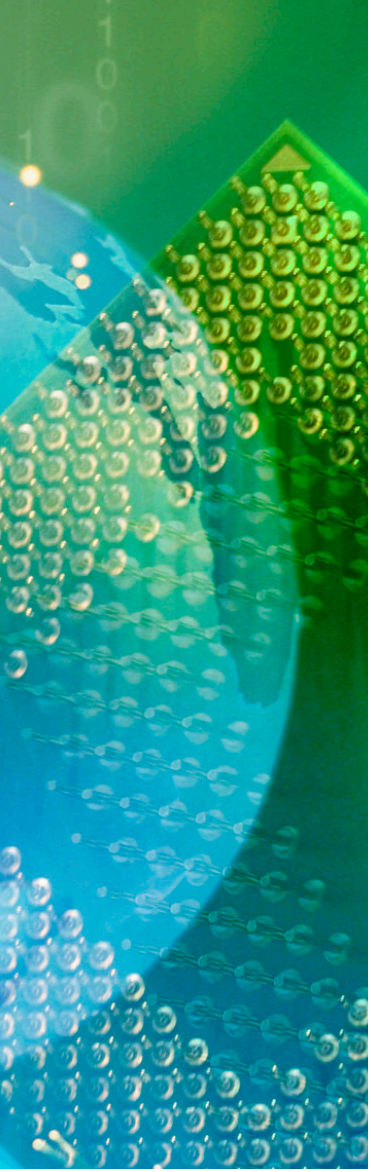

Information Systems Collection
Daniel J. Power, *Editor*

Creating a Culture for Information Systems Success

Zakariya Belkhamza

BEP BUSINESS EXPERT PRESS

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To Mom and Dad, with love

Abstract

It has been widely reported that issues related to organizational context appear frequently in discussions of information systems success. The claim that the information system did not fit the behavioral context in an organization is often part of the explanation of why a particular information system encountered unanticipated resistance and never met expectations. While this context has been intensively studied, we still lack evidence on how this organizational context is affecting the success of information systems from a managerial action perspective. This type of managerial involvement is often neglected to the extent that it becomes a major obstacle to organizational performance.

The objective of this book is to assist chief information officers and information technology managers on how to use their managerial actions to create a suitable cultural environment in the organization that leads to a successful implementation of information systems. The book will also provide guidelines for managers on how to create this organizational context, measure it, and make sure it leads to a successful implementation and use of information systems. The book's main theme is to explain how the behavioral context of an organization led by its managers and executives would lead to the success of the information systems function.

In this book, we first begin by illustrating how the managerial actions of managers and executives can build a behavioral context. Then, we provide some guidelines to measure this behavioral context. Finally, we explain how the success of the information systems function occurs as a result of this process. The term system behavioral success model represents how the system, resulting from the managerial action of the information systems managers and executives in an information systems context, leads to the success of the information systems. In other words, how a behavior leads to the success of a technical system amidst a complex organizational behavioral structure of change.

Keywords

information effectiveness, information systems, information systems success, managerial action, organizational context, service performance, system performance

Contents

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CHAPTER 1

Introduction

One of the most important concerns for information systems executives is how to measure and improve the effectiveness of organizational information systems. Information technology's (IT) efficiency in organizations has been consistently reported as a major concern for chief information officers (CIOs) and executives.[1] This is because it is difficult to differentiate the effect of information systems on organizational performance from the effect of other factors. Many studies suggest that poor information systems in the organization generate poor organizational performance. Thus, high information systems effectiveness is associated with high organizational performance.

Similarly, the correlation between information systems and the culture has always been critical, an issue that is often cited as the top priority for CIOs. According to a recent survey by the *CIO* magazine (2014),[2] cultivating the IT business has been reported as one of the top three activities of a CIO. This is not surprising, as the claim that the information systems in the organization did not fit its culture is often part of the explanation of why a particular information system encountered unanticipated resistance and never met expectations. As the worlds of business and organizations are synergizing in an increasingly faster manner, we are faced with various challenges in organizational forms; therefore, IT executives need to take a closer look at the link between organizational culture and information systems if they want to succeed in their businesses.

This book will help IT executives and managers investigate this problem by touching on three main issues:

1. The first issue this book will investigate is the aspect of information systems success. What do we mean by information systems success? Different people have addressed different aspects of success, interpreting a successful system differently. To some, a successful system

is simply a system that does not fail. To others, a successful system is the one that is proven to be effective and efficient. However, what we have observed is that it has proven to be practically impossible to define and measure the effectiveness of the information systems function. One important reason for this observation is that the effect of the information systems function on organizational performance and effectiveness can be subtle and difficult to differentiate from the effect of other factors. Some organizations define information systems effectiveness as the capacity of the system to unveil hidden values in its use. Others depend mostly on qualitative rather than quantitative measures. Within the organizational context, we argue that the effective deployment of information systems provides a great value to the organization, and this is what we are going to show in this book.

2. The second issue after defining information systems success is how to integrate the information systems aspect into the business organization's context. This is important because there is a mismatch between information systems and the culture of the organization. We can clearly see this gap if we ask IT executives how many times they have evaluated their systems from the cultural perspectives of their own organizations. The assessment is usually undertaken from the perspective of the structure and design of the system, while ignoring the behavioral and cultural context of the organization. When we ask why, the answer is clear: Assessing the behavior and culture where the system is operated is subjective because it involves human emotions; thus, making this evaluation process difficult to be undertaken and hard to interpret.
3. The third issue that will be discussed in this book is how do we evaluate the system based on this definition of organizational culture? Which measurement is suitable for the context of the organization in which the information system is integrated?

While we can see that there are many measurements around, we cannot deny that these measurements are suffering from conflicting definitions and inconsistencies in operationalization. Although there are many approaches that conceptualize the organizational culture, the dominant approach conceptualizes climate as employees' shared perceptions of

organizational events, practices, and procedures. However, the lack of a theoretical basis for many organizational climate instruments has led to many variations in organizational culture dimensions employed in different measures. We will go through these measurements and show why measuring the information systems success from a cultural viewpoint is what any IT executive needs in his systems assessment.

We hope that this book will shed light on some important features in the relationship between organizational culture and information systems success, which is not widely approached, compared to the technical approaches that are dominating the information systems measurements. Since the information systems implementation is in fact a process of organizational change, it could be considered as a process of change, where, if a key criterion of information systems and culture is integrated, we can definitely observe a successful outcome of the information systems in the organization.

As new information systems applications find their ways into organizations, as they are used by increasing number of staff for various organizational tasks, the structure of the technology is infused into the social structure of the organization. However, information systems implementation must not be taken to mean the effect of the systems just through the use of their applications. The information systems process goes beyond use, when it is concerned with IT-related planning, selecting, purchasing, and evaluating. All these activities involve the human factor, as they affect the routines, practices, beliefs, and values of IT managers and executives throughout the organization. This concept of information systems must not be neglected.

What we are going to see in the following chapters is the establishment of an emerging approach that seems to be more appropriate for the assessment of the information systems. This approach is based on the information systems manager's perception as a user of the performance of all the aspects of the information function experienced within the organization. We believe that this is important because information systems functions include all information systems groups and departments within the organization. The information systems functions use resources to enhance information systems performance, which in turn influences business process effectiveness and organizational performance.

From an industrial perspective, the contribution of information systems-based assets to organizational performance provides a benchmark based on which the many processes of the information systems function, including business information system, can be evaluated and refined. Without the benefit of these measures, information systems assets may be undervalued by users and top executives, resulting in shortened budget allocations and lower managerial profiles for top information systems executives. In other instances, the absence of reliable performance metrics may cause users and top managers to overvalue information systems assets. Users and strategic planners may therefore be unaware of innovations adopted by competing organizations that are enhancing and changing their patterns of work and competition. The lack of validated and complete performance criteria in either of the two instances can result in misguided decisions regarding the acquisition, design, and delivery of information systems.

In this book, we also investigate the culture from a managerial action perspective, which leads to an assessment of information systems success from the users' perception within the business unit of the organization. The users' perception is part of the behavioral context that forms the culture of the organization. Improved organizational performance depends primarily on culture, where managers are able to build and fulfill their managerial roles and processes. This managerial role can lead the organization to create and embed a work ethic in its context that induces rational, yet value-oriented, actions on the part of its members. These characteristics are considered as key dimensions for quality management that induce the creation of a favorable and supportive organizational culture for improved organizational performance, and thus information systems effectiveness.

Another important point we make regarding managerial action perspective is that the approach is sociotechnical in nature. This explains the fact that implementing information systems is not just putting together a number of technical devices and organizational procedures. This argument also stresses that some other variables within the organization should be considered, which might also influence the ultimate success or failure of the implementation effort. By adopting this perspective, we also highlight that the long-term success of IT depends on

how IT-based work tasks are managed at the local level. In other words, the capabilities of IT can only be maximized if the local management style is also aware of such capabilities and is willing to take advantage of them as part of the implementation process. This can be achieved, as we will explain later, only by building an organizational context shaped by a managerial action assisting the information systems implementation process.

This view also comes from the understanding that IT managers and CIOs not only manage systems, but also manage people. They need to invest in people, because it is the key to achievement. As many CIOs recognize, people development is not ancillary in the organization; it has to be a core responsibility for them in order to drive success.

Summary

This chapter introduces the idea of the book, which is the correlation between information systems and the culture of the organization. The claim that the information systems in the organization did not fit its culture has often been a justification for the failure of many systems in organizations. The following chapters discuss information systems success, culture in relation to information systems, and the measurement of assessing information systems effectiveness from a managerial action perspective, which is the key for a sustainable culture in organization.

CHAPTER 2

Implementing Information Systems in Organizations

If you cannot describe what you are doing as a process, you don't know what you are doing.

—W. Edwards Deming

Introduction

We start this chapter by discussing the definition and implementation of information systems. We then explain how information systems implementation affects the process of organizational change. This effect can be either as a process of technical innovation in the organization or as a process of organizational maturity. We further discuss the approaches of the information systems implementation in the organization: the technological approach, the organizational approach, and the sociotechnical approach.

Definition of Information Systems

Across all schools of information systems discipline, the view of information systems is changing in two different aspects: The first aspect is to acknowledge an information system as both a technical and a social system, and the second aspect is to acknowledge the emerging technological innovation in data management. These two acknowledgments imply a richer view of the problems of information systems development, in relation to organizational changes.

However, defining the term information systems is considered a challenge. This is because the term information systems is used to refer

to many kinds of objects that share common aspects. For example, we may consider an information system as an autonomous organization whose purpose is to provide information to its clients. We may also consider an information system to be a subsystem existing in any system that is capable of governing itself as an autonomous system. The first aspect assures the communication between the managerial and operational subsystems of an organization, which is its purpose, while the second acts as a memory to store the outcome of such communication.

In both aspects, it is clear that information systems deal with information, either directly related to the organization or to the work carried out in the organization.

Among the best definitions of information systems that are aligned with the scope of this book is what Professor Frank Land of London School of Economics puts forward. He defines an information system as

> a social system, which has embedded in it IT. The extent to which IT plays a part is increasing rapidly. But this does not prevent the overall system from being a social system, and it is not possible to design a robust, effective information system, incorporating significant amounts of the technology without treating it as a social system.[1]

This definition, despite being 30 years old, contains the vital concepts that many are still considering, as it deeply underlines the practical composite between IT and the social element of its functional environment.

Another important definition put forward by Professor Steven Alter of University of San Francisco explains information systems based on a more general concept of a work system. This work system is "a system in which human participants and/or machines perform activities using IT, and other resources to produce specific products or services for specific internal or external customers."[2]

Following these two definitions, information systems are commonly recognized as work systems in which their activities and processes are committed to information processing, such as transmitting, storing, capturing,

manipulating, retrieving, and displaying information. Furthermore, this definition highlights the important point that dealing with information systems requires dealing with two types of entities: one with a social nature and another with a technological nature.

On the other hand, the emerging advanced technologies that we have witnessed in the recent years have had a great fundamental impact on the way we see information systems. The Big Data revolution has changed the way information is collected, stored, managed, and consumed, transforming the many traditional ways we are used to regarding our information systems.

We can obviously observe that the traditional data storage and retrieval methods, such as the relational database management system, are no longer considered a necessity, which have been the core of the corporate information systems for a long time. Many companies have already made a change adopting the three Big Data attributes: Data Volume, Data Variety, and Data Velocity.

- Data Volume: Scale of data
- Data Variety: Different forms of data
- Data Velocity: Analysis of streaming data

The three Big Data attributes have resulted in designing information systems that have the capability of handling both structured and unstructured data, processing a massive volume of data in real time. This drastic change enhances the effectiveness of decision making through Predictive and Data Analytics through the designed information systems.

Linking the two concepts together will not be complete without the definition of Big Data by Boyd and Crawford. They described Big Data as "a cultural, technological, and scholarly phenomenon that rests on the interplay of:

- **Technology:** Maximizing computation power and algorithmic accuracy to gather, analyze, link, and compare large data sets.
- **Analysis:** Drawing on large data sets to identify patterns in order to make economic, social, technical, and legal claims.

- **Mythology:** The widespread belief that large data sets offer a higher form of intelligence and knowledge that can generate insights that were previously impossible, with the aura of truth, objectivity, and accuracy."[3]

This is perhaps the most precise definition that links Big Data attributes to the information systems functions because it relates the two types of information systems entities: the social nature and the technological nature.

We talk about Big Data here because it is the core of any information systems functions, making the analysis and processing of these data more complex, and emerging technologies are being introduced such as collaborative cloud computing.

In addition to this data revolution, the emerging challenge of bring your own device (BYOD) continues to evolve in many organizations where the business operations heavily depend on technology. Allowing employees and business partners to use a personally selected and purchased client device for work purposes is a strategy many organizations are now adopting. In a recent study conducted by Gartner,[4] it is predicted that, by 2017, half of the employers will require their employees to supply their own devices to execute enterprise applications and access data. According to David Willis, the vice president of Gartner, BYOD strategies are the most radical change to the economics and the culture of client computing in business in decades.

In the following section, we discuss how an information system is infused or diffused in the organization, or where we implement an information system.

Information Systems Implementation

Talking about implementation of information systems often brings confusion because the term *implementation* is used with many different meanings. For instance, to a programmer or software engineer, implementation means to take into account the design specifications and write programs. To an information systems analyst, implementation means to examine the programs and other components and set them to work in reality.

However, many suggest using the term in both operational and strategic contexts where it means both a technical and an organizational process, because implementation incorporates all human and social aspects of information systems implementation in an organization. Implementation also includes other aspects of organizational reality, such as the technical, the strategic, and the managerial aspects. Sometimes, it is even considered as a continuous process of organizational learning.

What we can conclude from this is that we cannot talk about information systems without talking about their implementation due to the close tie between the social aspect and the technical aspect of information systems. For instance, when we introduce a new IT application or infrastructure in an organization, this installation would bring along a change to many aspects of the organization, including organizational procedures, processes, and behaviors. This means that information systems implementation is all about a process of change that would take place within the organization. Even with the process of designing a new system, the process of organizational change can be observed.

Therefore, planning for information systems implementation means planning for change in the organizational process. Both implementation and change are essential components of the information systems strategic planning activity. This change is an important link between the strategic and the tactical levels that encompass the information systems implementation.

On this matter, Professor Frank Land has identified six groups of factors that play an important role in determining the successful adoption of new technologies for an organization to complement the change management process.[5] These factors are:

1. Motivation for introducing the new system;
2. Commitment to the system;
3. Organizational culture;
4. Management of the implementation process;
5. The *distance* between the existing system and the replacement system; and
6. The technology itself.

These factors illustrate that the process view of information systems implementation is extensive. It can include various management aspects

that deal with the integration of both technical and social approaches of the information systems development process.

In 2009, many technology analysts believed that the escalation of cloud computing would lead to a mass elimination of corporate jobs related to IT. However, what happened actually was something very few would have anticipated: The introduction of this new infrastructure changed the way IT professionals behaved in the organization. Due to that introduction, some companies in the IT industry such as Aricent Group and Enterasys Networks observed their professionals developing interest in areas not known to them before; they were increasingly becoming attracted to some *value-added* activities such as business analytics, enterprise architecture, and strategic vendor relationship management.[6] Leadership teams also started articulating a vision associated with cloud technology and delivered it to their subordinates.

The new infrastructure has also eased some of the Aricent employees' tactical concerns, freeing them up to focus on new skills such as predictive analytics. It was even reported to have changed many line-level IT workers' jobs and to have altered IT leaders' roles. Many organizations are also aware that implementing such new technology requires the right skills and workforce; making sure that they have the right skills and people in place to plan, design, implement, and operate the cloud technology to the extent that some giants like Microsoft have invested in this and reinvented its certification program to directly address technology's evolution to the cloud.[7] This certification program is considered a necessary step toward greater industry relevance and business value.

Like cloud computing, Big Data solutions are also revolutionary technologies that have an important impact on the social context of the organization, corresponding to organizational change. The outcome of the intersection of the three trends of technology, mobile, cloud, and Big Data, has emerged as what is known as social technology, a term that defines any technology that facilitates social interactions enabled by communications capabilities such as the Internet or a mobile device.

Since organizational change does not occur in a direct linear way or through identifiable sequential phases, the process is much likely to be seen as continuous, iterative, and uncertain, which always needs an incentive and is a process of learning in nature. Although organizational

change can take many forms, the two forms that are often associated with the implementation of information systems are innovation and maturity.

Let us see these two forms of information systems implementation: the technical innovation and the organizational maturity. Although there are many other forms in which the information systems implementation process is seen in an organization, these two perspectives are seen to be dominating this phenomenon, proven to be effective and widely accepted.

Information Systems Implementation as a Process of Innovation

Innovation and diffusion theory has become an important stream in information systems implementation. It is assumed that certain system users have personal qualities, which predispose them to an innovative behavior. This stream is important because it attempts to create an integrated framework to deal with the whole phenomenon of information systems implementation. Furthermore, the information systems implementation is divided into stages that explain the whole process of implementation.

The framework developed by Zmud and colleagues is a good example to explain how to facilitate the implementation of information systems.[8]

The factors of the framework are:

1. The user's decision style
2. The user's knowledge of the system
3. The user's job characteristics
4. The user's acceptance
5. The user's demographics

The framework was constructed into a stage model as illustrated in Figure 2.1.

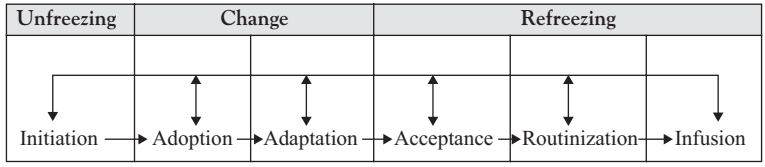

Figure 2.1 Information systems implementation model

Source: Kwon and Zmud;[9] Cooper and Zmud.[10]

As we can see from the model, the organizational change dimension is added to the model by splitting it into three phases, which correspond to the famous change model of Kurt Lewin. The processes that characterize each of the six stages are described below.

1. **Initiation**
   - Process: Active scanning, passive scanning, or both of organizational problems or opportunities and of IT solutions are undertaken. Pressure to change evolves from either organizational needs (pull) or technological innovations (push).
   - Product: A match is found between an IT solution and its application in the organization.
2. **Adoption**
   - Process: Rational and political negotiations ensure organizational backing for implementation of the IT application.
   - Product: A decision is reached to invest resources necessary to accommodate the implementation effort.
3. **Adaptation**
   - Process: The IT application is developed, installed, and maintained. Organizational procedures are revised and developed. Organizational members are trained both in the new procedures and in the IT application.
   - Product: The IT application is available for use in the organization.
4. **Acceptance**
   - Process: Organizational members are induced to commit to IT application usage.
   - Product: The IT application is employed in organizational work.
5. **Routinization**
   - Process: Usage of the IT application is encouraged as a normal activity.
   - Product: The organization's governance systems are adjusted to account for the IT application: The IT application is no longer perceived as something out of the ordinary.
6. **Infusion**
   - Process: Increased organizational effectiveness is obtained by using the IT application in a more comprehensive and integrated manner to support higher-level aspects of organizational work.

- Product: The IT application is used within the organization to its fullest potential.

According to the model, initiation is associated with the unfreezing stage; adoption and adaptation are associated with the change stage; while acceptance, routinization, and infusion are all associated with the refreezing stage. From this basic conceptual orientation, two major problems flow: First, this stage model treats information systems implementation as a linear process composed of sequential stages. Second, it considers the use of IT and the reorganization of work as the only consequences of information systems implementation, when taken as a linear process.

As we can observe from the aforementioned model, we have been using the term information technology instead of information systems. This is because at this stage, which precedes full implementation, the full integration of users and the IT infrastructure is yet to evolve with a fully blended concept to formulate an information system, as we move on toward the final stages of the model.

Another example of an information systems implementation model as a process of innovation is DeLone and McLean's process model.[11] The DeLone and McLean model also places information use and user satisfaction as the ultimate measure of success. This model is an attempt to establish measures of success for information systems implementation. In this model, information systems success should be seen as a process construct of both temporal and causal influences in determining information systems success, and the success categories presented in the model should be interdependent while maintaining the serial, temporal dimensions of information flow and impact. In other practical words, in order for a system to be successful, some factors that contain processes have to be determined and ensured as a precondition for a successful implementation to occur.

Both models discussed earlier provide relevant features enabling us to understand the importance of considering the implementation stages in the dynamics of innovations and that putting technology to use in an organization is not a matter of a single decision, but rather a series of linked decisions and nondecisions.

In practice, these theories have been applied in various organizations with similar concepts but in different applications. One example for this is what is called business process re-engineering, a practical model that optimizes end-to-end processes and automates nonvalue-added tasks, where IT is the key enabler of that radical change.[12] This concept takes the organization as a network of some interconnected processes. These processes are a collection of activities that take one or more kinds of input and create an output that brings value to the business. This requires the involvement of everyone in the organization. Of course, all these processes have to be considered during the various phases discussed earlier through system design, process mapping, and flow chart instrument.

Another practical interpretation of technical innovation when selecting or adopting new systems is to explore the process of certain frameworks and methodologies. One applied guideline we present here consists of seven steps categorized in three phases.

Phase 1: Knowledge Formation

In this phase, managers are required to gather the necessary information concerning the three structures of the organization: processes, people, and requirements. This is a necessary step to recognize the current activities and how they are performed in the organization. In this phase, three steps can be followed:

Step 1: This step requires the use of process mapping and value stream to analyze activities to determine which activities would add value to the organization. This step will also enable us to identify challenges and tasks that can be improved.

Step 2: In this step, various outputs of step 1 will be discussed by the organization's members, in order to get feedback. This step will allow us to see attitudes of individuals and influential groups toward the new information system to be implemented.

Step 3: Build a list of system requirements and develop a technical strategy, which is fit for the tasks outlined in step 1. The engagement of technical staff and end users into the selection of the new system is important.

Phase 2: Strategy Implementation

In this phase, managers are required to identify the strategy to be of use in the implementation execution process. This phase consists of three steps.

Step 4: In this step, a selection of a change management strategy will take place.

Step 5: In this step, the implementation process starts on a small scale.

Step 6: This step deals with preparing staff and training them to be ready for the engagement with the implemented system.

Phase 3: Status Evaluation

Step 7: This phase consists of only one step and it deals with the process of monitoring and evaluating change management strategies for the previous two phases. It is favorable to utilize some performance measurement systems to ensure that the desired outputs are achieved.

Progress monitoring can be used to track the operational work of the system implementation process. This monitoring can be achieved by answering the following questions:

- Have activities been completed as planned?
- Have outputs been produced as anticipated?
- Is the work of the system progressing as projected?

After this initial progress report, the following detailed investigation report can be made, identifying the answers to the four questions: the what, why, when, and how of monitoring.

What	A continuous review of system implementation progress at the activity and outputs levels Identify corrective action if necessary
Why	Analyze current situation Identify issues and find solutions Discover trends and patterns Keep system implementation activities on schedule Measure progress against outputs Make decisions about human, financial, and material resources

When	Continuous
How	Regular visits and inspection by executives and top management Record activities and Reports

Information Systems Implementation as a Process of Maturity

The second information systems implementation process is the use of IT infrastructure to automate organizational procedures. This process is generally determined by the background of the system used in the organization. Of course, it is also a complex process because besides the background of technology itself, it involves the background of all actors involved in the management and use of technology.

Such a process is often explained by the notion of organizational maturity, which means establishing an improvement map to use for assessing the effectiveness and efficiency of information systems in the organization. It enables organizations to decide on how to perform their IT projects in order to guide advancements, and how to achieve dramatic enhancements leading to their systems' success. This process also allows the evaluation of the system's maturity and provides recommendations to improve the system's delivery competencies. The idea of measuring the level of information systems organizational maturity has given rise to the introduction of various maturity models and frameworks, in an attempt to typify information systems development stages across the organization.

Executives and chief information officers (CIOs) often have a hard time trying to visualize strategies to answer questions related to the aforementioned issue, such as:

- How can I tell if I am doing a good job of managing these changes and monitoring my progress on an ongoing basis?
- How do I manage the interactions of systems and processes that are continually evolving?
- How do poor processes impact interoperability, safety, reliability, efficiency, and effectiveness?

Nolan's model, one of the well-known models, can be a starting point to answer the above questions. Unlike other models, this model

is characterized as an evolutionary theory, according to which it consists of six stages through which an organizational information system passes, in the course of its evolution to be effective as an efficient support of an organization's information needs. The six stages are:

1. Initiation
2. Contagion
3. Control
4. Integration
5. Data administration
6. Maturity

As illustrated in Figure 2.2, the six stages represent gradual phases of growth driven by technology. The model provides benchmarks for diagnosing the firm's current growth of its progress and describes guidelines for managing that growth to maturity in order to minimize crisis and lost opportunities. The model typically has phases along an evolutionary scale that define measurable transitions from one level to another. The corresponding attributes define each level. If the organization manages to acquire these attributes, this means that it has achieved both that level and the capabilities that the level represents.

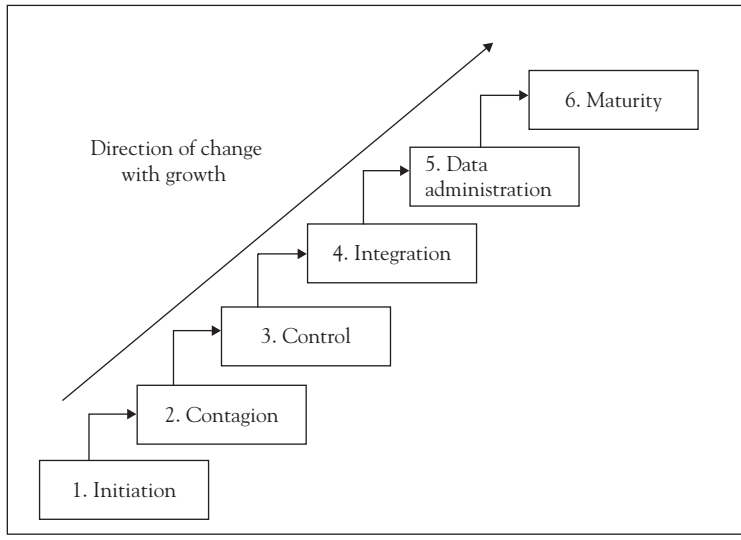

Figure 2.2 The six stages of the evolution theory

One good example for applying the maturity concept in an organization is the case of the Software Engineering Institute, where the Smart Grid Maturity Model was initiated and applied to assess progression of three tasks: (1) evaluating new sensors, switches, and communications technologies for grid monitoring and control; (2) extending the use of new control analytics across line-of-business decision making; and (3) establishing automated decision-making capabilities.[13]

Nolan affirmed that information systems evolution in an organization follows two S-shaped learning curves.

The first curve starts with very low levels of learning at the initiation stage, increasing through the contagion stage, leveling off at the control and integration stages. The second curve starts at the leveling off of the first curve with a slow growth, then high rapid growth through the data administration stage, leveling off again at the maturity stage.

However, two important contributions can be learned from Nolan's model:

- First, it drew attention to the fact that the growth of computing is due to the influence of forces inside and outside the organization.
- Second, it introduced the notion that throughout the evolution of information systems in an organization, managements go through periods of slack and control.

This discussion leads us to a central issue, which is the debate between the technology platform and the business platform. The nature of this debate creates significant pressure for line managers to disperse IT resources and the decision-making responsibilities regarding these resources. A rebut technology platform must exist in order for customers, managers, and professionals to use the technology-related products and services. The interrelation between the two platforms, often called the push–pull dilemma, builds significant pressure for managers to prescribe IT policies, plans, standards, and guidelines. In order to facilitate technological innovation in the business platform, business pull and technology push are required. On the other hand, in order to facilitate technological innovation in the technology platform, technology pull and business

push are needed. The success of information systems lies in the balance of these two forces. However, in order to achieve such balance, the cooperation and partnership building between information systems and business managers are necessary.

Amazon Web Service (AWS)* is a cloud platform launched by Amazon in 2006. Amazon argues that AWS has become a mature and robust platform for enterprise workloads, to the extent that it allows some customers to use its infrastructure to operate mission-critical applications. According to Werner Vogels, the chief technology officer of Amazon, the cloud platform has had a fundamental impact on how IT has evolved. He stressed the firm's commitment to openness and value as reasons for the success of the AWS. To Werner, the firm's business strategy toward its customers was that all doors were open to any type of technology. Customers can choose any operating system and any application and run them all through AWS. The business platform is so open to the extent that no period contract restricted the business abilities of the customers, which ultimately increased customer satisfaction over the technology platform.

This push–pull dynamics puts the organization in a position to strive constantly toward maintaining a balance between the development of an IT infrastructure and the building of partnerships between IT staff and IT users. A centralized corporate IT infrastructure can bring benefits such as a more cost-effective utilization of computing resources. Strong IT staff–user partnerships can also create other benefits, such as the systems management style, which is more responsive to local business needs, a shared understanding of IT capabilities and business unit needs, which are directly targeted at customer needs.

One of the traditional areas where maturity models are applied is data processing and governance in modern IT organizations, in which maturity plays important roles. They are defined by a set of characteristics or capabilities that can be measured and assessed within a domain of interest.

The IBM Data Governance Council Maturity Model is another example based on Nolan's concept of evolution. It was introduced with the objective to encourage new thinking about how data could be leveraged beyond the individual project level to reach across the organization.

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* Amazon: cloud computing driving business innovation.

The model enables organizations to recognize their current level of maturity, setting the stage for movement to higher levels. In the final phase, optimizing is expressed as a verb because it indicates the ongoing process. The core disciplines in the model, information quality management, information life-cycle management, and information protection are the main points targeted as an organization's immediate needs.[14] The model consists of five stages that provide a framework for prioritizing actions, a starting point, a common language, and a method to measure progress. These stages are:

1. **Initial:** Process unpredictable, poorly controlled, and *reactive*
2. **Managed:** Process characterized for PROJECTS and is *manageable*
3. **Defined:** Process characterized for the *organization* and is *proactive*
4. **Quantitatively managed:** Process *quantitatively* measured and controlled
5. **Optimizing:** Focus on *continuous* process improvement

As IT infrastructures move toward cloud-based infrastructures, many companies see cloud as the most advanced step in an infrastructure maturity model. Many IT executives have started recognizing that it is imperative to collaborate across their organizations and embrace the cloud-based systems and other emerging technologies such as Big Data and Analytics, and mobile and social technologies in order to better optimize the way they source and deploy their IT resources. The Cloud End-user Survey conducted by International Data Corporation (IDC) 2013 Asia/Pacific (excluding Japan) shows that more than 70 percent of surveyed companies are currently using cloud services or planning to use them within the following 12 months.[15]

Some cloud maturity models have emerged recently; these models are necessary for organizations because they enable them to better understand how they can effectively engage with cloud technologies in order to advance successfully. According to IDC, a leading IT market intelligence corporation, any successful cloud project must address its unique functional areas by performing the following activities:

- Identifying the business benefits that organizations can realize in each of the model stages, and guiding the CIO

in developing the cloud-based systems that leverage other emerging technologies, such as Big Data and Analytics.
- Addressing the key changes that must occur in people, process, and technology, expanded as eight core measures—IT roles; business roles; vendor management; service management; architecture, security, and integration; infrastructure; platform; and software.
- Ensuring the required investment and value of each stage—not just from IT organizations and IT budgets but more broadly across the company.
- Recognizing the complexity caused by changes to people and processes and that technology acquisition requires a business case and a process to achieve the expected value.
- Highlighting that the most advanced stage provides seamless access to IT resources (cloud and noncloud) based on an accurate determination of cost and value, and enabling innovation on cloud computing and new technologies.

To ensure that these activities are performed for a successful information systems implementation in the cloud, James Urquhart proposed a five-phase model of maturity to describe the stages of evolution for an organization wishing to achieve a successful information systems implementation in the cloud. This model is illustrated in Figure 2.3 below.

- **Consolidation:** This is the first phase, and it is achieved as servers discover ways to reduce redundancy and wasted space and equipment by measured planning of both architecture and process.
- **Abstraction:** This phase is achieved when servers decouple the workloads and payloads of the infrastructure from the physical infrastructure itself and manage to gain abstraction instead of the infrastructure.

Figure 2.3 Cloud maturity level

- **Automation:** This phase is achieved when servers systematically eliminate manual labor requirements for their run-time operation.
- **Utility:** This is the phase in which servers introduce the concepts of self-service and metering.
- **Market:** This phase is achieved when utilities can be brought together over the Internet to create an open competitive marketplace for IT capabilities.

As a result of these maturity models, many companies are satisfied with their performance on the cloud; the cloud services are found to be even more successful than originally anticipated. Cloud computing has been proved to allow companies deliver all their promises to their vendors effectively and efficiently. According to a recent survey conducted by CA Technologies on cloud services users, companies highlighted the satisfaction over the maturity use of the cloud computing services due to sophisticated IT management and security tools guaranteed by these cloud services. The study also showed that the more you use cloud services, the better cloud works. This means that when cloud implementations become stable and well established in constant environments, the maturity in cloud services will be achieved. Following this achievement, companies have shown the intention to take cloud services the extra mile by acquiring more value from cloud by using advanced automation technologies.[16]

Now, whichever maturity model stages companies feel comfortable to adopt and develop for their own information systems implementation, there are two types of processes entailing the implementation: business process and technical process must be well defined and identified. This is where the IT management team is comfortable managing the use of IT and IT staffs are comfortable using the technology.

Approaches of Information Systems Implementation

In the previous sections, we have discussed the information systems implementation from a change management perspective, in which the implementation is seen as an internal process, in the form of either a technical innovation or a maturity process. Now, let us see the

information systems implementation from a different perspective: the various approaches from which the implementation is driven.

In this regard, the focus is generally on three broad areas:

1. Impact of IT
2. Development and deployment of IT
3. Organization and management of IT resources

This classification is generally known as IT impact, development, management, and use. From these three broad areas, a structure of three main approaches of investigating information systems can be identified: the technological approach, the strategic approach, and the sociotechnical approach. These three approaches are very important for IT executives and managers.

The Technological Approach

The technological approach is a technology-driven approach that enables IT managers to focus primarily on the application of the available information technologies to organizational setups, through the use of appropriate methodological tools. In this approach, IT executives view technology as an exogenous force that determines the behaviors of individuals and organizations. However, since IT managers, in adopting this approach, often focus on the technical aspects in analyzing and monitoring the system implementation, they usually ignore the action of individuals and their behaviors in developing, appropriating, and changing the technology.

The Strategic Approach

This approach is a strategic, top-down approach, which is concerned mainly with creating the links among the business environment, the business' strategy, and the information systems strategies. In this approach, IT executives strategize the system design in order to satisfy the needs of the organization. It is very important for managers to choose how and when to apply IT to accomplish work in the organization. In this approach, IT executives utilize the organizational capabilities to craft their strategies

Table 2.1 Definitions of various approaches of information systems implementation

Approaches	Definition
Technological	• Views technology as an exogenous force that determines or strongly constrains the behavior of individuals and organizations. • Technology is considered a determinant, or a strong driver, of organizational outcomes.
Strategic	• IT executives strategize the systems design in order to satisfy the needs of the organization.
Sociotechnical	• Views the introduction of IT into an organizational setting as a catalyst, initiating a series of reciprocal causes and effects from which the use of the technology and the organizational outcomes arise.

for serving their business operations. Usually, IT and systems are some of the capabilities that are taken into consideration. Neither the individual aspect of the employees nor the social structure of the organization is considered in this approach, which makes it less effective in assessing the information systems effectiveness in the whole organization.

The Sociotechnical Approach

This approach considers what has been lacking in the previous two approaches. It is a bottom-up approach concerned with the interaction between the technological and social structures of the organization, and the emergent effects of such interaction. This approach holds that the uses and consequences of technology emerge unpredictably from complex social interactions. It views the introduction of IT into an organizational setting as a catalyst, initiating a series of reciprocal causes and effects from which the use of the technology and the organizational outcomes arise. Table 2.1 summarizes the definitions of the three approaches.

Summary

Although there are various definitions of information systems from various approaches and perspectives, we have adopted the definition of information systems that is based on the concept of a work system whose

processes are committed to information processing, such as transmitting, storing, capturing, manipulating, retrieving, and displaying information. This definition recognizes the two types of entities that we deal with: the social nature and the technological nature. Since information systems implementation is a continuous process of organizational learning, it is guided by managerial action and shaped by organizational context. This information systems implementation can bring change to an organization either as technological innovation or as a process of maturity. We have seen some examples of both approaches. Finally, we have presented how information systems implementation can be approached: as a pure technological approach, or as a strategic approach, or as a sociotechnical approach.

CHAPTER 3

Measuring Information Systems Success

To measure is to know. If you cannot measure it, you cannot improve it.
—Lord Kelvin

Introduction

We start this chapter by discussing what we actually mean by information systems success and how we can possibly determine the effectiveness of the system in the organization by examining two dominant models in the field of information systems, namely DeLone and McLean information systems success and the information systems functional performance (ISFP) model.

Information Systems Implementation Effectiveness

Measurement nowadays is no longer a *check-in-the-box* process that was practiced decades ago. It is now a process that is directly linked to a management best practice, it is nearly becoming a stand-alone key management discipline, and it is widely practiced and found in various process standards and guidelines such as the ISO/IEC 15939 standard, Software Measurement Process, and the Software Engineering Institute's Capability Maturity Model.

Measurement is always important for IT executives and those who assess information systems because it provides the necessary information required to accurately monitor key issues related to progress and quality, monitor performance against a plan, and ask the right questions.

During the last three decades, there have been many attempts to conceptualize the measurement of information systems effectiveness. Many of these attempts tried to provide and identify which factors contribute to information systems effectiveness. However, we have to

recognize that this is not an easy task, whereas measuring information systems is an effective tool because it furnishes IT executives with the necessary information and data required for the decision-making process. The measurement process also enables the IT executives to accurately monitor key issues related to their systems, progress, and quality at both the executive and project levels.

As far as organizations are concerned, the effective deployment of information systems provides a great value to the organization. High information systems effectiveness is always associated with high organizational performance, which yields a high correlation between assessment and productivity. However, since information systems provide an output to support processes, operations, management analyses, and decision-making functions across the organization, the quality of information systems shall also include the necessary requirements that should exist in the organization. This includes:

1. System users
2. IT professionals

One example to measure information systems effectiveness is metrics to measure the efficiency and effectiveness of the IT value chain in order to improve the overall IT performance. These metrics, energized from the experience of the leading HP Technologies Corporation, are considered indicators that can truly provide IT executives with the real insights of taking control of assessing the best IT performance of their IT business units.[1]

1. **Number of systems by life-cycle category:** This metric suggests that IT executives should carefully seek to balance life cycles of the systems and minimize unsupported system applications in order to maintain growth in business productivity.
2. **Percentage of end users affected by system quality problems:** A good system is the one that provides good application performance from an end-user perspective. A large number of problems indicate poor delivery of services to end users. The quality of the system must be maintained in order to have a smooth running of internal IT departments and IT's business customers.

3. **Percentage of defects discovered postproduction:** System deficiencies clearly should not be promoted into production. The production of the IT application should be clear from any defects. Defects create a negative impact on the customers.
4. **Change success rate:** It is very important to maximize the high change success rate. Having control on the success rate would lead to the success of strategy and improve future value.
5. **Percentage of changes resulting in outages:** It is also important to minimize the number of changes resulting in outages. The larger the number of changes you have, the more the work to detect and correct.
6. **Percentage of services that meet performance goals:** It is important that the amount of services that meet performance goals should be growing and increasing over time. If it is low and shrinking, then failures are more likely to occur somewhere.
7. **Percentage of business service costs being reduced quarter over quarter:** The more the business service cost is minimized, the more the business gets effective and efficient.

According to IBM Rational, the pioneer world-class platform provider in software and systems development, successful system developers often follow a repeatable and measurable process. They identified six process of effectiveness for a successful IT project process:[2]

- Establish the underlying process first.
- Use measures that are natural by-products of the underlying process.
- Follow the underlying process to make the measures valid.
- Improve the quality of their measures via automation, which produces more objective results.
- Identify instrumentation points in the process that they can translate into measures or traceable measurement attributes.

The two examples mentioned earlier from the industry show that the quality of the information systems in the business units should not be taken for granted and the process must be carefully observed. However, the question is "How can we actually quantify this quality measurement

in a systematic way that works for any information system in any organization?"

In the following sections, we will define what we mean by information systems success, and how we can measure it by applying few measurement models available in the management information systems discipline.

Information Systems Success

There are many definitions of information systems success, and many provide measurement of information systems success. However, there is no ultimate definition of information systems success. Each group of stakeholders who assess information systems in an organization has a different definition depending on its respective perspective. For instance, from a software developer's perspective, a successful information system is the one that is completed on time and under budget and has a set of features consistent with specifications, and functions correctly. On the other hand, system users may find the system successful if it improves their work satisfaction or work performance. From a manager's perspective, a successful information system contributes to the company's profits or creates a competitive advantage.

To provide more general and comprehensive definition of information systems success that covers different points of view, let us examine some information systems success dimensions. We will examine two major models: DeLone and McLean model and ISFP model.

DeLone and McLean's Model

The seminal work by Wiliam DeLone and Ephraim McLean consolidated prior research on the information systems success.[3] They attempted to systematically combine individual measures from information systems success categories to create a comprehensive measurement instrument. Their model rests on the foundation of previous studies, which were used to suggest six distinct categories of information systems measures. They are *system quality*, *information quality*, *use*, *user satisfaction*, *individual impact*, and *organizational impact*. Looking at these categories, there are

various perspectives through which we can measure the success of the information system. We may, for instance, focus on the desired characteristics of the information system itself that produce the information. In this case, we will measure *system quality*. We may also wish to study the information product for desired characteristics such as accuracy, meaningfulness, and timeliness. In this case, we will measure *information and data quality*. Or we can analyze the interaction of the information product with its users and decision makers, by measuring *the system use* or *user satisfaction*. In another case, we might be interested in the influence that the information product has on management decisions: *individual impact*. Finally, we might be concerned with the effect of the information product on organizational performance: *organizational impact.* These six different categories are illustrated in Figure 3.1. Because we are only interested on the system measurement within its business boundaries, we disregard the last two categories of the model, the individual impact and the organizational impact.

According to the model, both *system quality* and *information and data quality* affect *use* and *user satisfaction*. Both these are considered as direct antecedents of *individual impact*, while *individual impact* is considered as an antecedent of *organizational impact*.

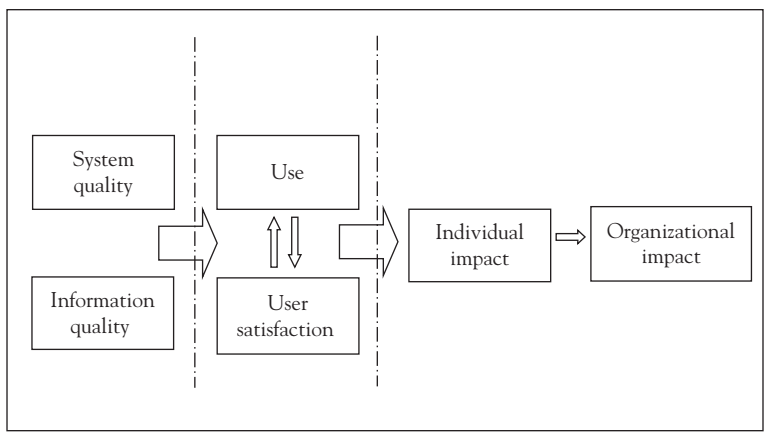

Figure 3.1 DeLone and McLean information systems success

Source: DeLone and McLean.[4]

Let us analyze the three dimensions in more detail and see how to apply the theme in an organization.

System Quality

System quality represents the quality of the information systems processing itself, which includes the application components, and assessing the extent to which the application is technically sound and free from errors. The desired attributes of the application include: convenience of access, flexibility, integration, response time, realization of user expectations, reliability, ease of use, ease of learning, usefulness, and so on.

As we have stated in the first chapter, measuring quality may vary from one individual to another according to its interaction with the system. The assessment of the system designer might be different from the assessment of the end user. Thus, we can group the attributes for system quality into two categories:

- *System flexibility* is system attributes from the system designer perspective.
- *System sophistication* is system attributes from the end-user perspective.

Information systems quality discussed here does not concern the quality of the system output, where the system results and output are being accordingly jugged and assessed, but rather the quality of the system itself and the environment where the system operates. Therefore, the quality of the system is derived from what comprises a system. The increasingly sophisticated systems emerging nowadays in the business environment require an equally sophisticated quality monitoring solution. The IT infrastructure is the first component of the information system that requires quality management. Quality management of the IT infrastructure in which the system operates allows testing of requirements and designing of artifacts. This process ensures more targeted testing against the system requirements and enables us to control and rectify test failures. A quality IT infrastructure will also allow organizations to design, run, and deliver secure systems and applications, meeting their customer needs and

requirements or demands in an economical and reliable manner. In addition to quality in IT infrastructure, other aspects of the system should also be encompassed, such as non-IT infrastructure, by establishing a strong governance structure and applying a solid quality assurance methodology.

A good example for this is Northwest Analytics Quality Information System™[5] introduced for quality control test stations. It provides accurate analytics-based reports and alerts to assist in making the right decision at the right time. This application also provides a comprehensive statistical process control to monitor the routine process management and continuous process improvement.

Information and Data Quality

Information and data quality refers to measures of information and data for desired characteristics, such as accuracy, precision, currency, reliability, completeness, conciseness, relevance, understandability, meaningfulness, timeliness, comparability, and format.

Surprisingly, many organizations often neglect information quality, focusing on just collecting and storing data and information. With the increase in data collection and storage, and the importance of data and information for business, the quality of the information produced becomes increasingly important. Bad information can mislead the organization and result in ineffective projects.

Of course, the first step of obtaining quality information is ensuring a quality process of collecting data. Failing to have quality data will affect the entire process of the value chain of data and information, affecting in turn other facets of organization and business.

In their editorial note of the winter issue of the *Journal of Management Information Systems* in 2003, Ballou, Madnick, and Wang asserted that realizing the importance of the data production process will lead to a better quality of data collection. However, the data collectors must be educated on the importance of quality, with real examples of the results. However, as many business leaders recognize, the enormous volumes, velocity, and variety of data and proliferation of information sources make it difficult to maintain and manage high-quality data. Organizations find it difficult to balance between the quantity and the quality of Big Data.[6]

Some technology corporations have already presented solutions. IBM InfoSphere Information Server for Data Quality is a platform introduced by IBM, which enables organizations to monitor data quality and cleanse data in a very sophisticated manner; thus, helping managers make better decisions and improve their business process execution. Under this server, other data governance initiatives are presented, such as IBM InfoSphere QualityStage,[7] which enables managing quality data for Big Data, business intelligence, data warehousing, application migration, and master data management projects. Oracle has also introduced its own platform of data quality. Named Oracle Enterprise Data Quality, it is used to better understand, improve, protect, and govern data quality. The application is also beneficial in data governance and business intelligence.

Use and User Satisfaction

The use of system refers technically to the consumption of the output by the recipient of an information system, or in other words the end user. The extent of the use of information systems is one of the most frequently reported measures of the success of information systems. User satisfaction, on the other hand, refers to the recipient's response to the use of the output of the systems. When the use of the information system is required, the preceding measures become less useful, and successful interaction with the information system can be measured in terms of user satisfaction.

The question now is who are our end users? Since our discussion is about the use of information systems in the organization, the end users are initially the staff and even executives of the business units across the organization, who interact with the system and align its use with the business functions. However, from an IT governance perspective, indirect stakeholders may also be the system's end users. With the advanced development and complexity in the IT-based systems, even new types of people are interacting directly with the systems such as cloud-based platforms and mobility solutions provided either by the organizations or directly by their vendors. If chief information officers (CIOs) and managers fail to observe the satisfaction and beneficence of all these users on a regular basis, the effectiveness of the system may be hampered by a lack of understanding on how customers perceive the system.

A regular feedback from users is necessary for managers and CIOs to gauge how well the system usage is creating value for their organizations. This side of information systems success requires a careful attention to the IT–business alignment. This in turn requires close collaboration with all parties of the organization to ensure that all their needs in running and using the systems are well met.

The IT user satisfaction survey is one assessment tool that many executives adopt to obtain feedback of the system users in terms of satisfaction and measure the level of engagement in practice. Such surveys can be either an individual assessment tool or part of a holistic IT service management practice. In both cases, what is important for CIOs is to realize the actual response and feedback of the systems users; they are under pressure to improve the quality of user experience by optimizing the system performance.

According to Richard Rees, head of IT Platform Integrity at BankWest,[8] a wholly owned subsidiary of the Australian Commonwealth Bank Group, the ultimate measure of their success in implementing HP IT Performance Suite is the increase in user satisfaction in 2010 to 83.1 percent, a percentage that was deemed to indicate a high satisfaction with their IT operations and systems. This achievement has allowed the BankWest to streamline IT operations and improve service levels across their infrastructure supports with 8,000 users and 30 mission-critical systems ranging from Internet banking to e-mail and customer relationship management solutions, providing people automated processes to access infrastructure, applications, and business services.

Hence, were BankWest system users satisfied because the system was successful and effective in delivering the business value and achieving performance, or because the users' satisfaction caused the system to be effective and successful? The system use actually precedes individual impact, organizational impact, and net benefits; however, it does not cause them. This is because system use is a behavior that prevents an expectation of net benefits from using an information system, which makes the net benefit of the system an outcome behavior of its use. As a result, the use of a system is a consequence of the success of that system, not an inherent characteristic of information systems success. Any behavior related to the system is caused by the success of the system. Hence,

information systems use should be considered an important behavior, because different individuals are likely to evaluate the consequences of information systems use in different ways; it is a value judgment made by an individual, from the point of view of some stakeholders.

In sum, we view information systems success to contain three components: the creation of a system, the use of the system, and the consequences of this system use. Each of these steps is a necessary condition for the subsequent outcomes.

Information Systems Functional Performance

Now that we have seen the information systems success measures and explained how we classified them into three components, let us discuss further this process by exploring the functional performance of an information system. Although there has been a good deal of research on the efficiency, effectiveness, and success of information systems at various levels of analysis described earlier, overall functional-level performance is one of the least discussed and studied. This functional-level performance concerns the IT executives more than anyone else. It provides them with the necessary tool to practically measure the actual performance of the system.

Although the concept of information systems function is widely studied, Chang and King's work is among the early studies that pay attention to measuring the performance of the information system taking its overall function.[9] They proposed an ISFP. The information systems function is shown to produce *systems*, *information*, and *services*. Information systems outputs are also shown as significant enablers and drivers of business process effectiveness, since information systems are often the basis for business process operations and redesign. The system functional performance is also shown to influence business process effectiveness and consequently the overall performance of the organization.

The ISFP framework was designed according to the guidelines of organizational effectiveness developed by Cameron and Whetten in the early '80s, in response to problems plaguing organizational effectiveness.[10] Cameron presented a tabular comparison among seven major models of organizational effectiveness, giving definition for each model and

describing the condition under which each is the most useful. He further suggested six critical questions that every IT executive must consider in order to assess effectiveness. These six questions were subsequently expanded to seven questions—the seven guidelines for assessing organizational effectiveness. These seven guidelines are listed below:

Guideline 1: From whose perspective is effectiveness being judged? It is important to make it clear who is defining and assessing effectiveness, since each constituency uses different criteria.

Guideline 2: On what domain of activity is the judgment focused? The customer, process, and output or service define the domain being judged. It is important that this be explicitly stated, since many different domains exist in organizations and each one should be judged differently.

Guideline 3: What level of analysis is being used? Effectiveness judgments can be made at many levels: individual, subunit, organizational, industry, and societal. The appropriateness of the level depends on the constituency being used, the domain being focused on, the purpose of the evaluation, and so on.

Guideline 4: What is the purpose for judging effectiveness? The judgment almost always is affected by the purpose(s). Different data will be available, different sources will be appropriate, different amounts of cooperation or resistance will be encountered, and different strategies will be necessary based on differences in purpose. The purposes also help determine appropriate constituencies, domains, levels of analysis, and so on.

Guideline 5: What time frame is being employed? Long-term effectiveness may be incompatible with short-term effectiveness, and sometimes effects and outcomes cannot be detected using the wrong time frame, since they may occur suddenly in the short term, or incrementally over the long term. The time frame should be made explicit.

Guideline 6: What types of data are being used for judgments of effectiveness? *[is it]* Objective data or subjective, perceptual data? Objective data will tend to be more reliable, more easily quantifiable, and more representative of the *official* position. However, they are limited in scope and usefulness. Subjective data allow assessment

of a broader set of criteria, but can be biased, and lack validity and reliability.

Guideline 7: What is the referent against which effectiveness is judged? Comparing with competitors, standards, organizational goals, and past performance, and evaluating on the basis of the characteristics of the organization are all possible methods of comparison. Each one will yield different effectiveness judgments; therefore, the referent being used should be made clear.

Considering these guidelines carefully should help identify the meaning of organizational effectiveness in each type of evaluation and guide evaluators when to select the appropriate criteria. These guidelines have also been adopted by information systems researchers to clarify conceptual developments in examining the functional effectiveness of information systems.

As shown in Table 3.1, from these seven guidelines, Chang and King[11] constructed the ISFP, which is based on three dimensions:

1. **Systems performance:** Systems performance assesses the quality aspects of systems, such as reliability, response time, ease of use, and the various impacts that systems have on the user's work. Systems encompass all information systems applications that the user

Table 3.1 Implementation of Cameron and Whetten's guidelines[12]

Guidelines (Cameron and Whetten)	Implementations (Chang and King[13])
• From whose perspective is effectiveness being assessed?	• Organizational users of information systems services and systems
• On what domain of activity is the assessment focused?	• Products and services provided by the information systems function
• What level of analysis is being used?	• The information systems function
• What is the purpose for judging effectiveness?	• Identify strengths and weaknesses; track overall effectiveness
• What time frame is being employed?	• Periodically, ranging from quarterly to annually
• What types of data are being used for judgments of effectiveness?	• Subjective; perceptual data from individuals
• What is the referent against which effectiveness is judged?	• Past performance measures

regularly uses. This also includes the concept of both system quality and individual impact.

2. **Information effectiveness:** Information effectiveness assesses the quality of information in terms of the design, operation, use, and value provided by the information as well as its effects on the user's job. The information can be generated from any of the systems that the user uses.
3. **Service performance:** Service performance assesses the user's experience with services provided by the information systems function in terms of quality and flexibility. The services provided by the information systems function include activities ranging from systems development to help desk to consulting. The entire IS-SERVQUAL instrument is included in this dimension of comprehensiveness.

The importance of ISFP is that it integrates aspects of various philosophical approaches undertaken to develop IT metrics, as well as various subfunctional levels that have previously been measured. The comprehensiveness of the ISFP instrument was demonstrated by its consideration of numerous information systems activities as reflected in the hierarchical structure of subdimensions within the three dimensions (Table 3.2).

Table 3.2 Subdimensions of the ISFP

System performance	Information effectiveness	Service performance
• Effect on job • Effect on external constituencies • Effect on internal processes • Effect on knowledge and learning • System feature • Ease of use	• Intrinsic quality of information • Contextual quality of information • Presentational quality of information • Accessibility of information • Reliability of information • Flexibility of information • Usefulness of information	• Responsiveness • Reliability • Service provider quality • Empathy • Training • Flexibility of service • Cost and benefit of service

Source: Chang and King.[14]

Summary

In order to understand the concept of information systems success, simple quotations of definitions may be misleading and confusing when taken out of the context of their particular research. Thus, while investigating of information systems dimensions and models, it is more appropriate to have a compressive understanding of information systems success. We have presented two dominant models used to measure information systems success, DeLone and McLean information systems success, and the ISFP model. We have also presented the three dimensions that we believe are suitable to measure information systems success in the organizational context, namely, systems performance, information effectiveness, and service performance.

CHAPTER 4

Organizational Context

Building People, Not Systems

—Graham Waller

Introduction

This chapter reviews the concept of action theory and managerial action and relates these two concepts to the organizational context. The chapter defines organizational culture, reviews theories on organizational culture dimensions, and differentiates from organizational culture organizational context and organizational climate. It also discusses Ghoshal and Bartlett's organizational context model and its four attributes, stretch, discipline, support, and trust, as well as the role of these four in shaping the ambidexterity process as an organizational change process. The chapter further discusses the concept of organizational context from an information systems perspective, clarifies the information systems climate, and provides an assessment tool to assess the four dimensions of organizational context in the organization.

The Concept of Action Theory

Chester Barnard is considered the first organizational theorist who made a strong case for the responsibility of the company's executive in creating a work ethic. This work ethic will lead people to cooperate willingly and for the benefit of the organization.

Being an executive practitioner, Chester Barnard's seminal book *The Functions of the Executive* is one of his greatest contributions in which he emphasized on the cooperative nature of an organization. He argues that the strength of organizations depends much on the willingness of individuals to contribute their efforts toward the cooperative system

within the organization. It is the actions of individuals that constitute an organization, not people themselves, he argued.[1] This idea particularly is very important for any executives and chief information officers (CIOs). The answer to the question of why some CIOs are successful while others are not, despite the similarity in their working infrastructure, lies behind the idea that everything CIOs need to accomplish will be achieved through people, by people, and with people of their organizations.

Together with the willingness to cooperate, Barnard singles out two key elements of organization: purpose and communication.[2] For purpose, there is a clear distinction between organizational purpose and individual motive. In order for individuals to cooperate, organizational purpose must be translated into motivating factors, which will enable individuals to find satisfaction in terms of their personal needs in order to help the organization achieve its aims. Communication on the other hand is another key mechanism offered as a means of bridging the gap between organizational purpose and individual motive, being unspoken and dependent on mutual understanding and acceptance. Barnard defined observational feeling as a capability developed by some organizations, whereby decisions are reached without having ever been formulated by anyone in particular.

The concept of purposeful action is another analysis similar to willingness to cooperate.[3] It is a determined, persistent, and relentless action-taking to achieve a purpose, against all odds. People who exhibit purposeful action possess two critical traits: energy and focus. Energy requires the investment of personal involvement and vigorous effort, while focus requires the discipline to avoid distraction, overcome barriers, and resist the urge to be sidetracked when plans do not proceed as expected. Because of these rigorous criteria, it was found out that only 10 percent of managers act purposely.[4] Most CIOs—regardless of the inclination to be a procrastinator, or overbusy, or detached—possess the capability to engage their willpower. In order for them to build and sustain the level of energy necessary for taking a purposeful action, they must identify a clear, ambitious goal that they are confident of achieving. After identifying such a goal, emotions related to the task that must be achieved will also need to be actively managed. Managers can train themselves to visualize the purposeful action-taking process by envisaging what would happen if they

chose not to pursue their goal. This requires knowledge structures, which can be described as systems of rules for action. In order to study these knowledge structures, it is necessary to face such rules. However, because these rules are hidden and unwritten, they cannot be surfaced. But the outcome of the applications of such rules can be easily detected through action. In order to change the manager's espoused theories, it is necessary to uncover the behavior of the manager. This can happen only by uncovering the theory of action. If this change can be extended to all managers, the organization would be much more effective. However, this process of going inside the minds of managers is in itself highly problematic because it tampers with people's deepest emotions, and requires them to be more open to share feelings, perceptions, and assumptions. Frank Wander put forward the following for CIOs:

> If you fairly examine today's problems in IT, they are often traceable to knowledge workers who have not been encouraged to freely exercise their judgment and bond with their fellow craftsmen. Ultimately, the focus is much more on the work processes, not the people doing it.[5]

This is the first step toward connecting organizational members with the systems in their organization. By looking at the way people jointly construct maps, it is possible to understand organizational learning, which involves the detection and correction of errors. If this does happen, then both individuals and their organizations will learn.

The New Managerial Role of CIOs

The action theory we have seen earlier is too general since it is adapted from the psychological school of thought. But how do IT executives and CIOs recognize their roles in light of this concept? Since the general environment for organization has changed beyond recognition, a novel approach to the roles of management must be presented. As presented in Table 4.1, the combined impact of these changes has led to a major shift in the strategic emphases of many companies. This new management agenda, which companies cannot ignore, is really the cause and

Table 4.1 The IT management concepts

Tasks	Traditional concepts	New IT management concepts
Principal strategic task	Allocating capital	Managing the existing human capital of knowledge and learning capabilities
Key managerial task	Devote time to elaborate planning, coordination, and control systems	Concentrate on adding IT value
Main organizational task	Structuring organization based on division of responsibilities from top down	Proliferation of small unit from bottom-up

the consequence of the customer-oriented and quality-focused programs, such as total quality management (TQM), which companies all over the world are trying to implement.

This fresh look does not emphasize organizational structures and formal managerial roles, but instead managerial processes and their interrelationships. Bartlett and Ghoshal propose a management framework, which is a radical departure from the models suggested by the founding fathers.[6]

In the new model of Ghoshal and Bartlett, managers are the creators of organizational purpose, challengers of the status quo, and integrators of strategy and capabilities. This new model is a radical departure from the traditional management through the structuring of organizations. It is based on a new conceptualization of organizational endeavor, whereby organizations are "developed and managed on a principle of proliferation and subsequent aggregation of small independent entrepreneurial units from the bottom up," rather than on a principle of "division and devolution of resources and responsibilities from the top down."[7] This is also true in IT management where organization is seen as a social structure and actions of IT experts within organization emerge through processes of social interactions.

This management model is based on extensive research on the management practices of well-managed global corporations that serve as role models. From case studies and academic experience, new roles for the three core positions within the management structure of most companies were introduced. These roles reflect all the major changes which have

been taking place in large organizations. Furthermore, they develop the notion of *management processes*, which are the *interlocking behaviors*—interactions of managers with the rest of the organization in performing their daily activities. They are seen as the managers' key tasks. Managerial processes are the outcome of an act of managerial choice, in the form of managerial formal roles and the interpretation of such roles by collective action. Consequently, we can follow Ghoshal and Bartlett's definition of this action as the behaviors and actions associated with each of these managerial roles that collectively define the social structure of a company within which its management processes are embedded.

What we are trying to do here, following the definition is to apply this managerial role in the organizational context where information systems operate, in order to achieve an organizational context measure, which is suitable for a healthy collective culture for the success of information systems function. The reason for this is that we have seen how behavior in an organization depends very much on how IT managers and CIOs themselves view the nature of the organization and its members. For this reason, people in organizations possess vast reserves of knowledge and aspiration, which managers must strive to capture and retain.

Organizational Culture and Context

To operationalize the notion of organizational context, let us discuss culture and context and to what extent they differ from each other.

Definition of Culture

Culture is usually considered as a difficult concept with even more difficult research constructs. It has been studied for centuries in various disciplines such as cultural anthropology. Culture had also been a topic in various academic areas ranging from psychology to cross-cultural management. This explains why many researchers from these areas have produced several definitions of culture, ranging from simple definitions to complex ones. Some definitions even contradict prior definitions.

The term culture in English language originates from nurture, agriculture, and pearl culture. In his earliest book *Primitive Culture*, Taylor in the

late 19th century defined culture as "that complex whole which includes knowledge, beliefs, art, morals, laws, customs and any other capabilities and habits acquired by man as a member of society."[8] The term culture was also being used by the Germans as early as 1843. According to some early studies, more than 160 different instantiations and definitions of culture can be found in the literature.

In management, the definition of culture has been widely quoted as "the collective programming of the mind which distinguishes the members of one human group from another"[9] or "such patterns of thinking, feeling, and acting mental programs."[10] While the cultural differences are rooted in attitudes, which are less observable, they are able to manifest themselves through beliefs, values, and communication patterns. Pragmatically, we often define culture based on our respective backgrounds.

Thus, the actual meaning of culture is to consider new conceptualization and measurement of culture in the information systems context, an environment where IT is the major shaper of the culture in the business unit. For this reason, we acknowledge the multiplicity of diverse cultural influences received by an individual that contributes to a unique personal set of values that every IT manager ought to know.

Definition of Organizational Culture

Although the concept of organizational culture has been under scrutiny for years, many definitions and concepts are provided. Schein, the leading contributor to the field of the organizational culture has mapped some of these concepts; many phenomena are often associated with organizational culture. Such phenomena include:

a. **Behavioral regularities of people interaction:** Such as language used, customs and traditions evolved, and rituals employed.
b. **Group norms:** Implicit standards and values evolved in organizations.
c. **Espoused values:** The articulated, publicly announced principles and values that an organization claims to be trying to achieve.
d. **Formal philosophy:** The broad policies and ideological principles that guide an organization's actions.

e. **Rules of the game:** Implicit rules for getting along in the organization.
f. **Climate:** The feeling conveyed in an organization by the physical layout and interaction.
g. **Embedded skills:** Competencies displayed in accomplishing certain tasks.
h. **Habits of thinking and mental models:** The shared cognitive frames that guide the perceptions, thought, and language of an organization.
i. **Shared meanings:** The emergent understanding created by organizational members when interacting with each other.
j. **Root metaphors and integrating symbols:** Ideas, feelings, and images developed by organization.

According to Schein, organizational culture can be analyzed at different levels. These levels range from tangible manifestations that can be seen and felt to the deeply embedded, unconscious assumptions. He has proposed a model to uncover the levels of culture as illustrated in Figure 4.1.

The first level of this model is artifacts. It refers to a phenomenon that can be seen, heard, or felt in an organization. This level is easy to be observed, but hard to be interpreted and, hence, it is dangerous to make conclusions about culture merely on the basis of such artifacts. The second level is espoused values. It refers to the various corporate values such as business mission values, which members of the organization profess, but

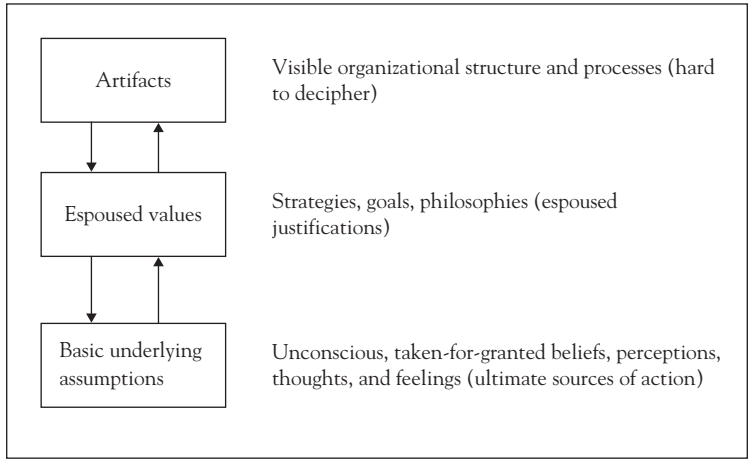

Figure 4.1 Schein's levels of organizational culture

are not necessarily the values *in-use* in the organization. The third level is the basic underlying assumption. Espoused values can become shared underlying assumptions if a manager or a leader succeeds in instilling his own chosen values in the individuals' beliefs and convincing them to act accordingly. The espoused value will become a basic underlying assumption if action based on it continues to be successful. However, in an organization, it is not easy to understand culture by just analyzing the depth of underlying assumptions, as the underlying assumptions' level of culture is unconscious by definition. Therefore, it cannot be directly analyzed. On the other hand, trying to understand culture by just looking at behaviors would be misleading because behaviors can have many different interpretations. Hence, the level of identities holds a very special role in the link between those two levels.

Another good contribution in explaining culture is manifested in drawing the attention to the middle level of the three-layer model of Schein, by constituting the model as the main and only factor for the development of a managerial action framework, whereby in that level, managers can influence both the cultural context of the organization on one hand and the behavior of the individual on the other hand. Culture here can be managed by meeting the crossing point between high culture and multiple emerging identities. In an IT context, a cultural system is not just a sociological term but the actual mean of production and output, which clearly determine the actual nature of IT: the working social.

But how to relate organizational culture with the outcome of IT in an organization?

In the book *In Search of Excellence*, Peters and Waterman identified 36 U.S. companies that had displayed excellent performance between 1961 and 1980.[11] Several performance measures were used in their studies. Their findings showed that many of these performance measures had a direct link with corporate culture. However, Peters and Waterman did not prove empirically that these cultural attributes did not exist in less excellent organizations.

On the same trend that Peters and Waterman have elaborated, Denison[12] has conducted an extensive quantitative study on organizational culture and economic performance. His study was based on the answers of 43,747 respondents in 34 countries across 25 industries. Denison's

results show that a well-organized environment is positively related to return on investment and return on sales. Although his survey did not cover all possible dimensions of culture, such as the organization's relation to its environment, and did not prove a clear correlation between organizational culture and performance, it provides an important in-depth study on the link between organizational culture and performance.

Culture, Context, or Climate?

While climate has been consistently described as employees' perceptions of their organizations, the construct has suffered from conflicting definitions and inconsistencies in operationalization. The dominant approach conceptualizes climate as employees' shared perceptions of organizational events, practices, and procedures. However, consensus is not easily achieved in this area, since there are theoretical differences in what climate represents. Many of these differences are revealed in the debate about the distinction between organizational climate and organizational culture. Indeed, the two terms are sometimes used interchangeably. For managers who wish to measure their organization's climate, the organizational climate questionnaire (OCQ) developed by Litwin and Stringer[13] has been widely used to operationally define dimensions of organizational culture. This measurement has been used to assess the shared beliefs and values of organizational members that constitute the perceived work environment. Shared beliefs and values are often considered as central elements in the definition of organizational culture. Although we can observe different uses of organizational climate and organizational context, the content of the two notions tends to be exactly the same. Because of the strong argument provided by Ghoshal and Bartlett, we use the expressions *climate* and *context* interchangeably.

The work of Ein-Dor and Segev[14] in 1982 is perhaps the first study of IT climate where they examined the relationship between climate and information systems and the quality of developer–user relationships, the degree of system use, and system integration in the organization. The IT management climate can be defined as shared, enduring perceptions of salient aspects of the IT work environment, such as organizational practices, procedures, and forms associated with IT-related activities.

This definition clarifies the link between climate and managerial action where IT management climate is highly correlated with managerial IT knowledge. However, IT climate should also be considered from an innovative perspective rather than from a strategic perspective, because just as manager practices affect organizational climate, information systems manager or CIO practices also affect the IT organizational climate.

How to Measure Organizational Climate?

An initial assumption in the area of organizational climate is that social environment could be characterized by a limited number of dimensions.

Organizational climate measurement and frameworks can be classified under three principal categories:

1. **Multiple measurement-organizational attribute approach (MMOAA):** Under this approach, organizational climate can be defined as a set of characteristics that distinguish the organization from the other organizations. These characteristics are relatively enduring over time, and influence the behavior of the people in the organization.
2. **Perceptual measurement-organizational attribute approach (PMOAA):** In this approach, organizational climate is defined as a set of attributes specific to a particular organization and deals with its members and its environment.
3. **Perceptual measurement-individual attribute approach (PMIAA):** In this approach, organizational climate is a set of global perceptions held by individuals about their organizational environment. The sets of perceptions are basically the result of interactions between personal and organizational characteristics. This approach can also highlight subcultures and identify the effects of particular dimensions on specific outcome measures, such as organizational productivity or innovation.

As far as the managerial behavior is concerned, the number of climate dimensions identified as targets of assessment has further expanded, leading to some confusion that resulted in slow theoretical progress. The main influence of general managers lies in their roles as shapers of

an organizational climate. In other words, the interaction between action and context, which is purely a management process, dictates the way in which the context can be created and renewed by a variety of management actions that develop the characteristics of stretch, trust, discipline, and support. The four attributes we adopted for our model are considered as the different types of managerial values.

Organizational Context and Organizational Performance

Gaining a competitive advantage is crucial for an organization to be successful. In order to keep the competitive advantage strong, it is essential to use the knowledge present in the organization and continuously update and improve it through learning. An organization should look beyond its current knowledge and create variety in its skills by experimenting with new practices.

Organization also needs to explore new possibilities and at the same time explore its current competences. In accordance with this approach, organization is seen as a knowledge system, as a living entity that is capable of cognition and learning, which directly affect the performance of the organization. Since the factual knowledge cannot be detached from the emotions, values, and attributes, which are the foci of the organizational culture, some researchers proposed to use the expression *organizational culture knowledge* as a way to overcome the conceptual divide among organizational culture, knowledge, and knowledge development or learning. Organizational learning is about increasing the collective stock of knowledge, whereby culture is about creating the conditions for knowledge development. Hence, while culture is about stability, organizational learning is about change—the outcome of the tension between individual creativity, which represents individualized organizational learning, and the control exerted by group norms and values, which represent socialized organizational learning.

Back to the four attributes discussed earlier, Ghoshal and Bartlett argue that an organization needs to foster discipline and stretch in order to encourage individuals to push for ambitious goals.[15] It also needs support and trust to ensure that this happens within a cooperative environment. Only after Gibson and Birkinshaw introduced the structural

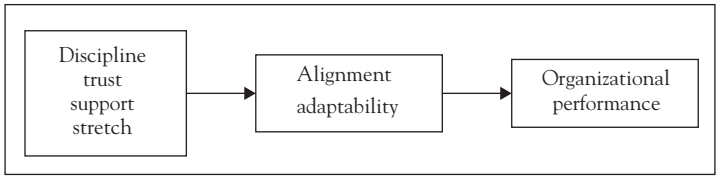

Figure 4.2 Relationship of the antecedent and the outcome of ambidexterity

Source: Gibson and Birkinshaw.[16]

ambidexterity, the four attributes of discipline, stretch, support, and trust were conceptualized to create the organization context from which ambidexterity emerges.[17] The creation of a supportive organizational context is not about managers mandating specific behaviors in employees, but about creating an environment in which employees take the initiative to balance the capacities of alignment and adaptability themselves. The interaction of both alignment and adaptability will lead to sustainable performance. Alignment activities are geared toward improving performance in the short term, while adaptability activities are geared toward improving performance in the long term. This relationship is depicted in Figure 4.2.

Taking the four attributes of Ghoshal and Bartlett, Gibson and Birkinshaw distinguish the two dimensions of context in relation to organizational learning and performance. The first is performance management, which is a combination of stretch and discipline, and it is concerned with stimulating people to deliver high-quality results and making them accountable. The second is social support, a combination of support and trust, concerned with providing people with the security, support, and latitude they need to perform consistently to their highest potential. If these two dimensions are represented as orthogonal axes on a matrix, it is possible to identify four generic positions that an organization can take.

In sum, organization context can be conceptualized as two pairs: a pair of hard elements (discipline and stretch) and a pair of soft elements (support and trust). Too much emphasis on discipline and stretch creates burnout and disillusionment among employees. Too much emphasis on

support and trust also creates a *country club* atmosphere in which no work gets done.

Organizational Context Model

In their model, Bartlett and Ghoshal give great emphasis to managerial values. They argue that improved organizational performance depends primarily on the organizational context that managers are able to build in fulfilling their managerial roles and processes. They suggest that an organization can create and embed in its context a work ethic that would induce rational, yet value-oriented, actions on the part of its members in furthering the interests of the organization as an end in itself, not just a means to an end. As the outcome of their research on the practices of successful companies, they have identified a number of value-oriented characteristics of managerial action, which are the key dimensions for quality management, and have induced the creation of a favorable, supportive organizational context for improved organizational performance. Organizational climate is subsequently distinguished from psychological climate, which consists of individual interpretive perceptions. Although individual perceptions of an organization climate may be used to assess it, if these perceptions are homogeneous, they can be aggregated to represent climate as a property of an organization even if they are taken from a managerial perspective, which is the case here.

This model, shown in Figure 4.3, explains how the interaction of the four key dimensions will result in an organizational climate conducive to initiative, creativity, collaboration, and learning, and this will lead to an improved organizational performance.

They say that "Concepts like stretch, discipline, trust and support have little relevance in existing theory. Yet, we believe they are of central importance for the analysis of organizational effectiveness."[18]

To this point, we have explained the causal relationship among the action theory, managerial action, and how they both constitute to an organizational context, as illustrated in Figure 4.4.

In order to maintain a collective thought, an organization needs appropriate organizational context, shaped by purpose and values. Context, in turn, crafts the relationships between people in the organization.

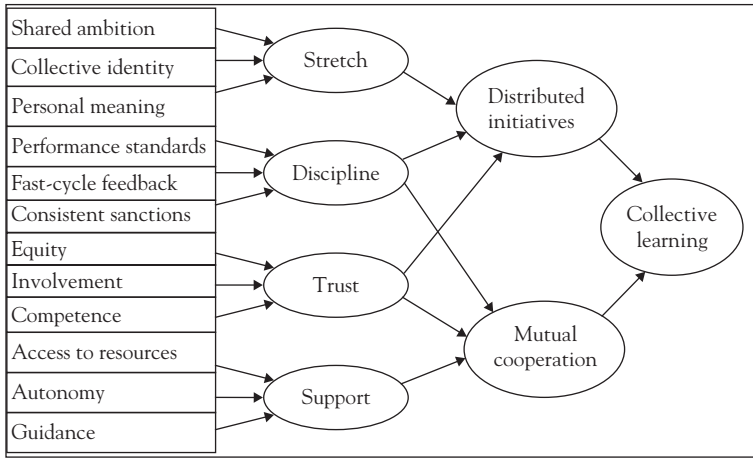

Figure 4.3 Model of organizational context

Source: Ghoshal and Bartlett.[19]

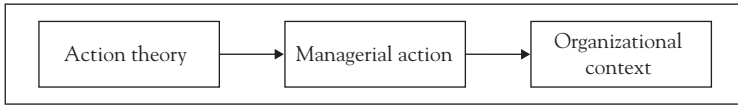

Figure 4.4 Action theory as an antecedent of managerial action

Source: Ghoshal and Bartlett.[20]

These relationships are the basic building blocks of any social system. If managers succeed in building such blocks in the minds of employees, they have solved the managerial dilemmas of how to balance control and empowerment, and how to merge individual ambition with corporate purpose.

The broad notion of organizational context encompasses three elements: It reflects a combination of the structural context, culture, and climate of a business unit, and it considers an objective, higher-level attribute of the unit or organization as a whole. This view manifests in the definition of organizational context as four behavioral attributes, which are created and reinforced by a variety of multilevel actions taken by managers in an organization; they are stretch, discipline, trust, and support and are defined as follows.

Stretch

Stretch is the attribute of an organization's context that induces its members to voluntarily strive for more- rather than less-ambitious objectives. Establishment of a shared ambition, the development of a collective identity, and the ability to give a personal meaning to the way in which individuals contribute to the overall purpose of an organization contribute to the establishment of stretch.

The information systems function at the corporate level has strong strategic implications in the literature, and agreement exists regarding the effect of the strategic dimension of information systems on the capability of information systems for leveraging the firm's competitive strength. When IT applications diffuse throughout the organization. and when decision making related to information system gets ever more decentralized, strategic thinking will gradually start to encompass a new type or intent, that is, information system intent, which is the awareness, understanding, and action of all IT managers toward the role of IT in helping to achieve their own business objectives and the organization's strategic aims. According to this definition, the corporate governance of information systems in an organization where managers have information systems intent will be different from that in an organization where managers have less information systems intent or do not have it at all.

The organization's standard or vision is very relevant in the case of the information systems context. A strategic vision of the role of information systems and especially of the role of the IT infrastructure on the part of top management is crucial for the growth of any business. Purpose and commitment are also crucial in the information systems context. Top and senior management should be very clear about the purpose of IT in their particular business. IT managers motivate both subordinates and their peers to help achieve the planned vision.

IT executives and CIOs can use the following questions to assess the level of stretch in their organization. It is important to note that the three elements of stretch, shared ambition, collective identity, and personal meaning, have to be achieved to a very great extent to say that employees strive for more ambitious objectives.

Stretch	Elements of stretch	Questions
	Shared ambition	People in my organization have a shared positive ambition for the future of the organization
		People in my organization share similar emotional commitment toward achieving highly challenging goals
	Collective identity	People in my organization share a collective identity
		In my organization, there is a personal link between the individual's work and the organization's priorities
	Personal meaning	People in my organization believe in the overall purpose of the organization
		People in my organization firmly believe that their effort will lead toward making the organization a better place.

Discipline

Discipline is the attribute of an organization's context that induces its members to voluntarily strive to meet all expectations generated by their explicit and implicit commitments. Establishment of clear standards of performance and behavior, a system of open, candid, and rapid feedback, and consistency in the application of sanctions all contribute to the establishment of discipline. The key attributes of discipline are performance measures, fast-cycle feedback, and consistent sanctions. In this context, in order for an IT infrastructure to be built up and maintained, discipline and control are very crucial elements, and are one of the main sources of conflict between information systems personnel and other line departments. This issue is yet another manifestation of the cultural gap between information systems and business. Discipline represents a way of life, a norm applicable to all tasks, rather than compliance with a well-defined set of contracts embodied in a company's strategic and operational control tools. In an organization where the control functions are widely shared, discipline is more likely to flourish. If, on the other hand, the control functions are concentrated in a few points in the hierarchy, individual responsibility is not fostered, and therefore, discipline cannot ensue.

Within the information systems context, the problems of responsibility and control are crucial than the dimensions of discipline, but they are usually in conflict with each other. Both information systems and line personnel have responsibility and control over their respective functions, but the responsibility and control of the information systems function often interfere with the responsibility and control of other line departments. Thus, in order to have discipline within the information systems context, information systems personnel have to be aware of the needs of business units regarding the constraints and limitations of the technical tasks involved in information systems development and maintenance. The following questions can be used by IT managers to assess the level of discipline in their business unit.

Discipline	Elements of discipline	Questions
	Clear standards	People in my organization are comfortable to follow ambiguous performance standards.
		People in my organization voluntarily strive to meet all expectations in achieving the performance standards of the organization.
	Fast-cycle feedback	People in my organization work toward improving the quality of internal feedback regarding their performance.
		People in my organization strive toward improving the efficiency of performance feedback
	Consistent sanctions	People in my organization possess a norm of fairness and consistency.
		People in my organization enforce accountability through consistent sanctions.

Trust

Trust is the attribute of an organization's context that induces its members to rely on the commitment of each other. Fairness and equity in organization's decision process, involvement of individuals in decisions and activities affecting them, and staffing positions with people who possess required capabilities all contribute to the establishment of trust. For the creation of an environment of mutual trust, individual-level competence is

as important as the process of inducing fairness and participation. The key attributes of trust are equity, involvement, and competence.

Being an organizational function with special characteristics of a technical nature, the problem of participation is crucial in the information systems context. Although participation and involvement in the technical issues are difficult, it is still an important element of trust. Hence, if there is less participation on the part of stakeholders, the decision making in information systems context is much easier. Such an involvement refers especially to those managers who are not directly associated with the planning of information systems resources but are, however, affected by the decisions taken regarding these resources. On the other hand, if no technical employees are involved in technical decision making, it will affect the transfer of functional responsibilities of various managerial positions within the organization. The three elements of trust, equity, involvement, and competence, can be assessed using the following questions.

Trust	Elements of trust	Questions
	Equity	People in my organization give everyone sufficient authority to do their jobs well.
		People in my organization are given an equal chance to contribute toward the performance of the organization.
	Involvement	People in my organization involve workers in decisions that affect their work.
		People in my organization are given an opportunity to volunteer for important involvement in the organization.
	Competence	People in my organization possess a norm of self-efficacy.
		People in my organization possess a norm of personal empowerment.

Support

Support is the attribute of an organization's context that induces its members to lend assistance and countenance to others. Mechanisms that allow actors to access the resources available, facilitate freedom of initiative at lower levels, and ensure senior functionaries give priority to providing guidance and help rather than to exercising authority contribute to the

establishment of stretch. Support induces organizational members to lend assistance and countenance to others; these values are access to resources available, freedom of initiative at lower levels, and providing guidance and help in exercising authority. Support depends mostly on the organizational autonomy, which is one of the key factors for developing individual commitment, as autonomy increases the possibility that individuals will motivate themselves to create new knowledge and also that by allowing them to act autonomously, the organization may increase the chance of introducing unexpected opportunities.

With regard to the information systems context, information systems function can reduce the number of levels in an organization by providing managers with information to supervise larger numbers of workers and giving lower-level employees more decision-making authority. In view of the changing trends, many of the traditional tasks of the information systems function are moving on to the job descriptions of managers. However, transferring responsibilities and autonomy may also lead to power transfer, which may cause conflict. Thus, autonomy of the decision-makers in the information systems functions is an important attribute of support.

Managers also need guidance in understanding the policy implications of new IT applications. They also need support to decide for the information systems functions, and as such guidance and assistance must come from information systems managers and staff. Clarification of the organization's strategy is one of the key processes in the governance of the information systems function. This clarification should only come from the IT managers and CIOs. They are needed to acquire better interpersonal skills, so that the role of internal guidance and coaching can be fulfilled successfully, and the element of support can be achieved. IT managers and CIOs can also assess to what extent these three elements exist in their business units using the following questions.

Support	Elements of support	Questions
	Access to resources	People in my organization have access to resources within the entire organization
		People in my organization encourage interdependency on accessing resources of various departments in the organization

	Autonomy	People in my organization contribute frequently toward developing autonomy within the organization
		People in my organization have an inherent preference for decentralization
	Guidance and help	People in my organization are always willing to guide and help their co-workers in their work

Table 4.2 Organizational context in the information systems context

In the general context	In the information systems context
Stretch Shared ambition Collective identity Personal meaning	**Peer relationship and networking** Mutual benefits Commitment Shared knowledge
Discipline Performance measures Fast-cycle feedback Consistent sanctions	**Motivate to achieve** Share an outcome Orientation Clear mission Emphasis on planning
Trust Equity Involvement Competence	**Innovation** Support of attempts to introduce new and improved ways of doing things Fostering capacity of members
Support Access to resources Autonomy Guidance and help	**Support** Guidance and motivation Empowerment

Summary

The action theory is very important for implementing, mobilizing, and focusing energy throughout an organization. This can be materialized by reconstructing the invisible theory of action that each organization's members hold. It is useful to help to draw attention to the difficulties involved in changing cultural values. Behind organizational values, there are human emotions, which are the building blocks of social organizations. Since the general environment for organization has changed beyond recognition in the recent years, a new approach to the roles of

management is needed. Managerial processes are the outcome of an act of managerial choice, in the form of formal managerial roles and the interpretation of such roles by collective action. Hence, managerial processes are the result of the organizational inaction processes. In order to maintain a collective thought, an organization needs appropriate organizational context, shaped by purpose and values. If managers succeed in building such matrixes in the minds of the employees, they have solved the managerial dilemmas of how to balance control with empowerment, and how to merge individual ambition with corporate purpose.

The main influence of general managers lies in their roles as shapers of an organizational climate. In other words, the interaction between action and context, which is purely a management process, dictates the way in which the context can be created and renewed by a variety of management actions that develop the characteristics of stretch, trust, discipline, and support. The four climate dimensions of Ghoshal and Bartlett are considered the types of managerial values. Although there is no consensus on the literature on the distinction between organizational climate and organizational context, this research adopts both the concepts to mean the same thing. The four behaviors framing attributes of discipline, stretch, support, and trust will create the organization context in which an innovation capability of ambidexterity emerges. The creation of a supportive organizational context is about creating an environment in which employees take the initiative to balance the capacities of both alignment and adaptability. From the information systems perspective, IT management climate is defined as shared, enduring perceptions of salient aspects of the IT work environment, such as organizational practices, procedures, and forms associated with IT-related activities. This definition clarifies the link between climate and managerial action. Managers shape organizational climate by engendering shared understandings of organizational values and practices. The IT management climate is highly correlated with managerial IT knowledge. The support obtained from the literature is that Ghoshal and Bartlett's organizational dimensions are suitable to be applied in the context of information systems to investigate the success of information systems that function within this contextual environment in the organization.

CHAPTER 5

Conclusion

Introduction

This chapter presents a summary by putting together all concepts that have been discussed in the previous chapters. We have represented a systematic effort to explain the effect of culture, shaped by discipline, support, trust, and stretch, on information systems success. We have provided a new insight on the link between organizational context and information systems success. This task is performed by looking at the success of the information system within the context of the organizational structure, as the system affects the performance of the organization.

IT Organizational Context

As discussed in the previous chapter, discipline has a direct effect on the system performance, information effectiveness, and service performance. It is the attribute that induces information systems users in the organization to voluntarily strive to meet all expectations generated by their explicit and implicit commitments. Performance measures, fast-cycle feedback, and consistent sanctions are the key elements describing the attribute of discipline. When IT executives manage to induce discipline in their employees' behavior, the performance and effectiveness of the systems can be enhanced to their highest levels. This justifies that in an occupational subculture of IT workers, organization members occupy a distinct and recognizable occupational subculture that crosses and transcends the particular organizational culture in which those IT professionals are embedded. When IT workers are committed within their workplace, the effectiveness of the information systems success and implementation is improved. On the other hand, the absence of organizational commitment is always a problem that affects the information systems success.

Support also affects system performance, information effectiveness, and service performance. It is the attribute that induces the information systems users in the organization to lend assistance and countenance to others. Support usually includes access to organizational resources, autonomy, and guidance, which includes help from within groups, and from management in terms of coaching and support. These attributes will enhance the system performance in the organization; make the information more efficient; and the service provided by the system more adequate. The importance of support can also be seen as a behavioral capability of IT personnel, which leads to an efficient performance of the information systems. It is also related to the successful implementation of information systems firm's strategies, where the role of the information systems department is more likely to be elevated from a supporting role to a more strategic role, in which it enhances the system performance and the efficiency of information and services of the information systems. In this regard, empowerment from IT managers and chief information officers (CIOs) is a key to achieving high-quality IT implementation. The support of the top management for information systems in general is also to promote the quality of the system used by facilitating the allocation of needed resources during the project.

Trust, being the attribute that induces the information systems users in the organization to rely on the commitment of each other, includes the involvement of IT personnel in decision making and activities affecting them. Equity, involvement, and competence are the main factors of trust and its importance in the success of the information systems in the organization. There is also a positive relation between the quality of expertise trust and IT system success at a general level. Therefore, information systems users experience higher levels of benefits from their applications when they possess the appropriate qualities of trust. Furthermore, the quality of information output from the system will be better understood and valued if the trust of the user is strong. When trust exists, the users are prepared to make efforts to ensure that the output of the system and its service are interpreted appropriately.

Stretch, defined as the attribute that induces information systems users in the organization to voluntarily strive for more rather than less ambitious objectives, involves the development of a personal meaning, collective

identity, and the establishment of a shared ambition among them concerning the information systems use. When stretch exists within information systems users in an organization, the information systems will more likely be effective in terms of performance and effectiveness, as the motivation to achieve and strive toward a common organizational goal will enhance the IT innovation in the organization and translate the mutual vision into a technology vision and positively affect the system performance.

The New IT Ambidexterity: Agility

The concept of ambidexterity in the organization literature describes the organization's capability to be aligned and efficient in its management of today's business demands, while also be adaptive enough to changes in the environment that would enable it to be still around tomorrow. Taken from the behavioral perspective, ambidexterity was adapted as a means to support the link between organizational context and the information systems success. In this regard, IT business units need ambidexterity to act as an engine to transform the organizational context into a successful functionality of the information system.

Trust, as an antecedent of the information systems success, should be carefully analyzed by IT executives and CIOs. In the sociotechnical perspective, this function of the ambidexterity can be an obstacle to the attribute of trust to have an effect on manipulating the performance of the information systems function. Because ambidexterity requires a balance between alignment and adaptability, achieving ambidexterity may lead to conflicts among information systems managers and face trade-offs in their decision making in which the behavioral context may not sustain in terms of commitment.

Ambidexterity can also lead to an information systems success. The more a manager obtains top-down and bottom-up knowledge flows and communication and autonomy, the higher the levels of ambidextrous activities this manager may undertake. This facilitates the effectiveness of the information systems function. Individuals also need prior related knowledge to assimilate and use new knowledge. If equipped with a breadth of prior knowledge categories, as well as various linkages across them, they will be better prepared to take on both tasks, especially related

to the usability of information systems functions. This also requires CIOs to move from vision to execution.

In this regard, not only is ambidexterity associated with higher levels of information systems organizational performance, but successful information systems managers tend to employ ambidextrous coping strategies to improve the adverse effects of information systems effectiveness as well. Looking at the elements of ambidexterity, alignment activities tend to improve the information systems functions in the short term, whereas adaptability activities tend to improve the information systems functions in the long term.

Here, we give an insight on ambidexterity and information systems. When the interaction of alignment and adaptability (i.e., ambidexterity) is influenced by the behavioral context in the information systems climate, an organizational capacity to change and adapt to this information systems environment will emerge. This is known in the information systems literature as organizational agility. The notion of agility has been carefully discussed without empirical evidence that it is related directly to ambidexterity. The clear definition that links agility to ambidexterity is to see agility as the readiness of an organization for action or change toward information systems development. This readiness is manifested in two dimensions:

1. The ability to adapt to various changes.
2. The ability to adjust and reengineer system and software development processes when needed.

So, IT agility is the organization's ability to respond operationally and strategically to changes in the external environment through IT. This response must to be quick and effective for the organization to be considered agile. The organizational change emerging from the behavioral context in the information systems organization will act as a transition and pave the way for the notion of agility to occur, in which it enhances the effectiveness of information systems functions. Taking software development as a benchmark for information systems functions, effective global software developers usually adopt special coping strategies to handle the challenges of global contexts and to mitigate their negative

effects on project outcomes, and exhibit certain ambidextrous properties. From this, we suggest that organizational agility is the sociotechnical form of the ambidexterity. A systematic figure of the model presented in this chapter is illustrated in Figure 5.1.

As illustrated in Figure 5.1, the model can be demonstrated in four stages. The first stage illustrates the managerial action of information systems managers and IT executives to build a behavioral context in order to fulfill their managerial roles and processes. This stage will lead to stage two in which the managerial action produces a climate of behavioral context. Because the information systems context in the organization possesses specific IT capabilities, which is manifested from the adaptability and alignment, an organizational change will emerge as illustrated in stage three. The final stage four represents the stage in which the success of information systems function occurs as a result of this process. This four-stage model called system behavioral success (SBS)

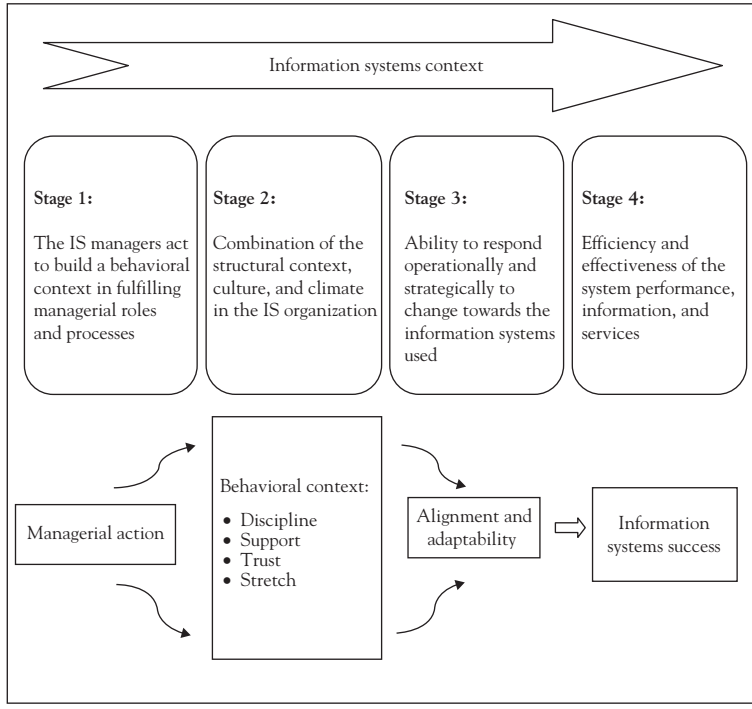

Figure 5.1 Systematic process of the SBS model

model is a sociotechnical model that describes a four-stage process of how the behavioral context of an IT organization led by its IT executives would lead to the success of the information systems function.

The term SBS represents how the system, which emerges from the managerial action of the information systems managers and executives in an information systems context, behaves toward the success of the information systems. In other words, how a behavior leads to the success of a technical system amidst a complex organizational behavioral structure of change.

Conclusion

We have integrated the four dimensions of organizational context and discussed their usability in information systems context in order to modify their structure to fit within the business information systems aspect. We have also introduced the conceptual aspect of organizational agility as the sociotechnical form of the organizational agility using the SBS model.

We have also managed to shed light on two main managerial questions often concerning the information systems unit's managers and CIOs. The first question is: Does the behavioral context of the organization members have an effect on the outcome of the information systems used in the organization? And if there is an effect, how can organizations enhance the information systems effectiveness generated by the behavioral context of its members?

We have authenticated the importance of organizational context in performance of information systems functions, and the role of top management in the effective management of information systems. This cannot be achieved without the support of the top management of the organization, as they are the key element in the understanding of the strategic potential and benefits of IT in their organizations, and knowledge and managerial action of top management of the information systems functions directly influence the extent of IT assimilation in organizations.

It is clear that the effort of managers is important to create a climate that promotes certain perceptions, norms, and values over others, and hence influences the shared belief systems of their members and subordinates. When these shared belief systems affect subsequent behaviors

and activities in an information systems business environment, they would induce ambidexterity, which synergizes an organizational capability described as organizational agility, a strategic translation of the system's success.

For a better performance of the information systems functions and a successful systems project, information systems managers and IT executives need to offer two main things to the organization: first, a purposeful action to harness the behavioral collective context in the IT business units. Second, they should facilitate IT capabilities and infrastructure to provide the organization a capacity of change that blends the behavioral context into agility, which is a key factor of successful system projects. By providing these two things, IT executives and CIOs tend to solve the question of why particular information systems encounter unexplained failure and never meet expectations and, subsequently, lead to a poor organizational performance.

By this, we hope to put managers and CIOs in the right path to consider the sociotechnical aspect of the success of the IT organizations. Managers and CIOs should realize the necessity of the four-stage model to achieve the success of the IT applications they are using in their companies. The entire organization would need to practice and contribute to this process for the initiative to see positive results.

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Creating a Culture for Information Systems Success

Zakariya Belkhamza

It has been widely reported that issues related to organizational context appear frequently in discussions of information systems success. The statement that the information system did not fit the behavioral context in an organization is often part of the explanation of why particular information system encountered unanticipated resistance and never met expectation. While this context has been intensively studied, we still lack evidence on how this organizational context is affecting the success of information system from a managerial action perspective. This type of managerial involvement is often neglected to the extent that it became an essential obstacle to organizational performance.

The objective of *Creating a Culture for Information Systems Success* is to assist CIOs and IT managers on how to use their managerial actions to create a suitable cultural environment in the organization, which leads to a successful implementation of information systems. This book will also provide guidelines for managers on how to create this organizational context, measure it, and ensure it leads to a successful implementation and use of information systems. The main theme is to explain how behavioral context of an organization led by their managers and executives would lead to the success of the information systems function.

Zakariya Belkhamza is a senior lecturer in management information systems at the Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, where he teaches management information systems subjects at both undergraduate and postgraduate level, including management information systems and human resource information systems. He holds a doctorate degree in management information systems and a master's degree in business. In addition to his teaching experience, he is also involved in many research and consultancy activities in Malaysia, Thailand, Turkey, and Algeria. He has more than 10 years of academic research and organizational consultation. His research interests include IT management, strategic information systems, IS implementation, and IS assessment and evaluation.

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