A Delphi Study on Issues for Successful Information Technology Transfer in the Arab World

Khalid Al-Mabrouk and Jeffrey Soar
Faculty of Business, University of Southern Queensland, Australia

Abstract: *Adoption of enabling technology is one beneficial and significant way countries can improve their developmental progress and achieve higher living standards. Many complex issues are involved in the consideration of information technology transfer. Some of those issues are not completely defined and studied, or cannot be precisely measured. Thus, a Delphi study was conducted in this research to investigate, identify and prioritise major issues for successful information technology transfer in developing countries from the perceptions of stakeholder groups in the Arab World. Responses were elicited from information technology academics, information technology practitioners, government officials and information technology suppliers. Valid questionnaires were returned from 73 respondents in the first round survey, providing a net response rate of 61% and yielded 410 perceived issues. Through two rounds of the Delphi survey, these issues have been synthesised and categorised into 10 major issue categories with 71 sub-issues. This study aims to assist in understanding the major issues surrounding information technology transfer success in the Arab World and to better realise the benefits of information technology transfer.*

Keywords: *Information technology transfer, major issues, Delphi study, Arab world.*

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1. Introduction

The technology transfer concept has been one of the complicated issues for developing countries during the last four decades. Developing countries such as those in the Arab World are at quite heterogeneous stages of industrial development and tend to differ according to their situations and the dynamics of their strategic pathways of development. Technology is important as it supports and sustains socio-economic growth, human needs and national development. More specifically, technology is believed to be one of the major forces promoting socio-economic growth; therefore, an efficient technology transfer system is expected to lead to an optimum use of resources [13, 30]. Technology transfer has long been identified as a key issue within the development process. However, the history of technology transfer has not been one of unqualified success. Many failures have occurred for reasons that have not always been clear [3, 5].

Information Technology (IT) is becoming an increasingly significant component of projects undertaken by international development organisations [18]. It provides a means by which countries progress and succeed in international economic, political, social, cultural and educational domains. IT is beneficial in improving productivity, efficiency and administration and in maximising usage of limited resources. Therefore, IT transfer seeks to promote economic growth, competitiveness, equitable distribution of goods and services, access to global markets, and support business processes, as well as narrowing the gap between developed and developing countries. Many complex issues are involved in the consideration of IT transfer. Some of those issues are not completely defined and studied, or cannot be precisely measured. In general, there has been relatively limited research conducted on IT transfer to the Arab World [1]. Arab World countries need to recognise the key issues for successful IT transfer process. Some of these might be the same issues which must be addressed for an organisation to succeed in achieving its goals and objectives [3]. Additionally, issues which affect IT transfer critically impact on an organisation's current operating activities and its future success [28]. Consequently, this study seeks to fill the gap in the Arab World literature related to successful IT transfer studies.

This study contributes to the area of technology transfer in three particular ways. First, it examines IT transfer process from the stakeholders' point of view and highlights the importance of identifying those stakeholders who identify the issues associated with IT transfer process. In contrast, past IT key issues studies have not been very detailed in addressing to whom the issue is related. Second, the study applies a new methodological approach towards understanding the IT transfer process. The Delphi method has not been used

in previous IT transfer studies; such a methodology, if applied appropriately, could allow upcoming researchers to uncover some of the embedded issues related to the IT transfer process from the perception of stakeholder groups. Third, the sources of evidence are collected from a three-round survey and literature.

The remainder of the paper proceeds as follows. After this first introductory section, we present the motivation of the study in section 2. Section 3 points out the research questions and aims of the study. We carry out a literature review on information technology transfer, as well as identifying the related issues of research design in section 4. The research method and design applied in this study is described in section 5. Section 6 presents the findings and discussion, and section 7 highlights expected benefits and outcomes. Finally, the conclusion is outlined in section 8.

2. Motivations of the Study

The prime motivation of this study is to investigate, identify and prioritise the major IT transfer issues leading to success in developing countries, especially in the Arab World, from the stakeholder groups' perceptions. Information technology transfer in developing countries has not always been successful [5, 14]. The IT transfer process is not only very costly and complicated, but its success and performance are far more dependent on a greater number of issues (political, economic, social, cultural, and technological environments) than was previously realised [16, 26]. These issues are highly influential in determining the success or failure of IT transfers [7].

The parameters of development are determined by the rate at which technological changes take place in a particular society. Today, the transfer of a number of highly sophisticated technological and technical systems causes a major problem for the Arab World [3, 26]. The IT transfer challenge is even more problematic in developing countries with emerging economies and social systems [9]. Although Arab countries are eager to adopt new technologies, the process of adoption has been slow and the current utilization of IT is far below that achieved in developed countries [2]. There is an increased likelihood that these obstacles could potentially affect the success of the IT transfer process: recognising and identifying the major issues for successful IT transfer will undoubtedly enhance and facilitate ways of overcoming such obstacles.

3. The Research Questions and Aims

The study intends to systematically identify, prioritise and rigorously analyse stakeholder groups' responses to the main research question: "What are the major issues for successful information technology transfer in developing countries from stakeholder groups' perceptions in the Arab World?" In a more prescriptive mode, we seek to identify issues in successful IT transfer that could enhance and improve the IT transfer process in the Arab World, thereby leading to efficiency and effectiveness gains in such technology transfer. More broadly, this study seeks to define implications and recommendations for successful IT transfer process in the Arab World.

4. Literature Review

4.1. Technology

Technology is widely accepted as necessary for improving the development programs to achieve higher living standards, especially in developing countries where industrial growth has engaged a very significant role. Technology is defined as the knowledge or science of skills or technique. Technology, from a very broad perspective, is defined as comprising knowledge, skills, methods and procedures associated with the production of socially useful goods and services from products of the natural environment [5, 29], however, defines technology as the knowledge and machinery needed to run an enterprise: it would include both software (blueprints and operating manuals) and hardware (machinery and other capital equipment). Taken in this context, technology is more than just the hardware and software; it includes knowledge, information and a series of activities and processes related to its production, its organisation, implementation, application, and absorption. In consequence, the objective of technology is to obtain advanced technology and to improve the level of existing technology, thereby leading to a strengthening of economic competitiveness.

4.2. Technology Transfer

Technology transfer involves two complex and multi-dimensional concepts: "technology" and "transfer". In consequence, it is useful to examine existing definitions and concepts to be found in the literature on technology transfer. The concept of "transfer" in this context includes an array of activities that have particular reference to developing countries. However, the concept of "transfer" has subsequently been linked with the systematically organised exchange of information between two enterprises generally located in different countries [5]. For the purpose of this study, the concept of transfer is identified as the dynamic interchange, application and utilisation of technology from one geographical area to another. We define technology transfer as a dynamic process, where there is a technological movement from one physical or geographical location to another through assessment and selection, acquisition, adaptation, absorption and assimilation, diffusion, development of technical and technological knowledge in a country other than that in which this knowledge has originated.

4.3. Information Technology

The IT revolution has impacted, directly or indirectly, on almost all aspects of our life. It is one of the most dynamic and fastest growing technologies in the world. Information technology is fundamentally changing how nations develop, trade, compete, educate their populations, interact with other nations, and organise knowledge [17]. Indeed, it provides the means by which countries progress and succeed in international economic, political, social, cultural and educational levels.

[25] Defines information technology as 'scientific, technological and engineering disciplines and management techniques used in information handling and processing; their applications; computers and their interaction with men and machines; and associated social, economic and cultural matters'.

4.4. Information Technology Transfer

Transfer of IT has, inevitably, been a new technological challenge for techno-economic development in developing countries. Little effort has been made to understand, conceptualise, and formulate IT transfer and its different impacts. In view of this, [20] defines IT transfer as being a problem of transfer of knowledge (or know-how) about a number of aspects. These include knowledge on how a particular system works, how to operate the system and develop its applications, how to maintain it and, if the need arises, how to produce the different components of a system and to assemble them.

4.5. Issues Affecting IT Transfer in Developing Countries

The approach of IT transfer is affected by issues which play crucial roles in its dynamic process [10]. A number of researchers such as [8 , 19] have identified that there are different interrelated conditions and issues that directly influence or have an effect on the IT transfer process to developing countries. Consequently, this research attempts to explore these issues from the literature and examine more closely their importance in influencing successful IT transfer process in developing countries.

[9] Pointed out some negative aspects in the IT process to developing countries, including the lack of an information infrastructure, communication mechanisms and trained personnel. Problems related to the physical environment, systems maintenance and user resistance were cited as the most important issues affecting the IT transfer.

[24] Pinpoints the geographical, economical, cultural and technical issues of technology transfer, whereas [29] addresses the issues of IT transfer in the statement: 'why the technology should be transferred to developing countries'. Regarding this point, he suggests that the role of technology transfer should be to close the gap between developed and developing countries. He also points out that the success of the transfer depends on issues such as intellectual knowledge, skills, training facilities and the supporting infrastructure.

[11] Indicates that industrialisation through IT is one of the most important aspects, after economic objectives, in developing countries. This author also mentions economic, manpower, physio-ecological, cultural, demographic, and social, political and existing information infrastructure as those issues that are involved in and associated with problems in the IT process to developing countries.

Other barriers to the use of technology in an organisation include the state of computer knowledge, availability of equipment, suitable economy, availability of skilled personnel, and constraints imposed by the social and political context [28]; social, technological readiness of an organisation [18]; and the social, economical, political and cultural infrastructures, and existing computer skills [27].

[19] Presents factors that are directly or indirectly dependent upon the economic and political conditions in the country, that is, the training and education facilities, the national development priorities and plans, including government policies and other social and organisational factors. This author classified these factors in three comprehensive and separate groups of issues: national (economic situation, political situation, government plans, education and training facilities and IT policies); technological (the suppliers and telecommunications infrastructure); and organisational (social issues). These groups of issues were used to assess the success of IT transfer to three African countries: Kenya, Zambia and Zimbabwe.

5. Research Method and Design

Due to the limited practitioner and academic literature which exists in the area of identifying major issues for successful IT transfer process, the research method conducted in this study can be described as exploratory and descriptive. The data collection method adopted in this study is based on the Delphi method at the RAND Corporation at the end of the 1940s [12]. Delphi method is defined as a technique for the systematic solicitation and collation of judgments on a particular topic through a set of carefully designed intensive questionnaires interspersed with summarised information and the feedback of opinions derived from experts [6]. This method is often used to investigate, identify and understand the issues or factors that influence, or may influence, any specific topic or problem area [4, 15, 21].

A two-round, non-anonymous, open-survey was conducted using email with attached survey instruments. The objective of the first round of the study was to explore and inventory all key issues for successful IT transfer in the Arab World experienced

to date from four major stakeholder groups (all highly qualified experts) who are familiar, active and knowledgeable on IT transfer in all Arab countries: IT practitioners, government officials, IT suppliers, and academics. After eliminating duplicate responses and unified terminology, a preliminary set of major issues were then grouped conceptually into categories. The purpose of the second round was to verify correctly interpreted issues and place them in an appropriate category and obtain comments and confirmation on the preliminary set of major issues. A review of the feedback from the first and second round resulted in a master set of major issues. From that, the master set of major issues was established. Figure 1 depicts the study design, with spheres representing main phases of activity and rectangles representing key inputs and outputs.

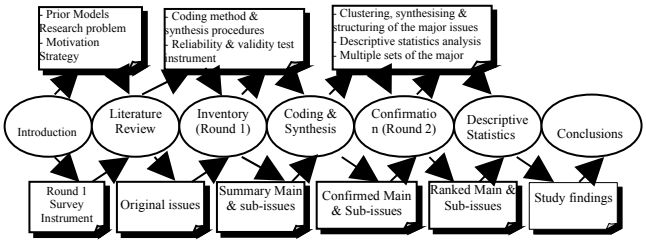

Figure 1. Study design.

6. Results and Discussion

Through round-one, a total of 120 survey instruments were distributed to four major stakeholder groups (all highly qualified experts). There were 30 experts in each panel or group, the study aimed to target 18 respondents in each panel following the recommendations from Delphi literature [21, 22]. A total of 75 questionnaires were returned, yielding a 63% response rate. Seventy-three valid questionnaires were eventually obtained from the first round survey, providing a net response rate of 61%. Table 1 shows the first round responses grouped by stakeholder groups. Known reasons for non-respondents were: some respondents were absent from the organisation because they were on holiday, or on leave; other respondents did not wish to participate because of the time required to complete the survey instrument.

In all, 410 issues were identified from the 73 respondents, or an average of 5.6 issues per respondent. Approximately 31% or 127 of the issues identified originated from academics. This is not surprising given the double role played by academics as respondents; most of them provided information from their academic view point, as well as their consultant role. Furthermore, their answers were more elaborate, which gave more detailed information than that provided by the other respondents in the study.

From within the other stakeholder groups 103 issues identified were from IT practitioners, 96 issues identified were from IT suppliers and 84 issues identified were from government officials. They represent 25%, 23%, and 21%, respectively.

6.1. Coding Method And Synthesis Procedure

The data analysis complexities in this study stemmed from two main sources. First, in order to obtain broad coverage of the IT transfer issues, the stakeholder groups were intentionally diverse. The respondent groups included IT practitioners, government officials, IT suppliers, and academics distributed in all Arab countries. Second, in order to yield issues for successful IT transfer process, the initial inventory round survey was deliberately very general in scope. Responses to the first round of the survey instrument were subsequently diverse, making data analysis more critical and complex than in the case of simpler Delphi studies. The coding schemes were then examined and tested to map the data into the existing model (IT transfer process framework) to provide a satisfactory level of discrimination between substantive issues. Therefore, a structured coding, framework approach was adopted and applied in this study to obtain a distilled set of issues identified in the first survey round. The major advantage of the structured coding approach is that this form employs a deductive research approach and starts with a logical framework to categorise the responses [23].

The coding and synthesis procedure resulted in a master set of 10 major issues categories (see Table 2) with 71 sub-issues (see Appendix A). In a broad coding and synthesis of the first round responses, 60% of respondents identified issues concerning social and culture, 53% nominated economic as a major issue, 47% of individuals referred to issues in government policies, 41% of the stakeholders rated technological capabilities as a source of issues, 23% of experts referred to issues of government political stability, 21% of respondents identified organisational issues as inadequate to meet operational requirements, 21% related specifically to the strategic planning, 15% of respondents identified adequate infrastructure as a major issue, and 12% of stakeholders referred to issues with IT suppliers.

Table 1. The first round (inventory) result of respondents by each stakeholder group.

Stakeholder Group Involved	Non-Respondents	Not Able to	Respondents	Number of Surveyed	Number of Issues
IT Practitioners	8	4	18	30	103
	7%	3%	15%	25%	25%
Government officials	6	6	18	30	84
	5%	5%	15%	25%	21%
IT Suppliers	9	3	18	30	96
	8%	3%	15%	25%	23%
Academics	7	4	19	30	127
	6%	3%	16%	25%	31%
Total count of row	30	17	73	120	410
Total % of row	25%	14%	61%	100%	100%

Table 2. Categorisation of issues in the preliminary set of major categories.

Issues Categories	Issue Nominated by Respondents		Issues Distributed by Categories	
	#	%	#	%
1. Social and Culture	44	60%	60	15%
2. Economic	39	53%	49	12%
3. Government Policies	34	47%	51	12%
4. Political Stability	30	41%	32	8%
5. Technological Capabilities	17	23%	47	11%
6. Organisational	15	21%	56	14%
7. Strategic	15	21%	29	7%
8. Adequate Infrastructure	11	15%	40	10%
9. IT Suppliers	9	12%	29	7%
10. Geographical & Location	6	8%	17	4%
Total			410	100%

The numbers of recorded issues relative to the respondent number of citations is indicated for each of the seventy-one sub-issue categories. The sub-issue categories are listed in (Appendix B), along with a break-down of the component issues by each stakeholder groups: ACAdemics (ACA), IT Practitioners (ITP), GoVernment Officials (GVO), and IT Suppliers (ITS).

7. Expected Benefits and Outcomes

If developing countries are to effectively promote socio-economic growth, technological development, changing environment and competitiveness, they must be aware of current major issues for successful IT transfer process. The Arab World must identify these issues which could enhance and improve its IT transfer process and lead to efficiency and effectiveness of technology transfer. More specifically, key players involved in the IT transfer process stand to benefit from a better understanding of the major issues in IT transfer. Policy makers and government strategy in the Arab World require current information on these issues and key concerns to improve and formulate forecasting and policies to promote successful technology transfer.

This study provides useful insights into areas of further investigation for academics and researchers involved in successful IT transfer. Furthermore, sponsorship opportunities exist for those undertaking studies closely aligned to the concerns of the socio-economic and technological development associated with IT transfer. Potential benefits to IT users from researchers investigating, identifying and prioritising major issues for successful IT transfer include a better understanding by policy makers, technology companies, IT executives, IT suppliers, and scientists in realizing the benefits of IT transfer in the Arab World.

8. Conclusions

This paper has presented the findings of the study, the main aim of which is to investigate, identify and prioritise major issues for successful IT transfer process in the Arab World and examine the relative importance of these issues as they affect various stakeholder groups. Accordingly, a modified Delphi type survey has been employed to establish a set of major issues and related sub-issues that will be confirmed as relevant to the study stakeholder groups. Given that this study focuses on an area of interest that has not been explored extensively in the IT transfer field, the presentation of the research findings may promote insights into the introduction of the new technologies not only in the Arab World, but also in another developing countries which are in the process of adapting to change in the near future.

Ultimately, findings are expected to be particularly valuable to policy makers, technology companies, IT executives, IT suppliers, academics and scientists who seek to better understand the major issues surrounding IT transfer success in the Arab World and to better realise the benefits of IT transfer. Accordingly, it is recommended that policy makers and individual's abovementioned are aware of the most significant issues involved in an IT transfer process according to the organisation circumstances. They also need to reflect honestly on the progress if the IT transfer process is adopted and to readjust and review policies which seem to be going against successful IT transfer and adoption. The results also show that policy makers and people involved in an IT transfer process should be aware of the possible changes and flexible approaches that may be adapted in response to new information, or changes in the environment where the IT process is occurring. Understanding the importance of the most relevant issues that an IT transfer process comprise could be a constructive and positive perspective in order to achieve success in the process that is being adopted. In brief, the understanding and recognition of major issues for successful IT transfer process may make it easier for organisations to adapt to their new technology challenges and changes.

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Khalid Al-Mabrouk is a PhD student at University of Southern Queensland, Australia. He received his first degree and MSc. in Accounting from University of Gar Younis, Libya and Graduate Certificate in Management and MBA from Central Queensland University, Australia. His current research is focused on technology transfer, with particular emphasis on the issues, challenges, and benefits associated with IT adoption in developing countries.

Jeffrey Soar is an associate professor in the Department of Information Systems, Faculty of Business at University of Southern Queensland, Australia. He holds a PhD degree in information management from University of Technology, Sydney, Australia, and Master in computer education from La Trobe University and B.A (Hons) from Monash University, Australia.

Appendix

A. categorisation of a master set of major issues and sub-issues

Major Issue	Sub-Issue
Social & Culture	• Encourage increased use of English language within the Arab environment to assist in adoption of new technologies • Improve individual levels of education to promote general understanding and recognition of the benefits of IT adoption • Encourage universities to adopt and maintain programs that will improve knowledge and adoption of contemporary technology in both current and new generations • Promote team work that encourages open, intensive and effective communication to build an environment of trust that will enhance successful IT transfer among users • Embrace technology transfer to improve social and individual lifestyles, without compromising local customs and traditions • Identify and evaluate individual and collective attitudes towards technology among different socioeconomic groups • Grant a higher degree of political freedom to recognised technical and technological professionals who can contribute to the viability of IT adoption • Enhance numbers of skilled academics and educators by offering higher wages and labour incentives to compete with international markets • Modify software and some of the English programmes for compatibility with Arabic language • Enhance technical facilities and pedagogical approaches to boost IT transfer • Create a relationship between university-organisation based on IT development and improvement
Economic	• Promote financial growth of individuals and organisations • Evaluate effectiveness and quality of candidate technology transfer • Develop technical skills in individuals, the labour force and organisations to achieve high standards in quality • Evaluate market needs according to available professionals who could achieve the IT transfer • Provide the necessary social and financial environment to further expand and develop IT transfer • Identify and evaluate individual and collective attitudes towards acceptance of technology among different socioeconomic groups • Control and satisfy the needs of users or consumers and organisations • Seek financial investment for new IT research and development in the Arab World
Government Policies	• Develop a national strategic plan to monitor the direction of transferred technological change at the individual and organisation level • Formulate flexible government policies, with assistance from private and public corporations, for the selection and introduction of technology • Promote flexible financial and government policies that encourage individual and organisational learning and adoption of new technologies • Promote government policies to enhance management leadership in technological projects • Adopt and enforce government policies aligned to internationally recognised technology development • Promote government policy aligned with national and international financial systems to support education and adoption of technology development • Develop government policies and incentives for increased annual growth and income distribution at the local and national levels
Political Stability	• Develop and maintain an innovative industrial and technological climate to create social and financial benefits • Enforce national government policy that increases local development and provides financial benefits • Maintain political freedom and stability to foster national reputation and enhance technological investment and adoption • Identify individual characteristics and attitudes toward technology into different social classes
Technological Capabilities	• Measure attitudes towards R&D learning and commercialisation capabilities • Improve and share knowledge capability for sustained technology adoption • Create R&D incentives to individuals and organisations to improve skill levels and productivity and financial gains in IT acquisition and development • Expand innovation capability to create and carry new technologies or make radical modifications • Establish environment wherein indigenous people are able to adopt technology on an individual or organisational level • Measure attitudes, performance and effectiveness of R&D • Enforce plans for improving technical conditions of production • Promote training courses to enhance technological knowledge required for undertaking new IT projects • Recognise previous experience with similar IT projects transferred and implemented
Organisational	• Initiate and promote training and financial incentives to encourage IT learning and implementation • Identify what will and will not be supported by technology suppliers in the IT transfer project • Make use of the consultation services concerning IT transfer and receive support for the quick and efficient realization of practical applications for best results • Identify and create a learning environment that develops the skills required to access information • Promote a work environment that encourages participation and learning by staff in meeting organisational objectives • Encourage, evaluate and reward initiatives of IT managers in generating innovative IT transfer policies • Promote high level of effective open management style to succeed in the IT transfer process • Recognise participation of the stakeholders in IT transfer and development • Increase staff awareness on role and benefits of IT to the organisation • Adopt and maintain an environment for improved knowledge sharing and open, effective communication between transferee and transferrer

Major Issue	Sub-Issue
	• Ensure effective control and risk management for the successful implementation of IT transfer
Strategic	• Formulate and develop a strategic plan that focuses on the actual IT transfer process and its implementation • Identify resource requirements and benefits expected from IT transfer project • Identify and appoint full-time, cooperative personnel with project experience to establish and implement new technology programs • Implement effective international and domestic coordination processes for monitoring and implementing technology transfer • Seek top-level support from technology suppliers for strategic and operational guidance • Incorporate flexible risk management strategies that enable successful implementation of IT transfer and accommodate technological change • Encourage government to play both leadership and supportive roles to provide a favourable environment for growth
Adequate Infrastructure	• Increase and accelerate the development and implementation of an appropriate framework to build responsive ICT and associated IT systems within the Arab world • Develop safety and social work systems • Establish research and development centres to evaluate, promote and encourage technological growth and development in the Arab world • Create incentive systems for innovation activities • Identify skills and availability of experienced IT staff who are capable of adopting and applying new knowledge • Assess availability of suitable equipment required for IT adoption process • Evaluate the availability of financial resources to enhance or build organisational IT infrastructure
IT Suppliers	• Identify and utilize competitive and high quality suppliers. • Encourage government to reward technology suppliers who engaged in favourable business practices • Develop open and effective relationships for information sharing between suppliers and acquirers of technology • Formally evaluate suppliers' performance against organisational requirements
Geographical & Location	• Identify the location of competitors and suppliers • Consider the attitude and reaction of local community to location to the candidate technology • Recognise the need to improve environment, and support that process with more technology

B. Cross-tabulation of the identified master issues by each stakeholder groups.

Sub-Issues Categories	S- #	M- #	Stakeholder Groups ACA	ITP	GVO	ITS
• Encourage increased use of English language within the Arab environment to assist in adoption of new technologies	1	1	3	2	1	1
• Improve individual levels of education to promote general understanding and recognition of the benefits of IT adoption	2	1	2	1	1	2
• Encourage universities to adopt and maintain programs that will improve knowledge and adoption of contemporary technology in both current and new generations	3	1	2	1	1	2
• Promote team work that encourages open, intensive and effective communication to build an environment of trust that will enhance successful IT transfer among users	4	1	1	1	2	1
• Embrace techno logy transfer to improve social and individual lifestyles, without compromising local customs and traditions	5	1	2	1	3	1
• Identify and evaluate individual and collective attitudes towards technology among different socioeconomic groups	6	1	4	2		2
• Grant a higher degree of political freedom to recognised technical and technological professionals who can contribute to the viability of IT adoption	7	1	2	1	1	
• Enhance numbers of skilled academics and educators by offering higher wages and labour incentives to compete with international markets	8	1	2	2	2	1
• Modify software and some of the English programmes for compatibility with Arabic language	9	1	1	2	1	1
• Enhance technical facilities and pedagogical approaches to boost IT transfer	10	1	2	2	2	
• Create a relationship between university-organisation based on IT development and improvement	11	1				
• Promote financial growth of individuals and organisations	12	2	2	1	1	
• Evaluate effectiveness and quality of candidate technology transfer	13	2	3	1	1	
• Develop technical skills in individuals, the labour force and organisations to achieve high standards in quality	14	2	1		1	1
• Evaluate market needs according to available professionals who could achieve the IT transfer	15	2	3	1	2	1
• Provide the necessary social and financial environment to further expand and develop IT transfer	16	2	1	1		2
• Identify and evaluate individual and collective attitudes towards acceptance of technology among different socioeconomic groups	17	2	3	1	1	
• Control and satisfy the needs of users or consumers and organisations	18	2	1		1	
• Seek financial investment for new IT research and development in the Arab World	19	2	3	2	1	1

• Develop and maintain an innovative industrial and technological climate to create social and financial benefits • Enforce national government policy that increases local development and provides financial benefits • Maintain political freedom and stability to foster national reputation and enhance technological investment and adoption • Identify individual characteristics and attitudes toward technology into different social classes	27 28 29 30	4 4 4 4	2 3 5 3	2 2 3 2	1 1 1	1 2 2
• Measure attitudes towards R&D learning and commercialisation capabilities • Improve and share knowledge capability for sustained technology adoption • Create R&D incentives to individuals and organisations to improve skill levels and productivity and financial gains in IT acquisition and development • Expand innovation capability to create and carry new technologies or make radical modifications • Establish environment wherein indigenous people are able to adopt technology on an individual or organisational level • Measure attitudes, performance and effectiveness of R&D • Enforce plans for improving technical conditions of production • Promote training courses to enhance technological knowledge required for undertaking new IT projects • Recognise previous experience with similar IT projects transferred and implemented	31 32 33 34 35 36 37 38 39	5 5 5 5 5 5 5 5 5	3 2 3 3 2 2 1 1 2	1 1 1 1 1	2 1 2 1 2	1 1 1
• Initiate and promote training and financial incentives to encourage IT learning and implementation • Identify what will and will not be supported by technology suppliers in the IT transfer project • Make use of the consultation services concerning IT transfer and receive support for the quick and efficient realization of practical applications for best results • Identify and create a learning environment that develops the skills required to access information • Promote a work environment that encourages participation and learning by staff in meeting organisational objectives • Encourage, evaluate and reward initiatives of IT managers in generating innovative IT transfer policies • Promote high level of effective open management style to succeed in the IT transfer process • Recognise participation of the stakeholders in IT transfer and development • Increase staff awareness on role and benefits of IT to the organisation • Adopt and maintain an environment for improved knowledge sharing and open, effective communication between transferee and transferrer • Ensure effective control and risk management for the successful implementation of IT transfer	40 41 42 43 44 45 46 47 48 49 50	6 6 6 6 6 6 6 6 6 6 6	2 2 3 1 2 1 3 2 1 3 1	2 1 2 1 1 2 1 2 1 3	3 2 2 1 1 1 2 1 	 1 3 2 1 1
• Incorporate flexible risk management strategies that enable successful implementation of IT transfer and accommodate technological change • Encourage government to play both leadership and supportive roles to provide a favourable environment for growth	56 57	7 7	3 3	 2	 	1 1
• Increase and accelerate the development and implementation of an appropriate framework to build responsive ICT and associated IT systems within the Arab world • Develop safety and social work systems • Establish research and development centres to evaluate, promote and encourage technological growth and development in the Arab world • Create incentive systems for innovation activities • Identify skills and availability of experienced IT staff who are capable of adopting and applying new knowledge • Assess availability of suitable equipment required for IT adoption process • Evaluate the availability of financial resources to enhance or build organisational IT infrastructure	58 59 60 61 62 63 64	8 8 8 8 8 8 8	2 1 3 2 1 1	1 2 2 2 1 2 1	 1 2 1 2 	 1
• Identify and utilize competitive and high quality suppliers. • Encourage government to reward technology suppliers who engaged in favourable business practices • Develop open and effective relationships for information sharing between suppliers and acquirers of technology • Formally evaluate suppliers' performance against organisational requirements	65 66 67 68	9 9 9 9	2 2 1 1	2 1 2	1 3 	5 4 1
• Identify the location of competitors and suppliers • Consider the attitude and reaction of local community to the location of the candidate technology • Recognise the need to improve environment, and support that process with more technology	69 70 71	10 10 10	2 1 2	3 	1 2 	
Total			139	88	68	52