The Pyramid of IT Implementation
Shady Fraiha
Asst. Prof., College of Business Administration, AUM, Kuwait

shadyfraiha@yahoo.com

ABSTRACT
IT implementation is an important step that occurs after acquiring IT. It includes the fitting-in of IT to the organization and necessitates organizational adaptation. This paper synthesizes exiting research on IT implementation and presents a pyramid framework for understanding the factors, problems, and processes that help, hinder, or destroy an implementation. The framework proves useful for analyzing existing research, providing a comprehensive view of the factors involved, and starting new research.

Keywords: Organizational factors, IT assimilation, technology characteristics

1. INTRODUCTION
Much has been written about IT or IS implementation and how to make IT fit the organization. However, the implementation of IS in organizations is not a technical issue anymore and is now considered a social phenomenon [1].

IT implementation refers to the act of putting the information system into proper operation after acquisition in order to reach assimilation. IT implementation is a group effort for automating work, informing users, and transforming the organization and IT assimilation is the “effective application of IT in supporting, shaping, and enabling firms’ business strategies and value-chain activities”[2]. In addition to technological changes, IT implementation may necessitate organizational changes as well [3], and these issues are addressed in this paper.

The importance of studying IT implementation stems from the problem of IT failures in the workplace researched by many [e.g. 4]. Companies spend billions of dollars on IT yearly [5, 6], whether to develop in-house, purchase, or implement. It is not enough to acquire good IT because the challenge is in making value from that technology through proper implementation that results in the organizational members’ use of the system.

Since the 1970’s, research on IS implementation success has produced several models and inconsistent results [7-10] and there is little consensus on what is meant by IS success [11]. Moreover, the relationship between variables leading to IS implementation success has not been consistently verified [9]. Because of all this ambiguity in understanding IS implementation success, this paper provides a framework for researching IS implementation and utilizes existing literature to verify that framework by synthesizing literature finding on the topic.

The framework consists of four main elements, namely management, users, organization, and technology (Figure 1). The perspective taken in this paper is that technology is integrated in the organization and hence, the four elements of Management, Organization, Users, and technology form a 3D structure, a pyramid. Thus, implicit in the framework is the interaction between the four elements. The relationship of users and technology is in the background of the pyramid, as it is in the background (essential) of any other relationship in the pyramid.

Fig 1: The suggested 3D IT implementation pyramid framework

The paper starts by defining the four corner elements in the framework and by synthesizing the results of previous research in relation to these elements. The paper then utilizes previous findings to comment on the interaction between these elements in an elaborated discussion section that produces variables relating to the four elements. The paper ends with limitations, conclusions, and implications for future work.

2. USERS
Users are employees that depend on the system to do their jobs. Managers may be users of the system as well and there are special types of information systems for managers that support decision making and provide forecasts and abstractions.

Users tend to develop interpretations of the technology when they discuss it amongst themselves, and that affects the actual use of the system as groups of users will make their own decisions about adopting or rejecting the technology, tasks, or rules [12]. As different users make their decisions, different IT cultures arise where user groups think about and deal with technology
and tension for some users, and could lead to changed behavior by some employees, and maybe resisted and resisted. Challenges leading to IT implementation failure [22, 23] are understood and managed [22]. It is also one of the main reasons for the failure of new systems and hence needs to be understood and managed. It is one of the main reasons for the failure of new systems and hence needs to be understood and managed [22]. It is also one of the main reasons for the failure of new systems and hence needs to be understood and managed [22].

2.1 End User Resistance

"User resistance to information systems implementation has been identified as a salient reason for the failure of new systems and hence needs to be understood and managed" [22]. It is also one of the main challenges leading to IT implementation failure [22, 23].

New technology may be seen as a welcome change by some employees, and maybe resisted and contested by others. New technology may create anxiety and tension for some users, and could lead to changed professional identities and new power relations [1]. Understanding user resistance is important because it may lead to underutilizing the system or even sabotaging it [24].

Kim and Kankanhalli [22] defined user resistance as the opposition of a user to the implementation of a new information system. Resistance occurs when initial conditions interact with system characteristics to develop perceptions of threats [22, 25]. Those initial conditions could involve power structure and political considerations as Markus [26] had mentioned earlier.

Markus [26] noted two points of view regarding resistance. From the social science point of view, resistance is a relative rather than absolute behavior; it rarely occurs when users’ and designers’ intentions are similar. And it may be beneficial to the organization by preventing systems that may cause negative consequences. And according to the people-determined resistance point of view, on the other hand, users that accept a system should be psychologically different from those that resist it. Markus used a case study to investigate three different theories of resistance, and concluded that the user-system interaction theory, affected by political considerations, is superior to the others. In relation to the framework presented in this paper, this research is about the user-technology interaction.

Lapointe and Rivard [25], on the other hand, classified end user resistance into three main categories: passive resistance, active resistance, and aggressive resistance between the subject of resistance (user) and the object of resistance (technology).

"Manifestations of passive resistance are rather mild; they include delay tactics, excuses, persistence of former behavior, and withdrawal. Active manifestations are typified by strong but not destructive behaviors, such as voicing opposite points of view, asking others to intervene or forming coalitions. Finally, aggressive resistance behaviors such as infighting, making threats, strikes, boycotts, or sabotage seek to be disruptive and may even be destructive" [25].

Other researchers modeled user resistance as a cost-benefit issue comparing the benefits of switching to the costs associated with the change [27], or as a status-quo bias where resistance may be based on a rationalization of a situation [22]. The status quo bias model of Kim and Kankanhalli [22] takes into account transition costs, uncertainty costs, and psychological commitment costs that form the switching costs attached to the new system.
Users can resist in various ways and even use the new situation to their advantage. According to Doolin “information systems associated with attempts to increase management control of organizational participants are also capable of empowering those over whom control is attempted, by making available a legitimate arena for action and discussion with the organization” [28]. Researchers also noticed that even when ISs can help save human lives, as in the health care business, for example, they are often met with resistance [29].

Thus, user resistance to IT is a powerful force that should be planned for, tackled, and circumvented whenever a new IT implementation is considered. If not dealt with properly, user resistance can lead to system failure [22, 23].

2.2 End-User Training

Another concept essential for understanding users is end-user training, which is management’s role in healing the relation between users and technology. Most end-user training research shows direct effects of training on IS implementation success, but fails to include situational or contextual variables [30] like technical complexity or task interdependence, which are used by Sharma and Yetton [31].

End-user training increases employees’ computer self-efficacy and decreases their perceptions of switching costs [22, 32]. Sharma and Yetton [31] studied the effects of training, technical complexity, and task interdependence on IS implementation. They found that training is more effective if technical complexity or task interdependence is high. Moreover, “end-user training is a critical intervention to support the successful implementation of information systems innovations” [31], a view supported by most user training research in IS [e.g. 32, 33].

Sharma and Yetton [31] approached user training from the individual learning and cognitive processing perspective. The cognitive processes involved are the ones that help individuals acquire the knowledge presented by instructors [30]. Whether it is application knowledge, business context knowledge, or collaborative task knowledge [34], this knowledge will help employees get over the knowledge barriers holding them back from using the system [35]. In the study by Robey et al. [36], training of users on using the new IT, as well as training of users with new work processes put in place, helped the firms overcome their knowledge barriers during implementation.

When training together, users will have the chance to learn about each other’s expertise and abilities, which leads to the creation of transactive memory [31, 37], and that provides individuals with greater access to knowledge [38]. Argote [37] also found that users that train together achieve better results than when individuals train separately and then come together for the task.

Group learning is a concept that applies when users train together. It utilizes a framework of five components, namely collective acting, group reflecting, knowledge disseminating, sharing understanding, and mutual adjustment [12]. This approach posits that group learning is a hidden mechanism that occurs when a group is faced with new IT. This hidden mechanism may speed up, slow down, or terminate an implementation [12].

End-user training is one of the effective methods for facing and reducing end-user resistance, and helping in making better use of the system. For systems providing collaborative applications, “training programs must not solely focus on developing users’ system proficiency skills but must also educate users about the business processes that the collaborative application will support”; not only that, but “training programs should sensitize users to the interdependencies that exist among their tasks and make them aware of the collective consequences of their individual actions” as well [34].

Bagchi et al. [16] suggest that investments in employee development be made before the change starts. These developmental investments are complementary to IT and should be carried throughout the firm. The authors stress that such investments in employee development create a positive attitude of users towards the IS and affect their sense of involvement. This positive attitude towards IT will likely increase users’ acceptance of IT and enhance their computer self efficacy [39].

3. ORGANIZATION

The second item in the framework for IT implementation is the organization. Organizations have formal and informal structures, and they both affect technology implementation [40]. Organizations also have cultures that may be a product of these structures and may affect those structures as well. Robey and Bourdeau [41] posit that the effect of IS on organizations is moderated by organizational cultures, and this fact is responsible for the contradictory findings in previous research.

Companies that are very successful with IT are usually the ones that have developed an internal information culture and are also committed to IT [42]. Characteristics of organizational cultures include values, climate, and others. In the following paragraphs we will comment on how values, climate and cultures in general affect IT implementation.

3.1 Organizational Culture

Hoffman and Klepper [43] researched the effects of organizational culture type on technology assimilation. They found that certain types of cultures, ones with high solidarity of employees, are positively associated with successful technology implementation. In people oriented cultures, where autonomy, trust, flexibility, and team work are valued, IT implementation is more successful than in a culture where rules, preciseness, conformity and predictability are valued [44]. Culture also plays another role, it may increase the effectiveness of knowledge
management structures within a firm [45], which can help match expertise and needs during implementation.

3.1.1 Organizational Values
Organizational cultures have embedded values, and IT applications have embedded values as well [43, 46]. Leidner & Kayworth [46] considered three types of conflict or mismatch between these sets of values: the first is contribution conflict, which reflects the difference between group values and values associated with IT; the second is system conflict, and it reflects the difference between group values and those embedded in IT; and the third one is vision conflict, and it reflects the difference between the values that a group associates with IT and those embedded in that IT. As these types of conflict arise and are resolved, the culture of the organization changes. However, the organizational culture may not be homogeneous because different groups may have changed and developed different IT cultures [13].

When a group adopts a system that does not match the values of its members, that group will adapt the system and that will take time [46], which delays the positive outcomes expected. People from countries with high uncertainty avoidance and high power distance may be less willing to adapt (change) the technology [47], which could lead to different IT cultures at the same organization.

Organizational culture may play a lesser role in the decision to adopt and a larger role in the timing of adoption [46]. Leidner and Kayworth [46] advise that groups that see fit of their values with technology are more likely to adopt it. The concept of fit has been discussed also by Srite & Karahanna [48], Loch et. al [49] and others, and shows the importance of considering values while purchasing new technology. Moreover, a good fit between IT values and the overall organizational values will likely lead to a more successful implementation [50]. For technology assimilation to be successful, the technology has to fit the organizational culture; otherwise, the culture has to adapt to the technological demands [51]. This brings us to the organization-technology fit concept, which will be discussed later.

3.1.2 Organizational Climate
For proper implementation, the right climate must exist [8]. Climate is the employees’ perceptions of how things are in the organization [52]. Practices, procedures and reward systems create a climate that encourages a certain type of behavior in a company, and that affects the perceptions of the employees as to the extent to which the use of a new innovation is rewarded [8]. When employees perceive implementation policies comprehensively and consistently, the climate of implementation becomes stronger. This can be achieved by increasing employee skills, providing incentives for use of the innovation, and removing obstacles to innovation use. When implementation is successful but does not lead to better outcomes, the climate may weaken [8].

Other contextual factors like existing relations between groups, interpersonal relations, or existing power structures affect the climate and may affect the implementation of a new system [53, 54].

3.2 Organizational Structure
Silva and Hirschheim [3] conceptualized obstacles to IS implementation as stemming from an organization’s deep structure. The deep structure of an organization is composed of five attributes: 1) core beliefs and values, (2) services, technology and political time, (3) power distribution, (4) the horizontal and vertical integration arrangements and (5) control systems. And when the IS is not compatible with one or more dimensions of the deep structure, then there is resistance or difficulty in implementation. The resistance or difficulty arises because of uncertainty risk or because of the required organizational changes [3]. The introduction of new IT could bring with it “interdependent relationships, single database and standard management and processing rules, all of which are capable of causing various degrees of change within the company” [55].

When we consider an enterprise with several business units, there is another variable to add. The implementation of IS in an organization can be made more difficult by the dimensions of differentiation between business units [56]. Business units are not exactly the same and their processes are different to a certain degree, which makes the implementation of one system across the organization a difficult task [57, 58].

Differences between the national cultures of subsidiaries also have an effect. The difference between the producing culture of IS and the ‘using’ culture negatively affects implementation success. For example, Robey and Rodriguez-Diaz [59] found that the accounting IS produced in the United States was difficult to implement in Chile where the subsidiary’s culture was different from that of the headquarters in the U.S.

One of the common themes during IT implementation is experiencing misalignments between the functionality of the new IS and the functionality required by the organization. Thus, implementing a new IS often requires disruptive organizational change and the outcome of an implementation depends on the adaptability of both IT and the organizational structure, in order to align the functionality offered with the functionality required [60, 61].

4. MANAGERS
The third item in the framework is the managers of the organization implementing the IS. Although managers are the actors of the organization and represent the organization, they are a separate entity in this analysis because they can affect and control the change necessary for IT implementation. The organization, on the other
hand, is seen as a set of rules and processes, with culture and embedded values, as discussed in the previous section.

For IT implementation to be effective, employees have to accept the new technology. And the “best predictors of individual IT adoption include Perceived Usefulness, Top Management Support, Computer Experience, Behavioral Intention, and User Support. The best predictors of IT adoption by organizations were Top Management Support, External Pressure, Professionalism of the IS Unit, and External Information Sources” [62]. Accordingly, the factor that affects IT adoption at both the individual and organizational levels the most is top management support. Other research has yielded similar results. For example, Sharma and Yetton [63] contended that management support is a critical factor in the effective implementation of IS innovations. In their own study of the effects of coexisting management support and task interdependence, they found that task interdependence moderates the effects of top management support on implementation success. One possible explanation is that high task interdependence causes more managerial concern and leads to more top management attention and control, which moderates the support leading to more effective implementation.

An important aspect of management’s job during implementation is controlling for and directing user expectations. If expectations are not managed properly, dissonance between user expectations and managerial policies might occur [64] and this could lead to user resistance towards the new system. When users have high expectations of the system, they may be disappointed when reality sets in as implementation expectations are often not realized [65].

Other problems, according to Lim et al. [64], is that management may credit any performance enhancement to the new system and forget to reward the efforts of users or fail to offer assurance to them.

Managers use different methods of control during the implementation of a large IS. The different sets of stakeholders affect the choice of formal or informal control mechanisms aimed at the collaborative coordination of effort [66]. Because of changes in the plan, stakeholder groups, or context of the implementation, managers may change their control mechanisms to influence user behavior in a certain direction. First, control is exercised as collective sense-making of the situation. Later, as the implementation advances, the mechanisms of control are adjusted and control is given primarily to IS managers that use more formal mechanisms. Towards the end, there is a combination of formal and informal action coordination mechanisms that act as controls of the implementation [66]. On the other hand, resistance is different between the stages as well. During the first stages of implementation, resistance is a “combination of independent, individual behaviors,” while during the later stages of implementation resistance is “one of composition, described as the convergence of individual behaviors” [25]. The reactions of users to IT implementation, including resistance, also affect the choice of control mechanisms.

Managers can affect IS implementation effectiveness through managing the learning process and directing the users in the right direction. This can be achieved through having a helpdesk, having IT experts, having informal meetings, having ideas and complaints collected from employees, and having IS evaluation sessions [12].

Another way for managers to affect the implementation was shown by Kaarst-Brown [67]. Brown presented a model where individual and organizational contextual variables, such as frankness, centralism, and technology orientation, influence the individual and group enculturation processes. This in turn influences users’ cultural assumptions about IT, which lead to better integration of IT with business. Later, Kaarst-Brown and Robey [13] concluded that there are five archetypes of IT culture: the revered, controlled, demystified, integrated, and fearful IT cultures, and these may co-exist in the same organization, which means that managers have to know the target users’ understanding of IT before they interfere to control behavior or manage expectations.

The relationship between IS managers and business managers falls under another line of research known as business-IT alignment. In general, effective relations between IS managers and business managers leads to more success with IT [68]. The business knowledge of IT managers and the IT knowledge of business managers also have a positive effect on the assimilation and effectiveness of IT [2, 69, 70].

5. TECHNOLOGY

The fourth and final element in the framework is technology. The characteristics of the technology being implemented play a great role in the success of the system. One reason is the quality of the system, and another is that IT “is not values neutral; rather, IT is inherently symbolic and value laden” [46]. This view is shared by many other researchers [e.g. 29, 41, 71]. When an IS is produced in one country it carries the cultural values of that country, and that will likely cause system conflict when the system is implemented in another country [46]. Scholz [72] argues that information systems are highly symbolic, representing a sense of equality or subordination, a sense of community or isolation, a sense of progressivism or conservatism, and others. It is these imbedded values that may clash with the deep structure of an organization.

For example, adopting an IT package from the market without customizing it to the particular user group will likely result in conflict between that group’s values and expectations and those imbedded in the IT
Coercive pressures affect top management participation in IT implementation and assimilation. While mimetic organizations ability to compete, leading to a positive effect of implementation effectiveness and enhances the organizational fitness. A high Organization-Technology fit leads to implementation effectiveness and enhances the organizations ability to compete, leading to a positive impact on the organization.

6. CONTEXTUAL ISSUES

The context of the IT implementation includes the environment of the organization, national culture, industrial relations, and others.

Organizations have many aspects to them that may be affected by their environments. National cultures and values may predispose certain groups to behave favorably or unfavorably towards IT adoption [46], and external pressure may affect organizational rules and policies.

External institutional pressures also play a role in IT implementation and assimilation. While mimetic pressures affect top management beliefs and participation, coercive pressures affect top management participation directly and normative pressures affect system usage without a mediating effect on top management [78].

As far as national culture is concerned, it was found that people in individualistic cultures are more likely to report bad news during IT implementation [79]. Thus, problems that occur during implementation of a new system are more likely to be reported in individualistic cultures and may be left to escalate in collectivistic cultures.

There is not enough research on how external conditions affect the implementation of new technology, whether directly or indirectly. There is some research on national cultures [e.g. 79] and external pressures [e.g. 78], but that research needs to be repeated, and more confirmatory research is needed regarding industrial and governmental policies and their role, if any, in IT implementation.

7. DISCUSSION

Information systems must have a clear business objective and must align with the business strategy and the IT department’s strategy [80-82]. And there should be proper planning and support for the implementation to work. These goals require the cooperation and interaction of users, managers, organizational characteristics, and technology. The following subsections address the interactions of the four elements in the framework two at a time, despite the difficulty of isolating these interactions from the other elements in the framework. The purpose is to concentrate on two elements at a time to verify the edges of the pyramid. The last subsection discusses case studies involving the four elements in the framework.

7.1 User-Technology Interaction

The importance of the user in this interaction comes through when the experienced success of the system varies between the different user groups within the same organization [83]. Implementation “problems can potentially form a self-fulfilling cycle, where the lack of skills and information constantly deteriorates both user perceptions and actual operational performance” (p. 73). This relates to two points: the first is that knowledge barriers arise due to lack of skill and information [36], and the second is that the success of the system is a socially constructed phenomenon [84]. So for certain groups, knowledge barriers formed by the lack of skill and information can lead to a downward spiral of less use and less learning, leading to a perception of system failure, and possibly eventual failure.

According to Sharma and Yetton [31] “when technical complexity is low, training has a weak effect on implementation success”; moreover, “when task interdependence is low, training has a weak effect on implementation success” (p. 224). The technical complexity of new systems imposes application knowledge barriers. Add to that the new work processes, which pose business knowledge barriers, and the effect on new IS implementation is huge. Training provides new
knowledge to the employees, and this “additional knowledge will enable users to deal with technology-induced changes in the business processes” [34]. At this point, access to application knowledge, whether through training or vendor support, and access to new knowledge about work processes, can help employees overcome the knowledge barriers [31, 35, 85]. Vendor support plays another role as trust between the vendor and organizational members is important for good relations [86].

Another aspect of users with different reactions is time related. In a case study by Alvarez [1], users strongly supported the system at the very early stages of implementation; however, that changed as the implementation went forward and user support became inconsistent. By changing the power structure in the organization, the IS challenges the existing professional identities and roles of employees, and that triggers actions of resistance from them. During implementation “technology, structure and identity are in a mutually constitutive relationship” [1].

7.2 Manager-Organization Interaction

Managers’ role comes through when they have to deal with the different stakeholders because stakeholders’ attitudes towards the implementation may help in achieving the desired goal. In a study by Akkermans and van Helden [87], a reversal in performance took place that “was caused by substantial changes in attitudes with most of the stakeholders involved, such as top management, project management, project champion and software vendor” (p. 35). A model for dealing with stakeholders’ attitudes concerning the effects of the IS on routines, power, culture, and the financial situation of the company was developed by Boonstra et al. [88] and they recommend to reconcile stakeholder interests during implementation.

Managers also interact with the organization by changing the rules, processes, and culture. A model for managing innovation implementation organization-wide was proposed by Sherif and Menon [89]. Their model shows how senior managers, middle managers, and operational staff have different roles in installing and implementing strategy changes, process changes, and cultural changes that adapt the organization to the new IT. These actions will get the company accustomed to assimilating new technology. In other words, the “model postulates that actors at different organizational levels implement strategy, process, and culture changes in order for an organization to advance through the stages of innovation assimilation. The actions at these levels instill routines that establish the absorptive capacity for implementing future innovations” (p. 247). This is how an organization learns how to deal with new IT implementations.

During implementation users are not likely to adopt an IS if they perceive it as conflicting with their values; however, management can proactively seek to reshape the values that a group associates with IT to allow for adoption, or they can seek to reshape the culture to achieve the technological goals of the firm [46].

7.3 Organization-Technology Interaction

The characteristics of the technology have to fit the characteristics of the organization; otherwise, change has to take place through interplay of the two. Information systems may have a great effect on organizational culture and they may open the door for competition or a desire for improvement. For example, the IS at GM led to a desire for perfection, which bred the six-sigma program. At the same time organizational cultures that are more “people-oriented” are more likely to experience IS success than “production oriented” cultures [44]. Also, Doherty and Doig [90] discovered that in one organization, improvements in the data warehousing capabilities propelled through the organization and led to changes in customer service and a general desire for more functional integration. With regard to changes, Leidner and Kayworth [46] suggest that IT can be introduced intentionally to cause targeted changes in the organizational culture especially that the implementation of an IS “is a complex social phenomenon that is intricately linked to and complicit in shaping organizational structure and identity” [1].

7.4 Manager-User Interaction

Management needs to control the implementation steps carefully because system users and management do not usually share a common vision. Managers may also under estimate the psychological barriers and effort required for adapting to the new system while users may be facing anxiety and a steep learning curve [64].

System implementation may be made easier through the use of informal controls, such as cultural control or self control. Uncertainty avoidance, cultural control and intrinsic motivation, a form of self control, affect users’ adoption of IS and managers can use these processes “to enhance tacit and social aspects of IS management” during implementation [91].

One aspect of user resistance has been explained as status quo bias where rational decision making, cognitive misperceptions, and psychological commitment cause users to prefer the current situation [22]. In this study by Kim and Kankanhalli, the switching costs and switching benefits played an important role in determining the perceived value of the new IS with a double effect of switching costs on user resistance and hence, system use. One recommendation for dealing with perceived switching costs and resistance to system use is the idea of showing the employees how similar the new system is to the old one, or embedding the new system within the old technology [92], which makes employees feel that the switching cost is low.

Other ways to reduce the perceived switching costs according to Kim and Kankanhalli [22] is through
self-efficacy and opinions of colleagues, both of which can be affected through training, support, and technology champions [32, 39, 93]. Switching costs also include ease of learning the new technology and its ease of use [22]. Thus, if managers can increase employees’ self-efficacy about the new technology and enhance their opinions about the system, then the employees’ perceptions of switching costs are likely to decrease.

The study by Alavi and Joachimsthaler [94] showed that user-situational factors such as training, involvement, and experience can improve implementation success by 30%. These factors can be controlled by the managers in an organization through a set of policies and a reward system.

7.5 Multi-element Interaction

This section comments on concepts that address the interaction of more than two elements in the framework and presents case studies from the literature that show the interaction of these elements in real life situations. Please note that the framework is actually three dimensional, with the four elements being the corners of a pyramid. This means that while some problems or implementation issues may seem to involve only two of these elements, in reality the whole pyramid, as a single unit, is affected.

The concept of knowledge barriers that relates to configuring the technology and creating new work processes fits well with a basic concept of Adaptive Structuration Theory [95, 96] that states that the technology structure has to adapt to the organization and the organizational structure has to adapt to the technology. By configuring the new technology, employees are adapting it to fit the organization, and by introducing new work processes, managers are adapting the work structure to fit the new technology.

The beginning of the knowledge barrier is outside the firm’s boundaries if the firm is adopting an IS from outside. At the beginning, the vendor has all the technical knowledge and the firm may not have any [97], which forms the first knowledge barrier. So, firms have to seek to acquire the technical knowledge from the vendor and provide it to the users directly by having the vendor train the users, or indirectly by having the vendor train company trainers. Other knowledge barriers affecting the transfer of knowledge between different users within the firm relate to motivational factors, both intrinsic and extrinsic [98].

Knowledge relevant to the operations of the firm is considered a strategic resource [99, 100]. Lack of this knowledge is a debilitating factor for the implementation of new IT, especially that the introduction of new IT systems is often accompanied by new work processes that disrupt the old routines of the firm [36]. To overcome these barriers and implement the new IT, some organizational learning has to take place [101], at least at the user level. Consequently, restructuring introduces knowledge barriers related to the new work processes and the way to help users overcome these barriers is through training.

Doolin [28] provided a good example of user resistance that led to restructuring through his case study of an IS implementation in a hospital. The new IS provided much detail about the cost effects of doctors’ (users’) actions, which led doctors to resist it. At the same time managers were reluctant to change the status quo and enforce the use of the new system. In this case, the notion of users as passive subjects was discredited, which showed that employees could act and resist. The result was that the new IS lost its significance and its strategic role changed from a tool of comparative evaluation of performance to a tool of measuring compliance to contracts.

Another case where organizational restructuring was the result of new technology implementation is the case of the Irish Credit Union researched by Mangan and Kelly [102]. The Irish Credit Union wanted to integrate credit organizations through the implementation of a large-scale information system. The new system clashed with existing organizational policies and the implementation provoked the emergence of institutional entrepreneurship and political struggle. These resulted in changes to organizational characteristics and led to institutional reform.

A third example is a study of industrial firms implementing new IT where Robey et al. [36] discovered that there are two types of knowledge barriers that these firms had to overcome to be able to implement IT successfully. The first type is knowledge related to configuring and using the IT, something shared by the findings of Hakkinen and Hilmola [83], and the second is related to the assimilation of new work processes caused by the introduction of new IT. User training helped users overcome knowledge barriers and new technology and work processes had to be adopted, either together or separately, for the implementation to work.

One of the famous IS implementation failure cases is the London Ambulance Service case [103]. This case of failure turned into a case of success once the problematic issues were addressed by management. Although management had control over most internal variables, like project supporters, organization and timing, and IS adaptation, they lacked control over the environment. However, the attendance of management to user needs and the careful phasing-in of the IS, with the right infrastructure and system testing, resulted in the success of the system. This takes us to the effect of managers and users’ attitudes on system success [16, 87]. This also shows that not all implementations are doomed to fail and a change in approach and attitude can go a long way.
The resulting framework with the four main elements and the uncovered variables are shown in Figure 2 below.

**Organization**
- Investment in employee development
- Organizational culture
- Technology needs
- Structure
- Task interdependence
- Adaptability

**Users**
- Knowledge (business/IT)
- Computer self efficacy
- Risk avoidance
- Professional identity
- Social network
- Adaptability
- Cognitive skills
- Expectations

**Technology**
- Characteristics
- Type
- Adaptability

**Management**
- Support
- Interpersonal skills
- Knowledge of IT

**Fig 2:** The framework with some variables

8. **LIMITATIONS**

One of the limitations of this work is that the framework is not based on a specific known theory of information systems. But in fact, it is based in previous research and theories that were used to discover the relations cited in this current work. Thus, this work synthesizes knowledge of IT accumulated in various research efforts.

The framework suggested is one that is concluded from previous research. Just as a researcher might gather data and conclude a model of relations. This gives strength to the framework, but, at the same time, it might be a limitation because it is based in our previous thoughts on IT implementation. This does not detract from the importance of the framework and its benefit for the field, though it might draw attention to our previous and existing thought patterns regarding IT implementation.

9. **CONCLUSION**

IT implementation is an important and expected step that occurs after IT acquisition. The purpose of IT implementation is to fit the new IT into the organization. This ‘fitting’ process may require the adaptation of technology, the organizational processes, or both. And at the same time users have to be readied to utilize the new IT.

This paper presented a research framework for studying IT implementation and synthesized the literature relating to the elements of the framework. The main elements are: organization, users, managers, and technology. And these elements interact to affect IT implementation effectiveness. This paper includes research relating to IT implementation enhancing factors (exp. Top management support), political factors (exp. Power and resistance), and risk factors (exp. Compatibility with deep structure of organizations) [40].

The paper also presents the organization-technology fit construct that is more encompassing than the task-technology fit construct researched earlier [e.g. 77]. If the technology fits the organizational characteristics, then that technology can be adapted to fit the task requirements. This does not circumvent the need to buy technology that is predesigned to accomplish the job that it is needed for. The main concern here is the use of the technology and not the ability of the technology to accomplish a given task.

Although some researchers [e.g. 104], suggest that any approach to IT implementation should focus on the benefits that an organization can derive from technology and not on the technology itself, the current work emphasizes the need to focus on all four elements for the precise ultimate goal of serving organizational objectives.

We conclude the discussion by providing a different dimension of the “automate, informate, and transform” visions [105, 106]. In our study, IT implementation is associated with being “automated, informed, and transformed”. It is the technology that automates the work done, so the processes become automated. At the same time, the managers have to provide the right information and training to the users, so that organizational members become informed and can
overcome their knowledge barriers. And at the same time that automation and learning are taking place, the organization is being transformed into a new entity. Depending on the size of the IT implemented, and the amount of automation and change, the organization might undergo great restructuring.

10. IMPLICATIONS FOR PRACTICE AND RESEARCH
The proposed framework and the accompanying research have implications for both researchers and managers.

By using the suggested framework, managers can now frame the problems they are facing in a more comprehensive way. The framework provides managers with points to consider and marks pitfalls to avoid. The comprehensive framework provides a better understanding of the situation through analyzing the interaction between the main elements.

The synthesis of research on IT implementation provides managers with many factors and points of view so that they are able to conceptualize the situation and ‘see ahead’ before any trouble arises. With the use of the previous research and the framework, managers can now develop effective implementation strategies.

This study provides a good framework for researchers interested in IT implementation. The framework provides elements to focus on individually, and provides room to study the interactions between them. The framework also provides room for researching contextual factors that might affect IT implementation, especially those not researched thoroughly before, such as external pressures and industry policies.

REFERENCES


[43] N. Hoffman, R. Klepper, Assimilating new technologies: the role of organizational culture,


[91] Y.J. Hwang, Investigating enterprise systems adoption: uncertainty avoidance, intrinsic


AUTHOR PROFILE

Dr. Shady Fraiha received his Ph.D. in Management Information Systems from the University of Western Ontario in 2011. He is currently an Assistant Professor of MIS at the American University of the Middle East. His research interests include information technology implementation, alignment of business and technology, team mental model content and measurement, and transformational learning. He has published many articles in journals such as International Journal of Business Research, European Journal of Management, and Journal of Small Business Management.