A CONTINGENCY FRAMEWORK OF THE RELATIONSHIP BETWEEN THE USE OF IT AND ORGANIZATIONAL DESIGN VARIABLES

(FIT AS GESTALTS PERSPECTIVE)

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Abstract - Despite the fact that IT has become a fundamental variable for organizational design, very few studies have been conducted to explore this vital issue in a systematic and convincing fashion. Indeed, the small amount of information and the few theories available on organizational design in general, and much less on the effects of IT on organization design is surprising. Most studies on the effects of IT on organizational design describe IT in general terms which have led to a non-generalizable and even contradictory results. The divergence in findings of previous research to some extent emerge partly from lack of a systematic approach to evaluate all the variables affecting organizational design. The current research attempts to address this problem by developing a contingency framework within which the impact of information technology (IT) on organizational design variables, and simultaneously a number of variables of interest and their relationship together are explored. To pursue these objectives, foremost the direct effects of IT on four organizational design variables (decision making, control, position and formalization) will be examined. Second, in addition to evaluating the direct effects of IT, based on a conceptual theory in the framework of FIT as gestalts approach, we also viewed this relationship from a contingency theory perspective at three levels: organizational, individual and technological. In order to obtain rich data to explain the processes of change, while still being able to quantitatively measure and statistically analyze the impact of advanced technologies on organizational design, a survey instrument will be utilized with a target population of 400 Iranian manufacturing companies.

Keywords - Information Technology, Organizational Design, Decision Making.

INTRODUCTION

Over the past decades, many papers have been published on the effects of Information Technology (IT) on organizations. However despite the fact that IT has become a fundamental variable for organizational design, very few studies have been conducted to explore this vital issue in a systematic and convincing fashion. The small amount of information on organization design and the few theories available on the effects of IT on organizational design is surprising. Given our meagre knowledge relating to the effects of IT on organizational design, this study intends to conduct an empirical study to fill this gap.

One major deficiency of previous studies is the lack of empirical evidence. This has led researchers to describe IT in general ways and resulted in different and very often contradictory findings. Many researchers have become very concerned about the shortfall of comprehensive study on organizational design and IT which has been apparent for decades. One objective of this research is to fill this gap.

This study will investigate four questions, aiming to develop a theoretical framework to evaluate the effects of IT on organizational design. a) What are the effects of IT on human-based organizational design variables in relation to the other influential forces (e.g. culture)? b) How does IT influence organizational design variables from FIT as gestalts perspective? c) How can the idea of FIT be conceptualized in contingency framework of organizational design? d) Which effects resulted from which IT technologies? Lack of attention to different types of IT in organizations is another deficiency regarding the previous literature. To redress this deficiency is one motivation for the current research.

These could be considered as the most important features of this study, different from previous literature. Although it should be noted that to turn this potential into reality many extremely difficult barriers have to be overcome.

To answer the above key questions, and to avoid simplicity and other negative consequences that might be caused by neglecting influential forces, using a systematic approach is most essential. An empirical study is needed to examine how the concept of FIT could be conceptualized in contingency framework of organizational design. Then based on findings of this research it will be possible to develop a theoretical framework to evaluate and predict the effects of IT on organizational design.

In order to obtain rich data to measure, while still being able to quantitatively measure and statistically analyze the impacts of IT on organizational design, an extensive survey data collection method (based on a self administered postal questionnaire) is utilized.

LITERATURE REVIEW

Adding the IT dimension to organizational design variables, recently some researchers have provided a strong view of IT enabling design variables for organizational change. With respect to previous studies it seems that the major deficiency of these studies is the lack of empirical evidence. There is a shortfall of comprehensive study on organizational design and IT which has been apparent for a decade. Generally, much of the literature review devoted to the effects of IT have focused on one component of organization and neglected the interaction and interplay among organizations' components dealing with IT devices. On contrast this study attempts to suggest a framework to investigate the effects of IT on all the organizational design variables in a systematic fashion from FIT as gestalt perspective.

Today's organizations face a wide variety of challenges, including such contradictions as maintaining unity of action while becoming increasingly diverse. To cope with the changing conditions and thrive in the competitive world, managers have confronted a few levers, [43] changing design, changing strategy or changing organizational culture. Nadler

and Tushman [43] consider organizational design as an ongoing part of each manager's job, argue that strategic change is generally the responsibility of a small group of senior executives and can't be employed too often without throwing organizations into massive confusion. They argue that changes in underlying organizational culture are complex and take extensive periods of time. In contrast, it seems changing design is an easy way to alter in the lines of organizational chart. It can be completed in a reasonably short period of time with relatively little discomfort. The above discussion is why this study focuses on organizational design.

Robey [48] asserts that design and management of organizations will become more challenging and rewarding than is today. He argues designing for the future is a question of knowing what is required, what is possible, and what we value. The rest of this study illustrates the reasons for evaluating IT as an essential tool on organizational design. Figure 1 shows three forces affecting organizational designs in the future.

Environment: Robey [48] argues that the most potent set of requirement influencing organization design in the future will be the nature of the environment. The environment always places demands on organizations. Most observers agree that the environments of the future will be more uncertain and that resources, broadly defined, will be scarcer than they are today. In today's turbulent environment, it takes a fairly dynamic organization to adjust to the constant challenges of remaining competitive.

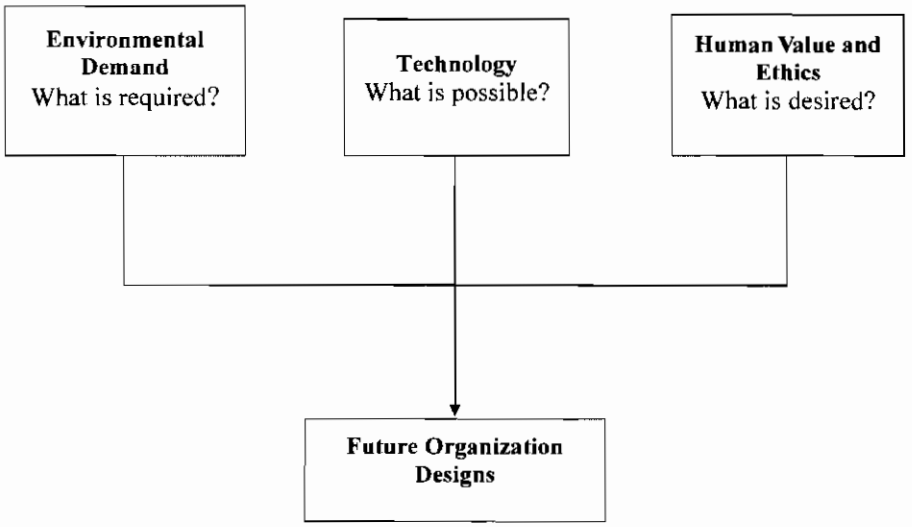

Figure 1: Forces Affecting Organizational Design [48]

Technology: a survey of leading experts in the information systems area identified two groups of information technologies that were expected to have the largest impact on organizations in the future. The first group, human interface technologies, includes those technologies allowing a human being to interact with electronic media (speech recognition, voice input and output interfaces, etc.). In the second group, communication technologies, voice-mail, email, FAX, etc.

Human values and Ethics: these will shape the future by indicating what we want. Compared with the environmental variables and human values, researchers argue that it

seems changing organizational design through technology would be a much easier way. While all the above mentioned factors are clearly important on organizational design, the focus of this study is investigating information technology advances on designing organizations. As mentioned earlier, many factors are driving change-or maybe it is better to say facilitate change on organizational context, but as Byrne's report [12] states, none is more important than advances in information technologies.

ORGANIZATIONAL DESIGN

As Huber writes in his classic research [32] "any significant advance in information technology seems to lead eventually in recognition and implementation of new organizational design options, options that were not previously feasible, perhaps not even envisioned." The emerging forms of organizations pose many challenges for information scientists, which first and foremost, are based on information and knowledge. [55] The relationship between development of information technology and structural options is shown in Figure 2.

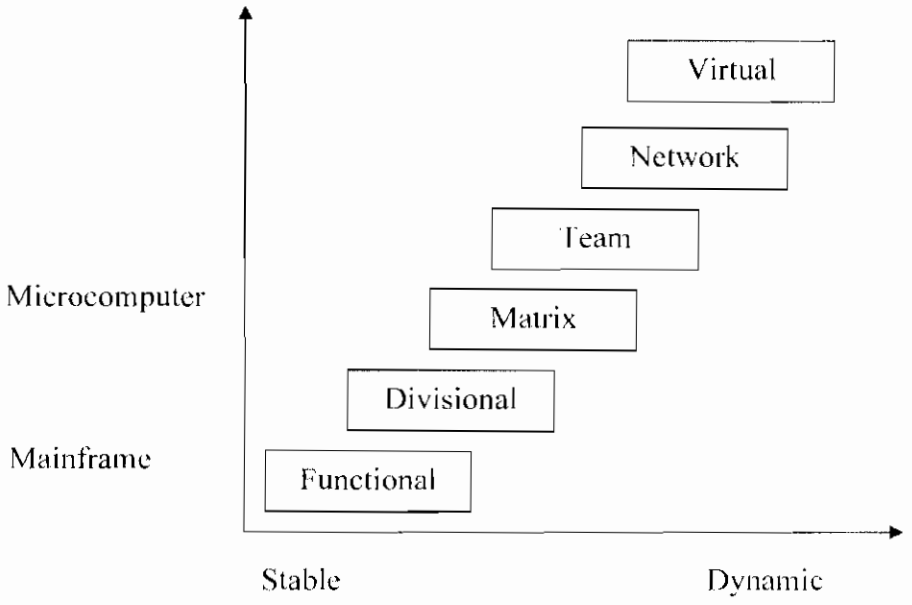

Figure 2: IT Development and Structural Options in Organizational Design

One objective of this research is to develop a theoretical framework to evaluate the effects of IT on organizational design. This research is also an attempt to address how managers can achieve managed effect through information technology (IT). In many cases effects of IT are largely accidental rather than managed. Accidental effects are those that are recognized only after the system has been implemented, and the consequences are a surprise to managers and users. "Managed effects" occur when the managers are able to predict consequences of implementation of specific IT devices. Achieving this goal needs work in two areas, "what are the effects of IT on organizational design variables" and "what kind of IT" has caused the specific effects. Also organizational design variables should be defined in broad terms.

ORGANIZATIONAL DESIGN, DEFINITION AND VARIABLES

Organizational design is a formal, guided process for integrating people, information and technology of an organization. It is used to match the form of the organization as closely as possible to the purpose(s) the organization seeks to achieve. Through the design process, organizations act to improve the probability that the collective efforts of members will be successful. Organizational design, Mintzberg writes , "in the case of organizational structure, design means turning those knobs that influence the division of labour and the coordinating mechanisms, thereby affecting how organization functions." According to this definition two basic elements could be identified, division of labour and coordination mechanisms. In other word:

Organization design = Division of labour + Coordination mechanisms

Division of labour, sometimes called Horizontal differentiation means that work is divided up into smaller set of operations/skills and that each set of skills/job or occupation is more clearly distinguished from others. This element consists of people and tasks. Obviously when talking of people, one constituent would be decision making. On the other hand coordination mechanisms proved to be a more complicated affair, involving various means such as direct supervision, standardization of work, and so on. As a result, organization design definition can be extended from two basic variables to more detailed variable as follows:

Organization design = Tasks + People + Decision making + Coordination + Communication + etc.

A possible result of breaking down the design variables, as suggested above, is that by evaluating the effects of IT on each of the variables, it would be possible to develop an impersonal understanding of the nature of organizational design emerging in light of adoption of the IT advancement.

In literature on organizational design, the claim is often made that there is no one best way to organize, however as researchers proposed several ways to organize and several designs are possible, the use of variables in organizational design has become quite common.

Table 1: Design Variables

Design Variables			Performance Variables
Sub-unit Level	**Organizational Level**	**Organizational Memory**	
Participation in decision making Size and heterogeneity of decision units Frequency and duration of meeting	Centralization of decision making. Number of organizational levels involved in authorization. Number of nodes in the information-processing network. Horizontal integration. Specialization. Standardization. Formalization. Distribution of influence on organizational decisions	Development and use of computer-resident data bases Development and use of computer-resident in-house expert systems	Effectiveness of environmental scanning Quality and timeliness of organizational intelligence Quality of decisions Speed of decision making

Source: Adapted from Huber [32]

To perform this study it requires determining organization design variables. Huber [32] classifies decision making and intelligence classified design variables in two major groups, independent variables and dependent variables. Table 1 shows this classification. Table 2 provides examples of IT design variables that could be used in organizational design.

Table 2: Examples of Design Variables caused by IT

Lucas and Baroudi (1994)	**Fiedler, Grover and Teng (1996)**	**Breukel (1996)**
Virtual components, Electronic linking and communications, technological matrixing, technological levelling, electronic workflows, production automation, electronic customer/supplier links	Degree of centralization of computer processing, capability to support communications, ability to share resources	Function: efficiency, effectiveness, innovation Distribution: centralization, concentration, integration

Resource: Adopted from Lam [35]

Mintzberg, [40] a guru in organizational theory, suggests a set of nine design parameters (variables) that fall into four broad groupings. They are listed in Table 3 together with the most closely related concepts.

Table 3: Design Parameters

Group	Design Parameter	Related Coneepts
Design of positions	Job specialization Behavior formalization Training and indoctrination	Basic division of labor, Standardization of work content, System of regulated flows, Standardization of skills
Design of superstructure	Unit grouping Unit size	Direct supervision, Administrative division of labor, Systems of formal Authority, regulated flows, informal communication, and work constellations System of informal communication, Direct supervision, Span of control
Design of lateral linkages	Planning and control systems Liaison devices	Standardization of outputs, System of regulated flows, Mutual adjustment, Systems of informal Commnnication work constellations, and ad hoc decision processes
Design of decision making system	Vertical decentralization Horizontal decentralization	Administrative division of labor, System of formal authority, Regulated flows, work constellations, and ad hoc decision processes, Administrative division of Labor, Systems of informal communication, work constellations, and ad hoc decision processes

Source: [40]

METHODOLOGY

The development of research structure comprises of two steps. In the first step, a set of design variables are used to measure the effects of IT on organizational design. To find out what design variables were significantly affected by IT several interviews were conducted with a number of academics. The interviews were conducted with two objectives in mind: 1) to determine the design variables radically affected by IT, 2) to gather general information on the IT context from the academic perspective.

As a result of interviews the research was restricted to the following design variables: decision making, control, design of positions and formalization. The reasons for these choices is that these variables seem to be significantly affected by IT; and have been the center of attention of previous studies (in many cases only one variable has been assessed); and also they are interrelated elements; for example, control and (de) centralization have correlation together and position of an employee indicates to the extend of his/her authority

of decision making. On the other hand these variables-apart from being organizational design variable, construct "work design" and "work organization" as well.

In the second phase of data collecting two questionnaires would be utilized as a means to understand the impacts of IT on the design variables and at the same time, assess the proposed framework. The first questionnaire is a factual questionnaire, in order to determine the level of IT usage in a sample of Iranian manufacturing organizations. The second questionnaire is designed to assess opinions. In case of a close ended questions the respondents (managers and employees) will be asked to indicate their opinion on the contributions of IT and its effects on organizational design variables at their organizations on a seven-point Lickert Scale.

This study develops a conceptual framework, as suggested in Figure 3, that is used as an initial reference model useful in understanding the process of research, and analyzes the role of IT on designing organizations. Having an eye on the conceptual framework, the rest of the paper tries to present more details on the development of the research objectives, propositions and research survey.

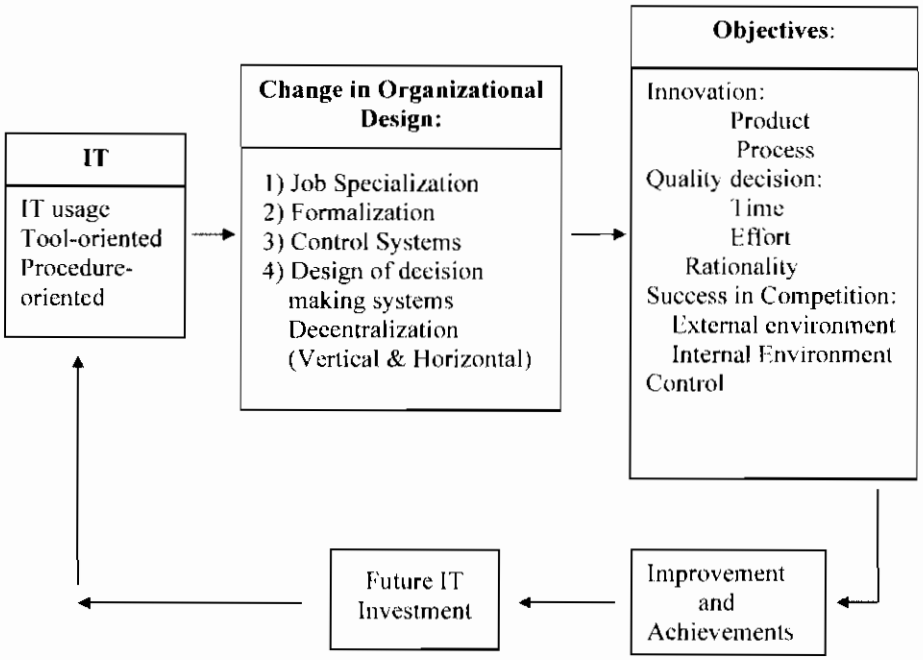

Figure 3: A Conceptual Theory

THE OBJECTIVE AND RESEARCH QUESTIONS

Through literature review many questions have been identified. Aiming to develop a theoretical contingency framework to evaluate the effects of IT on organizational design, this study attempts to investigate three questions:

1. What are the effects of IT on organizational design variables in relationships to the other influential forces (e.g. culture)? Is there any correlation among IT usage and organizational design variable (e.g. decentralization)?
2. How does IT influence organizational design variables from FIT as gestalts perspective?

How can the idea of FIT be conceptualized in contingency framework of organizational design?

3. Which effects resulted from which IT technologies?

These could be considered as the most important features of this paper, which are different with respect to the previous literature. Although it must be noted that to turn this into a potential reality, many extremely difficult barriers will have to be overcome.

SAMPLE AND DATA SOURCES

To perform this research, random samples of 400 Iranian organizations that implement IT at their routine tasks are selected. The data would be collected from companies with a minimum 3 years experience in using computers in their works.

In order to test the propositions regarding IT usage and organizational design variables, a sample of 400 active Iranian manufacturing companies listed in the Tehran Stock Exchange (TSE) database has been targeted.

The firms in the sample are distributed across Iran and the sample is narrowed on manufacturing industries. According to Iran's Third Development Plan (1999-2003), manufacturing industry is the main target of Iranian policymakers; this is why we focus on the manufacturing sector. Other reasons for this choice are, most of the literature has focused on manufacturing establishments in developed countries. Also, in comparison with other economic sectors, the data on manufacturing industry, especially in developing countries, are more reliable. Analysis of manufacturing enables a better comparison to be drawn between Iran and other countries.

The survey is pre-tested with 5 managers and academics via on site interviews to identify problems with question wording and survey length. Once the pre-test results were incorporated into the questionnaire some minor modifications were made regarding the survey questionnaire. Aiming to determine the level of IT usage in Iranian manufacturing companies, data collection would be initiated using the final 5 page factual questionnaire.

Along the years, one of the schools of thought that many of the researchers have focused on is the contingency design theory. This theory states that the effectiveness of an organization depends on the FIT between an organization's structure and the contingencies it faces. The contingencies of environment, technology, and size play a major role in the rational view on organization design. Many efforts have been made to clarify and understand the theoretical issues associated with contingency models.

Contingency models that hypothesize that there is no best way to organize have been used in various areas of management literature. For instance, in the scope of strategy and structure, Miles and Snow [34] have emphasized that current theory in the area of strategy and structure, and the process is founded largely on the twin concepts of strategic choice and FIT. Also, contribution of IT to the organizational performance has been assessed from contingency perspectives by Bergeron and Raymond. [5]

THE CONCEPT OF FIT

The concept of FIT which has been a focus of a number of researches in recent studies refers to the extent of fitness among organizational characteristics and other characteristics (say individual and environmental).

In an insightful article, Venkatraman [58] suggested a framework for the contingency models and its related concept of FIT, wherein six different perspectives of FIT have been defined. His proposed framework compromised six different perspectives on FIT (moderation, mediation, matching, gestalt, profile deviation, and co-variation). Each perspective classifies along three dimensions the degree of specificity of the functional forms of FIT, the number of variables in the equation, and the presence, or absence, of a criterion variable.

The concept of FIT is central to any contingency model that needs to be dealt with when considering alternative perspectives of FIT. Alternative perspectives of FIT are very briefly presented in the following paragraphs.

Alternative perspectives of FIT

1. Fit as Mediation:

This criterion-specific perspective adopts a conceptualization based on intervention. It specifies the existence of significant intervening mechanisms (e.g., organizational structure) between an antecedent variable (e.g., performance). In other word, according to the mediation perspective, there exists an intervening variable between one or several antecedent variables and the consequent variable.

2. Fit as Moderation:

A criterion variable is determined by FIT between a predictor and a moderator variable. In this criterion-specific perspective, FIT is conceptualized as the interaction between two variables. When this perspective of FIT is adopted, correlations for various sub-samples is the appropriate testing technique. In an attempt to explore the impact of IT on work group arrangement, Belanger et. al. [4] found out that "FIT as moderation" is more appropriate for the study.

3. Fit as Co-variation:

This perspective is described as a pattern of co-variation or internal consistency among a set of underlying theoretically related variables. Conceptually, FIT as co-variation appears very similar to gestalts, however the functional form is specified differently.

4. Fit as Matching:

Unlike FIT as moderation and mediation, this perspective does not require a criterion variable, but FIT here is a theoretically defined match between two related variables. This perspective is a major point of departure from the previous mediation and moderation perspectives because FIT is specified without reference to a criterion variable, although subsequently, its effect on a set of criterion variables could be examined.

In order to develop an empirical taxonomy that has implications for matching IT

structure and organizational structure, Fiedler et. al. [21] adapted FIT as matching as a proper method.

5. Fit as Profile Deviation:

Fit as profile deviation is defined as the internal consistency of multiple contingencies. In this criterion-specific perspective, an ideal profile is assumed to exist, and deviations from this ideal profile should result in lower performance.

6. Fit as Gestalts:

This perspective is based on an internal congruence conceptualization, whereby FIT is seen as a pattern. Venkatraman [54] adopts the definition proposed in [47] which conceptualizes FIT as a set of relationships in a temporary state of balance. Adopting this perspective implies that instead of looking at a few variables or at linear associations among such variables we should be trying to find frequently recurring clusters of attributes or gestalts.

According to this contingency approach a large number of variables that collectively define a meaningful and coherent slice of organizational reality could be explored simultaneously. In their proposed research framework for distributed work arrangement Belanger and Collins [2] used gestalt type of FIT to consider the internal coherence between a large numbers of attributes, whose interactions could not be precisely formulated.

In an invaluable article regarding conceptualizing FIT in strategic information technology research, authors concluded that "where FIT involves only two concepts, say strategy and IT, one would reject the moderator and matching perspectives in favour of mediation's greater explanatory power. In the complementary situation where FIT involves multiple concepts, one would reject co-variation and profile deviation in favour of the gestalts approach."

One issue to be considered in information technology research on the impacts of IT on organizational design is reliance on studying multiple relationships between outcomes of IT and organizational design variables. For this study, we borrow from the literature on the notion of FIT as a gestalt which provides part of the theoretical foundation needed to understand the impacts of IT and organizational design. FIT as gestalts which has been used extensively in theory construction suggest that we have to look simultaneously at all the variables of interest and their relationships.

Overall, the above argument leads to logic behind differences among previous research findings regarding IT and its effects on organization in general and organizational design in particular. As mentioned earlier, little interest is devoted to treat IT in specific and systematic ways as a tool during the design process. Much of the previous studies describe IT in general terms, the results of which range from decentralization to centralization of authority. While some researchers report more centralization from the use of IT, others have pointed out that using IT has led to decentralization.

These differences in findings to some extent arise partly from lack of systematic approach to evaluate all the variables affecting organizational design. From FIT as gestalts perspective, each combination of attributors may lead to a different organizational design.

In fact, the answer to the conflict lies not in which finding is right and which is wrong, but in recognizing that all findings may be correct. Borrowed from Miller as cited in [47] and based on the three forces that affect organizational design, the dissimilarities among different findings could be illustrated in a three dimensional space (Figure 4).

To pursue its objectives, in the first step of this study, direct effects of IT usage on some of the selected organizational design variables and on organizational/individual /technological levels will be examined. From the contingency theory perspective a concept of FIT must be used to look at the interrelationships of constructs and their impacts on various influential factors on organizational, individual and technological level.

In the next section we discuss those critical attributes of organizational design; design of decision making; control system, positions and formalization. Second, based on justified conceptual framework (Figure 5), the interactions between IT and organizational design variables would be explored, using the concept of FIT, for impact on organizational/individual outcomes.

The model is based on a conceptual framework presented in Figure 3 and a research by Robey [48] that suggests that three forces interact to affect successful organizational design (see Figure 1). This perspective is driven by the recognition that organizational design can not be determined by advances in information technology, but rather it is the outcome of the interaction between multiple forces that may explain different organizational design.

The following paragraphs describe each critical attribute of the above conceptual framework of FIT. The remainder of this section tries to present more information on the development of research objectives, propositions and survey.

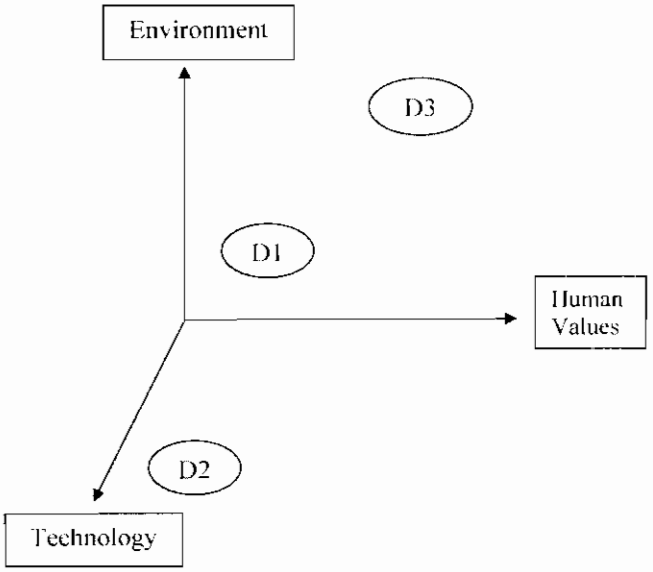

Figure 4: Differences in Organizational Design from FIT as Gestalts Perspective
Source: Adapted from Bergeron et. al. [5]

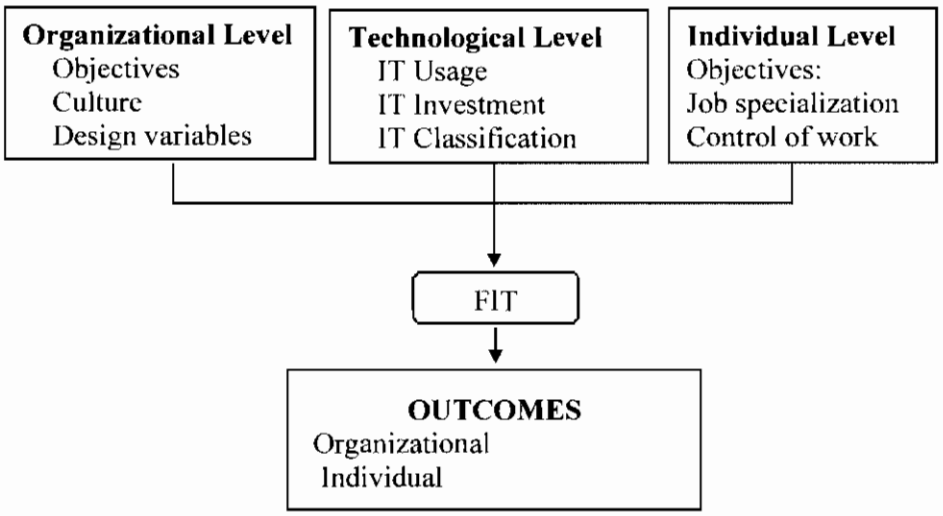

Figure 5: Conceptual Theory in Framework of FIT as Gestalts

ORGANIZATIONAL LEVEL

This section covers some of the organizational aspects regarding objectives, culture and design variables in conjunction with effects and intention of IT usage in organizations.

Organizational Objectives of IT Usage:

Based on previous literature, most common drivers to use IT in organizations are a) Change in staff, they demand more and more responsibility ; b) change in environment that makes it very competitive, c) change in market place, and need to be more innovative, d) change in the role of computers from back-office to supporting the day to day activities e) to deal with highly competitive internal environment and to maximize competitive effectiveness among other managers, and so on.

Organizational Culture and IT:

O'Brien [44] suggests that organizations and their subunits have a culture that is shared by managers and other employees. That is, they have a unique set of organizational values and styles. For example, managers at some organizations share an informal, collegial, entrepreneurial spirit that stresses initiative, collaboration, and risk taking. Managers at other organizations may stress a more formal approach. Naturally, the designs of information systems and information products must accommodate such differences, for example, managers in a corporate culture that encourages entrepreneurial risk taking and collaboration will probably favour executive information systems that give them quick access to forecasts about competitors and customers and E-mail and Internet systems that make it easy to communicate with colleagues anywhere.

Many researchers have devoted themselves to analyzing the impact of IT in a firm's performance, the organizational culture styles and the degree of successful implementation of information technology within an organization. They have mostly focused on two levels of outcomes, for individuals and for organizations. For example, Belanger and his colleagues [3] report that as an enabler, IT has facilitated work arrangements. In such a setting the

impact of IT on organizations could include changes in culture and work structure.

Organizational Design Variables and IT:

Every organized human activity gives rise to two fundamental requirements; the division of labour into various tasks to be performed, and the coordination of these tasks. These sentences clearly emphasize the central role of human factor in organizational design.

Organizations structure their management, employees, and job tasks into a variety of organizational subunits. However, commonly believed that information technology (IT) must be able to encourage and to support a more decentralized, collaborative type of organizational structure, which needs more interconnected intranets or client/server networks, distributed databases, downsized computers and systems development resources distributed to business unit and workgroup levels. Thus, information technology must emphasize quick and easy communication and collaboration among individuals, business units, and other organization workgroups, using electronics instead of paper . Due to the importance of organizational design variables, the vital role of these variables (decision making, control, formalization and design of positions) in the development of the present research, are explored in a separate section.

TECHNOLOGICAL LEVEL

IT Usage:

Surveys of managers and case study literature show that the most important reasons for investing in IT are product quality improvements, notably customer service, timeliness, and convenience. Most important benefits of IT investment are intangible, such as convenience, target new customers, improve customer service, improve quality and variety, improve timeliness, provide managers more control, reduce labour cost, reduce total cost. Since this argument has a drastic effects on measurements of the effects of IT on organizations and creating business value, which has been debated for a numbers of years and in order to narrow the focus of the definition of IT, in this study only computer-assisted technologies are at the center of attention. To determine the usage of IT and its effects on organization, the first step is to determine the usefulness and ease of use of IT from a user's perspective. After that, using statistical analysis it would be possible to measure the correlation of IT usage and organizational aims of IT usage and organizational design variables. The factual questionnaire in this section is built upon the work of previous literature (with appropriate changes related to the objectives of the research) that has been tested for content validity and reliability.

IT Investment:

What are the effects of different kinds of information technology on organization? In this section, the aim is to determine whether companies can get what they are supposed to get from IT investment.

Owing to the fact that it is predicted an increasing trend in a company's investment in IT will continue in the future, [28] to be able to measure the ensuing outcomes, distinction between IT investments could be a useful step.

	Technology Scope	
Business Solutions	Process Improvement	Experiments
Shared Infrastructure	Renewal	Transformation
	Short term Profitability	Long term Growth

Figure 6: A Framework for IT Investment
Source: Ross and Beath [50]

Ross and Beath, [50] argue that IT investments could differ along two dimensions: strategic objectives, which highlight the trade offs between short term profitability and long term growth, and technology scope, which distinguishes between shared infrastructure and business solution. They suggest four distinct types of investments, Transformation, Renewal, Process improvement, and Experiments (Figure 6). On the other hand, Stebbin and Sena [53] argue that IT devices could be divided to two broad groupings: Tool-oriented and Procedure-oriented. Procedures-oriented systems are used for repetitive tasks such as ordering and billing. Tool-oriented systems are less directly related to the production of goods or services . This study intends to separate which technology effects the results. Is there any correlation between using Procedure or Tool-oriented and probable findings of this research; e.g. correlation among Tool-oriented device and (de)centralization of decision making etc.

ORGANIZATIONAL DESIGN VARIABLES

Decision making:

In case of the effects of IT on decision making in any given organizations there are two dimensions that are frequently referred to by previous research. The effects of IT on a) (de)centralization of decision making and b) quality of decision making.

It has been suggested that IT (computer) could, in fact, facilitate decentralization. The hypothesis is that a decentralization of information represents a decentralization of power, enabling IT to become a mechanism for further decentralization.

Centralization refers to the degree to which decision making is concentrated at a single point in the organization. Centralization is an organizational set up whereby the authority to make important decisions is retained by managers at the top of the hierarchy.

One of the crucial dimensions of organizational structure, associated with IT is the extent of centralization or decentralization of decision making. The question of whether IT will tend to favour centralized decision-making or decentralization has been debated for almost 40 years . Yet, the literature has come to opposite conclusions about the relation of IT via organizational decision making. There is an ongoing debate about the correlation of IT and (de) centralization. For instance, some studies found that whether IT led to greater centralization or decentralization depends significantly on organizational politics.

This study is an attempt to empirically test the relationship between information technology, and decision making in organizations and how the combination of IT and

organizational design affects centralization or decentralization of decision making. Mintzberg distinguishes between two kinds of decentralization.

Vertical decentralization is concerned with the delegation of decision making power down the chain of authority, from the strategic apex into the middle line. In other words, delegation of decision making power from top managers to lower level managers.

Quality of Decision:

To evaluate quality of decisions in organizations three measures are used, time, effort and rationality. In case of effort, it must be noted that because of capabilities of IT that leads to more available and more quickly retrieved information, including external information, internal information, and previously encountered information, that leads to increased information accessibility, sometimes IT facilitates the use of external experts, and sometimes experts can be replaced by expert systems and information keepers can be replaced by management information systems.

The basic notion in our use of technology has its roots in our desire to overcome limitations in human natural, physiologically defined capabilities, and that this also applies to the construction of organizations. In the 1950s Herbert Simon, Nobel Prize winner declared that organizations can never be perfectly rational because their members have limited information processing abilities. He argued that people:

- Usually have to act on the basis of incomplete information about possible course of action and their consequences,
- Are able to explore only a limited number of alternatives relating to any given decision,
- Are unable to attach accurate values to outcomes

Today, as developments in information technology and forms of networked intelligence are giving a completely different way to the information processing view of organization and its implications for organizational design, a significant challenge can be made to the traditional assumption. Organizational rationality has often been defined in terms somewhat different from that of the classical definition of rationality. It is necessary to first consider the classical definition before we can discuss the more restricted assumptions that underlie organization-specific rationality. In describing the classical model of rationality, researchers identified the following components: (1) Universality: All rational thought will consistently lead to the same conclusion for each specific situation given the same information set. In other word, while gathering sufficient data about any question, a manager should decide when he/she has enough data. One good method of deciding when we have enough data is related to the data's repeatability. The amount of repeatability depends on the complexity and effect of the decision. (2) Necessity: The rationally derived conclusion must follow with necessity from the information given. (3) Rules: The rationality of a conclusion is determined by whether it conforms to the appropriate set of decision rules. (4) Algorithms: Decision rules which, when applied to a problem, provide a solution in a series of steps. (5) Induction: Means versus the ends. (6) Justification: The rational justification of the means. (7) Value: Rational processes have value due to the reliability of the results. Also, one way to measure the quality of decisions is to compare the results of a decision with

expectations prior to making the decision. Essential to all models of rationality is the requirement for complete, or at least sufficient, information to make an optimal decision. "What if" scenarios allow the organization to consider alternative courses of action via an established set of " rules" existing in the various MIS, DSS, GDSS, and expert systems. The rational decision making process involves a growing awareness and identification of the problem, whether a solution is possible, identification of alternatives and their probable and possible consequences.

CONTROL

A great part of information processing pertains to control and one of the key drivers of investing in information technology has been its use as a mechanism for organizational control. Despite extensive literature on organizational control in general, few efforts have been made to explore the effects of IT on organizational control and also, less efforts have been undertaken to integrate the findings into comprehensive theories of organizational control.

The objective of this section is to examine the extent of facilitation caused by IT in work processes in forms of organizational control. To achieve this object, in conjunction with the overall objectives of research, this section focuses on some related issues such as formal control, informal system of control and more recently concepts of trust and self-control in organization. Formal control consists of all control systems used. Informal control, on the other hand, refers to establishing a culture that will guide the employees in dealing with challenges and in making decisions.

The growing trend towards informality encourages informal control. The literature review supports a growing trend towards informal control, and many management philosophies share the assumption that knowledge, decision, and accountability will shift downward in a more flattened organization structure, which is congruent with other studies. Self-control is associated with uncertain and rapidly changing organizational processes and relies on commitment, and share values for control. Information systems, common architectures, shared databases, decision support tools, and expert systems facilitated the coordination of behaviour without control through hierarchy.

DESIGN OF POSITIONS

Regarding meteoric advances in information technology, along with increasing global competition, some researchers radically suggest that organizations need a totally new organizational structure (flexible project groups instead of a normal hierarchy); and job structure (multiple rather than single jobs).

There is no doubt that IT has affected all areas of task performance.This is consolidated by the previous research that indicate an increasing trend in sharing knowledge through communicational channels. [15] Nowadays employees are asked to enhance their attitude towards accepting more responsibilities and a better preformance of their duties. Commentators such as [18] have argued that motivation and job satisfaction become increasingly important because of added autonomy and reliance on employee cooperation.

FORMALIZATION

Formalization is the degree to which jobs and procedures within the organization are standardized, rule based, and in writing . It has been measured as the availability of particular documents, a self-reported assessment of the extent of written regulations-rules, policies, availability of manuals, job description, individual performance records, etc. From behavioural aspects, formalization is used to ensure adherence to standards, especially when behavioural norms cannot be counted on to provide the desired behaviour.

Electronic mail systems, electronic bulletin boards, video conferencing and fax machines all offer alternatives to formal channels of communications. Informal communication facilitates sharing of information and knowledge, and IT (communicational technology) relates negatively to formalization. Table 4 summarizes the literature review on IT and organizational design, while Table 5 suggests indicators associated with design variables.

Table 4: Examples of Empirical Research on IT and Design Variable with Different and Contradictory Results

Design Variable		Study
Design of Individual Positions	Job	[45], [27], [8], [2, 4], [45]
	Formalization	[25], [32], [62], [56]
Design of Control System	Control	[8], [21], [39], [38], [53], [14], [29]
Design of Decision Making System	Decision Making (centralization and decentralization)	[7], [8], [32], [58], [14], [11]

Table5: Variable, Measure and Associated Indicators

Variable	Measure	Indicator(s)
Formalization	Written Rules	The Amount of Written Rules and Procedures [56]
Decision Making System	Higher Quality of Decision	1) Time absorbed for decision (hour) [32] 2) Efforts involved in decision making (Number of people involved in decision making)
	Rationality of Decision	1) providing a criteria to understand cause and effect relationship 2) Providing rules in the process of decision making [17]
Control	The Amount of Control Held by Managers (Makham, Bonjean as cited in [56])	1) Formal Mechanism: the Level of formalization [29] 2) Informal: Individual and social control [51]
Job Specialization	Enhancing Skills and Expanding Jobs [45]	1) Breadth" or "scope" of job: number and variety of skills 2) Separating performance from administration of work: responsibility and autonomy [40] 3) Self managing team, broader duties assigned to line workers

IMPROVEMENT AND ACHIEVEMENT

Although it is difficult to measure the effects of IT on organizations and on a function Which can be hard to isolate, but tough metrics should exist if the business goals are clear. This is because it encompasses products that should not be considered in the category of information technology and, second, because its breadth of products is so wide that methods of measurement are often not implemented as precisely as they should be.

Through literature review, more frequently reported goals for the use of IT among managers are: a) change in staff, they demand more and more responsibility; b) change in environment that makes it very competitive, c) change in market place, and the need to be more innovative; d) change in the role of computers from back-office to supporting day to day activities and e) change in the highly competitive internal environment to maximize competitive effectiveness among other managers.

SUMMARY AND CONCLUSION

Every organization is constituted of five major components, the work to be done by the organization and its parts; the people who perform the work, the structure which means the relationship between positions and people who hold the positions; culture that reflect people's values, beliefs, and their patterns of behaviour; technology that facilitate performing works and processes. An overview of the literature review of management and IT indicates that all the above mentioned factors have been greatly affected by information technology. Knowledge and skills of individuals (from unskilled workers to management) the coordination and control mechanisms, job design and communications etc. have been affected by IT advances.

Despite the fact that organizations are dynamic and complex, and it is very difficult to set down definitive detailed criteria to test the effects of IT on organizational design variables, however it seems utilizing a set of propositions is a reasonable method to determine relatively precise understanding of the change process. In order to obtain rich data to measure, while still being able to quantitatively measure and statistically analyse the impact of IT on organizational design, an extensive survey data collection methods would be utilized. The small amount of information and few theories available on organization design in general, and much less on the impact of IT on organization design is the main restriction of the work.

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