tasks. Often the orientation of booth groups are so at odds that they appear to speak in different tongues.

Systems differ dramatically in their size, scope, level of complexity, and organizational and technical components. The larger the project - as indicated by the money spent, the size of the implementation staff, the time allocated to implementation, and the number of organizational units affected - the greater the risk. Projects that are more highly structured run a much lower risk than those whose requirements are relatively undefined, fluid, and constantly changing; when requirements are clear and straightforward, outputs and processes can be easily defined. Users in highly structured projects tend to know exactly what they want and what the system should do.

The conflicts and uncertainties inherit in any implementation effort will be magnified when an implementation project is poorly managed and organized. Training to ensure that the end users are comfortable with the new system and fully understand its potential uses is often sacrificed, in part because the budget is strained toward the end of a project.

A systems development project without proper management will most likely suffer vast cost overruns, major time slippages, and technical performances that fall significantly below the estimated level.

Many information systems failures are not necessarily falling apart, but thy clearly are either not used in the way that they are intended, or they are not used at all. Users have to develop parallel

manual procedures to make these systems work properly. These failures can be traced to four basic information system problems: design, data, cost, and operations.

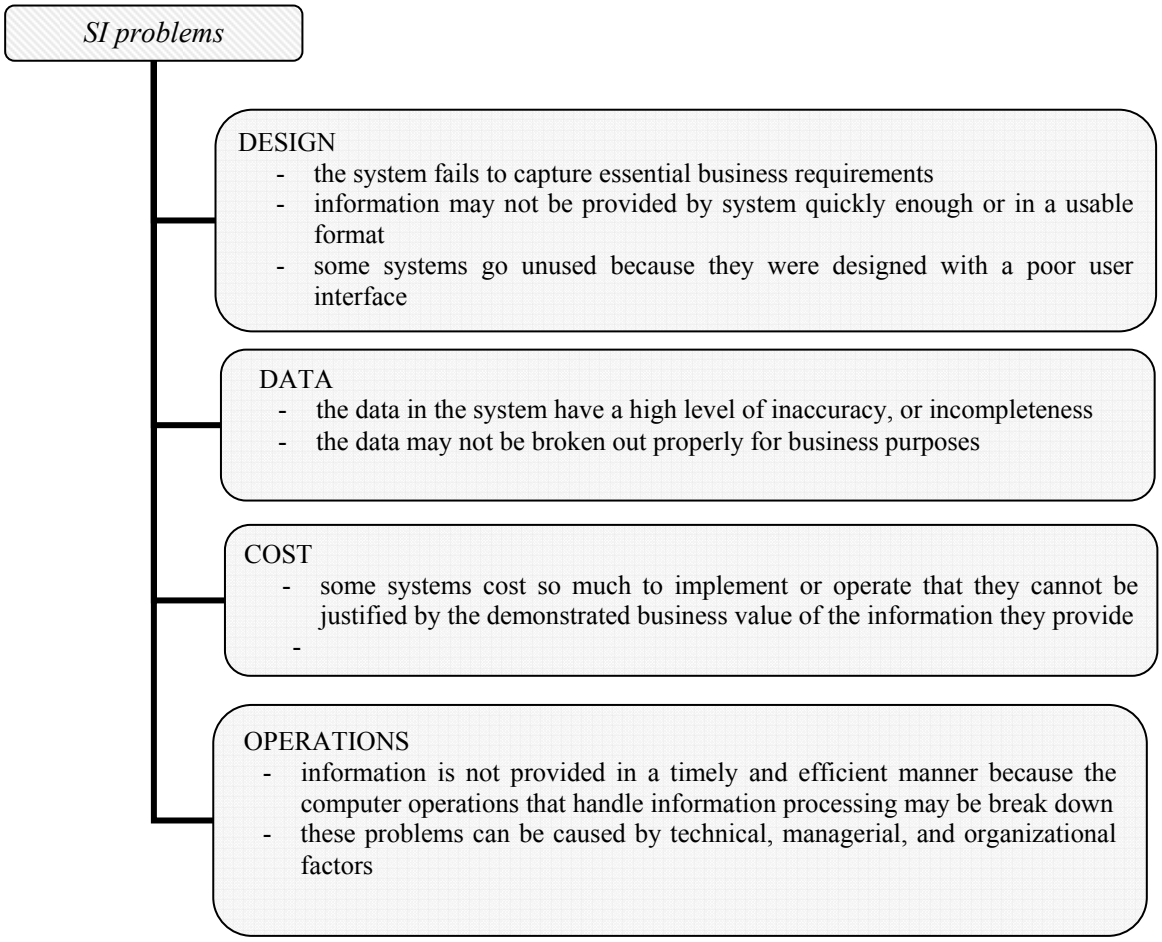

Figure 4. Problems of Information Systems

4. Controlling Information Systems

Before computer automation, data about individuals or organizations were maintained and secured as paper records dispersed in separate business or organizational units. Information systems concentrate data in computer files that can potentially be accessed more easily by large numbers of people and by groups outside the organization. Consequently, automated data are more susceptible to destruction, fraud, error, and misuse. When computers systems fail to run or work as required, firms that depend heavily on computers experience a serious loss of business function.

Security refers to the policies, procedures, and technical measures used to prevent unauthorized access to alteration, theft, and physical damage to record systems. Security can be promoted with an array of techniques and tools to safeguard computer hardware, software, communications networks, and data.

Computers can also serve as instruments of error, severely disrupting or destroying an organization's recordkeeping and operations. Errors in automated systems can occur at many points in the processing cycle: through data entry, program error, computer operations, and hardware. Fig. 5 illustrates all of the points in a typical processing cycle where errors can occur.

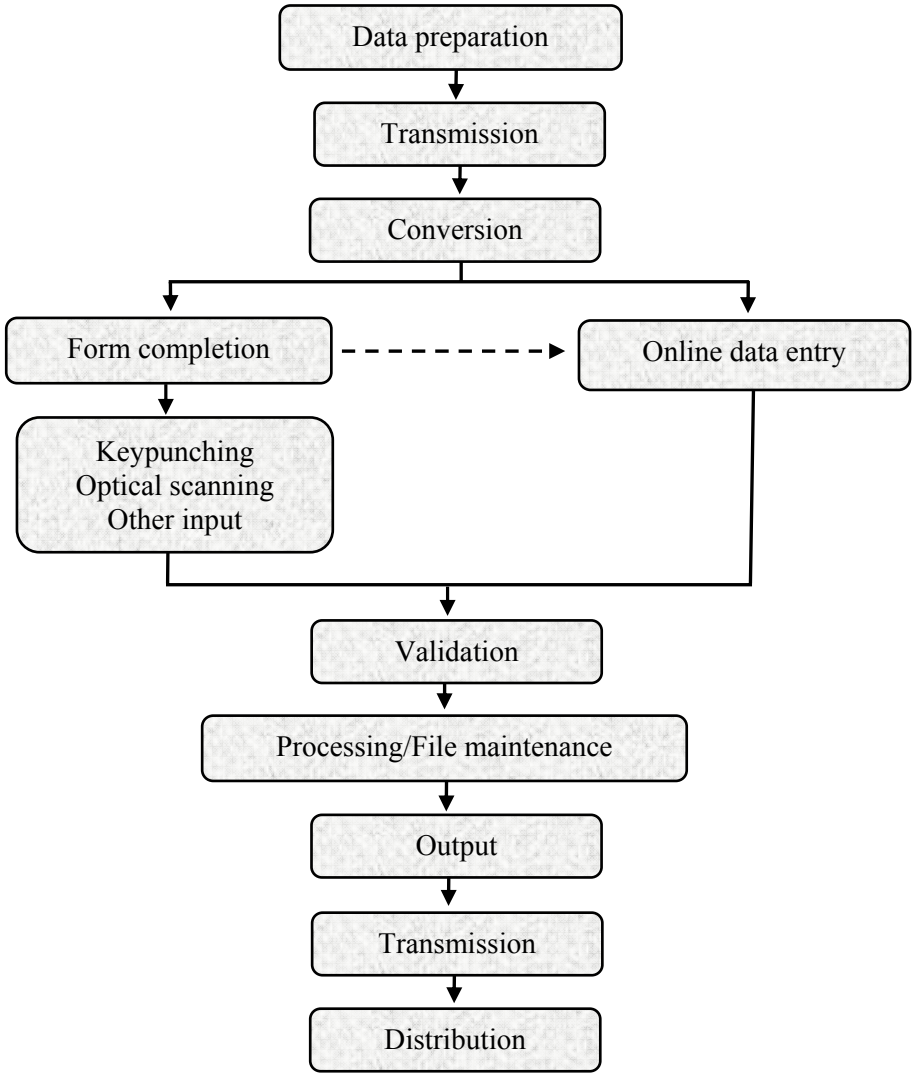

Figure 5. Points in the processing cycle where errors can occur

To minimize errors, special policies and procedures - named *controls* - must be incorporated into design and implementation of information systems. There are two main categories of control:

- *general controls* - control the design, security, and use of computer programs and the security of data files in general throughout the organization; they include physical hardware controls, system software controls, data files security controls, computer operations controls, controls over the system implementation process, administrative disciplines;
- *application controls* - specific controls unique to each computerized application, such as payroll, accounts receivable, and order processing; they focus on the completeness and accuracy of input, updating and maintenance, and the validity of the information in system.

To determine what controls are required, designers and users of systems must identify all of the control points and control weaknesses and perform risk assessment. They must also perform a cost/benefit analysis of controls and design controls that effectively safeguard systems without making them unusable.

Implementation controls audit the system development process at various points to ensure that it is properly controlled and managed. The system development audit should look for the presence of formal review points at various stages of development that enable users and management to approve or disapprove the implementation.

The system development audit should also examine the level of user involvement at each stage of implementation and check for the use of a formal cost/benefit methodology in establishing system feasibility. Without a good documentation that shows how a system operates from both a technical and a user standpoint, an IS nay be difficult to operate, maintain, or use.

5. Conclusion

We have tried to explore various facets of successful information system throughout this text. We identified some problem areas and causes of information system failure. The sources of system success or failure are both technical and organizational. Both traditional and new methodologies should be used for promoting software quality. The success of organizational change can be determinated by how well information systems specialists, and users, and decision makers deal with key issues at various stages during implementation. Information system design and entire implementation process should be managed as planned organizational change. Sociotechnical design emphasizes the participation of the individuals most affected by a new system and aims for an optimal blend of social and technical solutions.

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