

*Full Length Research Paper*

# **A delphi examination of emerging issues for successful information technology transfer in North Africa a case of Libya**

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**Transfer of information technology (IT) is an increasingly important component for techno-economic development in the developing countries. It can play a major role in the process of technological development. Yet there have been very little studies in IT transfer in developing countries, particularly in Arab countries. The success of the IT transfer process depends upon a number of issues that must be identified for each country. This study identifies key issues on IT transfer process and draws a consensus domain from experts on the key issues. This study also is an attempt to provide a basis for understanding clearly the key elements and requirement for the success and effectiveness of an IT transfer process in Libya. A three-round delphi method was conducted for this study, identifying 15 key issues in the IT transfer, along with their importance and urgency ratings. Analyses show that participating experts achieved a higher level of consensus on the importance and urgency of the issue as the rounds progressed. The findings will assist: (i) academics to build models and provide a broader view and a better understanding of what the important issues are when dealing with successful IT transfer in Libya; (ii) policy makers and government officials to improve and formulate forecasting and policies to promote successful IT transfer process; and (iii) technology suppliers who seek to better understand the key issues surrounding IT transfer success in Libya.**

**Key words:** Information technology transfer, delphi study, Libya.

## **INTRODUCTION**

In the last century the importance of information technology (IT) has been greatly emphasised in developing countries. The governments of these countries have recognised benefits of technology, and consequently allocated billions of dollars to build infrastructures to support reliable and efficient transfer of information technology (Al-Gahtani, 2004). Information technology transfer can play a major role in the process of technological development. Successful experience in IT transfer in developing countries such as in Latin America (Brazil, Argentina and Chile) and in South-East Asia (Singapore, Hong Kong, Taiwan and Malaysia) has shown that IT crosses the boundaries of organisations to reach the national level in order to play a fundamental role in the process of techno-

logical development in these countries. These countries have also assisted by establishing many businesses to develop applications, conduct education and training, and offer basic products and services to promote social and economic growth and improve their technological capability to better serve nationwide interests. The main point is that IT transfer is believed to be a part of the dynamic process of development in nations nowadays. To have successful technology transfer, IT should meet the suitability criteria, and to be suitable, it needs to be adapted to those people who will operate it (Cohen, 2004).

The success of the IT transfer process in developing countries should be preceded by a clear understanding of a number of issues, the most important of which are an awareness of the value of information in the nation, the indigenous organisational capacity to use IT and the national and organisational infrastructures. These issues are dependent, directly or indirectly, upon the economic and political conditions in the country, the training and

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education facilities, the national development priorities, plans and strategies, including government policies, and other social and organisational issues (Odedra, 1990). It is probably true to say that, historically, there has not been an IT transfer to Libya which could be regarded as having been totally successful. Many failures have occurred for reasons that have not always been clear. Identifying the emerging issues for successful IT transfer in Libya will allow academics to build models that would further expand the IT transfer domain in Libya, and policy makers and management leadership to formulate and improve forecasting and flexible policies to promote successful IT transfer processes in Libya. Consequently, this study is an attempt to provide a basis for understanding clearly the key elements and requirements for the success and effectiveness of IT transfer processes in Libya. This paper attempts to answer the following two questions regarding IT transfer in Libya (i) What are the key emerging issues for successful IT transfer in Libya which academics and policy makers are faced with?; and (ii) Which of the key issues do academics and policy makers believe deserve more urgent consideration? The primary purpose of the paper is to address these questions in order to identify clearly the emerging issues for successful IT transfer in Libya. To achieve this objective, we adopted a Delphi method that is known to be effective for reaching consensus from experts. The remainder of the paper proceeds as follows. After this first introductory section, we present an overview of information technology development in Libya in Section 2. Section 3 reviews the literature on information technology transfer as well as identifying related issues of research design. The research method and design applied in this study is described in Section 4. Section 5 presents the descriptive analyses of the study. Section 6 presents interpretation of the results. Finally, the discussion and conclusion is outlined in Section 7.

### **Overview of information technology development in Libya**

Libya is a developing Arab country located in the north-central part of Africa. The country's population is 6 million (CIA World Fact book, 2007). The Libyan social environment is characterised by the extended family, clan, tribe, village and Islamic religion. These play a major role in the community's life and people's relationships (Ahmed and Gao, 2004). Until the discovery of oil in Libya in 1959, the economy of this country was poor and dependent mainly on agriculture, animal husbandry, fishing and trade. The transformation of Libya's economy from subsistence farming to a developed economy is impressive. This transformation changed the country from a poor to a rich country within that region, and ranks 12<sup>th</sup> among petroleum producers since 1991. The economy has largely depended on oil as the main natural sources of wealth and constitutes 99% of Libya's exports (ArabNet, 2002). The oil industry in Libya has reserves of 39 billion barrels

of proven crude oil. Libya has the largest reserve base in Africa (42%) and 3% of world reserves. The sale of oil, natural gas and refined products generates export earnings of US \$ 12 billion per year, accounting for 95% of Libya's foreign currency earnings and 75% of government revenues (PROJEX Libya, 2007). Libya did not pass through the usual development stages that most developed nations have experienced. It's GDP (Gross Domestic Product) rose from US \$2,113 million in 1970 (Libyan Central Bank, 2001) to US \$ 72.68 billion in 2006 (CIA World Fact book, 2007). Libya is now working towards transforming its socialist-oriented economy to a more market-based economy, through applying for WTO (World Trade Organization) membership, reducing subsidies, and implementing a privatisation strategy (WTO News, 2004). Clearly, new technologies for Libya will be required to support the transformation.

Libya's economic progress is dependent on overseas technology and expertise for the expansion, upgrading and modernisation of its vital infrastructure. This is central to an ambitious multi-billion dollar national development plan which has a US \$ 14 billion allocation for 2007 alone, representing 60% of the total annual budget. Technology is important as it supports and sustains socio-economic growth, human needs and national development, especially in developing countries (Al-Mabrouk and Soar, 2006). Libya as a developing country has valued the importance of technology such as IT in improving its socio-economic growth and development and overall efficiency of its businesses, communications systems, and processes. It has similarly allocated substantial resources for IT transfer and begun to build infrastructures to support a more reliable and quicker adoption of IT. Libya, at the heart of North Africa, is the fastest growing IT market in the North Africa region which is set to reach US \$ 13.4 billion in 2008, with the region showing the most significant growth across Africa (PROJEX Libya, 2007).

Recently, Libya has attracted more than 500 companies in the technology industry, such as IT, and oil and gas, from America, Europe and Asia with a view to obtaining the best technology in the region. Libya seeks to establish itself as an industrial, commercial and technological leader in North Africa. The cornerstone of the country's economic development plan is a focus on creating a strong IT infrastructure that will attract businesses eager to engage in commerce in North Africa. For information and communication technology to be transferred and widely used and accepted in a society, good telecommunication systems and IT infrastructure are essential, because without them technology transfer and technological innovation development will not take place nor be effective. Table 1 shows the internet users and population statistics in North African countries.

### **Literature review**

Technology transfer Technology transfer involves two

**Table 1.** Internet usage and population statistics for North African countries.

Country	Population (2007 Est.)	Internet users in 2000	Internet users, latest Data	% population	% Users in Africa	Usage growth (2000-2007)
Algeria	33,506,567	50,000	1,920,000	5.7%	5.8%	3,740.0%
Egypt	72,478,498	450,000	5,000,000	6.9%	15.0%	1,011.1%
Libya	6,293,910	10,000	205,000	3.3%	0.6%	1,950.0%
Mauritania	2,959,592	5,000	20,000	0.7%	0.1%	300.0%
Morocco	30,534,870	100,000	4,600,000	15.1%	13.8%	4,500.0%
Tunisia	10,342,253	100,000	953,000	9.2%	2.9%	853.8%

Source: Internet World Stats.

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 (Cohen, 2004). 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.

### Information technology

The information technology (IT) revolution has impacted, directly or indirectly, on almost all aspects of life. It is one of the most dynamic and fast technologies in the world. Information technology is fundamentally changing how nations develop, trade, compete, educate their populations, interact with other nations, and organise knowledge (Nahar, 2001). Indeed, it provides the means by which countries progress and succeed in the international economic, political, social, cultural and educational level. Smith and Campbell (1981) define 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.

### 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, Odedra (1991) defines IT transfer as being a problem of transfer of knowledge (or know-how) regarding 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 assemble them. In addition, IT transfer, as defined by Avgerou (1995) from an organisational point of view, can be understood as comprising 'the acquisition of hardware, software and telecommunications, the development of technical skills and an infrastructure for technical services, and the development of an organisational capacity to manage projects for the application of IT in the tasks of the organisations. Indeed, these definitions are not limited to IT transfer; they can also involve some other technological transfers. These definitions consider IT transfer almost as a physical practice, rather than socio-technological and human-oriented practice.

However, technology in general, and IT transfer in particular, should be linked into the human side within the operation process; the mutual interactions of man-machine cannot be neglected. Since there are immense differences among different countries in terms of technical, natural environment, human resources, infrastructure, socio-cultural background, industrial and business experiences, orga-managerial styles, and so forth, it is essential to examine the suitability of the transferred IT process to developing countries (Kahen, 1996).

### Issues affecting IT transfer in developing countries

The approach of IT transfer is affected by issues which play crucial roles in its dynamic process (Kahen, 1996). A number of researchers such as Kahen (1996) and Odedra (1990) 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 ex-

plore these issues from the literature and examine more closely their importance in influencing successful IT transfer process in developing countries. Kahen (1996) 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. Samil (1985) pinpoints the geographical, economical, cultural and technical issues of technology transfer, whereas Wie (2005) 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. Kirlidog (1997) 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 (Cohen, 2004); social, technological readiness of an organisation (Nahar, 2001) and the social, economical, political and cultural infrastructures, and existing computer skills (Twati and Gammack, 2006). Odedra (1990) presents factors that are directly or indirectly dependent upon the economic and political conditions in the country, that is, the training and education facilities, and 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.

## RESEARCH METHOD AND DESIGN

### Delphi method

Delphi is a technique for the systematic solicitation and collation of judgments on a particular topic through a set of carefully designed sequential questionnaires interspersed with summarised information and the feedback of opinions derived from experts (Delbecq et al., 1986). Delphi method is often used to investigate, identify and

understand the issues or factors that influence or may influence any specific issues, topic or problem area (MacCarthy and Atthirawong, 2003; Okoli and Pawlowski, 2004). The Delphi method has been applied and used widely in information technology research (Chang, 2006; Chang and Gable, 2001; Gonzalez et al., 2006; Okoli and Pawlowski, 2004). It has also been applied in technology transfer issues to formulate various governmental policies and strategies (Al-Mabrouk and Soar, 2006). The process of the Delphi method can be continue until a satisfactory level of consensus is achieved regarding the objectives of the study, then a ranking procedure is used to finalise the decision. In addition, the Delphi findings would allow statistical summarisation and comparison to demonstrate group consensus and differentiation. The reliability and validity of the Delphi study depends on the nature of the study, characteristics of the experts used as panel members, and the successive rounds of the survey instrument (Hasson et al., 2000). The primary objective of this study is to identify a list of agreed upon key issues for successful IT transfer in Libya. Achieving this objective requires gathering information and ideas from domain experts and crystallising the information through an iterative consensus-making process. Thus, this study applied the Delphi approach due to it being a stronger methodology for a rigorous enquiry of experts and stakeholders.

### Study design

The study utilised a three-round, non-anonymous, open survey was conducted using email with attached survey instruments. The selection of experts is a very important stage of the Delphi process. This study used a multiple-step process to identify and select the highly qualified experts, following the guidelines of Delphi literature. The steps were:

- i.) Prepare experts nomination worksheet.
- ii.) Populates the nomination worksheet with names.
- iii.) Rank experts by qualifications and experience.
- iv.) Invite experts to the study.

### Participants

The study used two groups of qualified experts (academics and government officials) who are both familiar with and knowledgeable on information technology and willing to share their knowledge opinions, and insights. The academic experts (management information systems, project management, and computer science) were identified and listed almost entirely via a literature review of academic and practitioner journals, workshops, interest groups, professional associations, institutions' and universities' websites. The government official experts were identified and listed from ministries, oil companies, banks, IT companies, IT consulting, and policy makers were also selected because they were recognised as# the most qualified and most active experts.

### Round one

The round one was intended to be the basis for determining the preliminary set of issues recognised by the selected experts regarding successful IT transfer in Libya. In this round, an open-ended questionnaire was sent via an e-mail or fax to the 120 experts. In addition the invitation letter was crucial in the process, therefore, it was well-prepared. The survey instrument covering letter thanked the experts for participating, explained why his or her help was needed, explained how the results of the Delphi study would be utilised, provided instructions, nominated a response date, and addressed the issue of data confidentiality. The first question in the

**Table 2.** Ranking of issues for successful IT transfer in Libya by importance.

No.	Key issue
1	Formulate and develop a strategic plan that focuses on the actual IT transfer process and its implementation
2	Embrace IT transfer to improve social and individual lifestyles, without compromising local customs and traditions
3	Create a relationship between university-organisation based on IT development and improvement
4	Formulate flexible government policies, with assistance from private and public corporations, for the selection and introduction of technology
5	Establish R&D centres and units to evaluate, promote and encourage technological growth and development in the Libyan environment
6	Develop technical skills in individuals, the labour force and organisations to achieve high standards in quality
7	Evaluate effectiveness and quality of candidate IT transfer
8	Make use of the consultation services concerning IT transfer and receive support for the quick and efficient realization of practical applications for best results
9	Promote government policies to enhance management leadership in technological projects
10	Promote high level of effective open management style to succeed in the IT transfer process
11	Recognise participation of all stakeholder groups in IT transfer and development
12	Identify and utilize competitive and high quality suppliers
13	Control and satisfy the needs of users or consumers and organisations
14	Encourage universities and institutes to adopt and maintain programs that will improve knowledge and adoption of contemporary technology in both current and new generations
15	Encourage increased use of English language within Libyan environment to assist in adoption of new information technologies

questionnaire concerned demographic information. Then the questionnaire asked the participants to list at least five and up to ten most critical issues for successful IT transfer in Libya, according to their knowledge and experiences. Next, the experts were asked to rank them with two criteria: importance and urgency. Critical issues refer to the issues that will have great impact on successful IT transfer in Libya in the next five to ten years, and urgent issues are defined as those issues that should be immediately addressed in order for IT transfer to advance in the next couple of years. These concepts were provided clearly in the survey instrument to establish the study participants' perception on the criteria. The participants were also requested to offer a brief explanation (in one or two sentences for each issue) of the relative importance of each issue. These explanations provided a dual purpose offering a qualitative empirical basis for answering the research questions and allowing the researchers to understand and recognise the different experts' issues. Moreover, the explanations helped the researchers to classify the issues into categories. The first round of the questionnaire was e-mailed and faxed to the participants in late August 2006. In the first round, a total of 62 of 120 experts (52%) contributed their expertise, yielding a list of 95 issues for successful IT transfer in Libya. These issues have been synthesised and categorised into 15 key issues listed in Table 2.

### Round two

In this round all the experts received the second questionnaire, which was a list of all the consolidated issues (15) obtained from the first round. Through this questionnaire the experts were asked to rate each issue in terms of its importance and urgency. For the importance and urgency rating, we used a seven-point interval scale with 1 being 'not at all important or urgent and 7 being 'extremely important'. A seven-point scale was chosen in order that

a neutral choice was available, and to provide sufficient variability in the data (Deans, 1991). Furthermore, the participants were allowed to suggest additional issues if they believed that the provided list was incomplete. As a result, two new issues were added to the consolidated list. A total of 72 experts participated in this round, yielding a 60% response rate.

### Round three

After having defined a meaningful relevant set of key issues identified in the previous two rounds and the average importance and urgency ratings from the second round, the researchers followed with the final-round questionnaire of this study. Through this questionnaire the potential respondents were asked:

- i) To provide their own importance and urgency ratings after reviewing the average ratings of second-round participants.
- ii) To submit comments explaining or justifying their ratings. A review of the literature had not identified such an explanation of rankings in any Delphi study.

This study has considered the experts' explanation as one option to obtain a better understanding of the respondents' replies, and to support the analysis of their answers, which will help achieving the final study outcomes. This round received feedback from 54 experts, yielding a 45% response rate.

### Descriptive analysis

#### Participant demographics

This section collected demographics information about the partici-

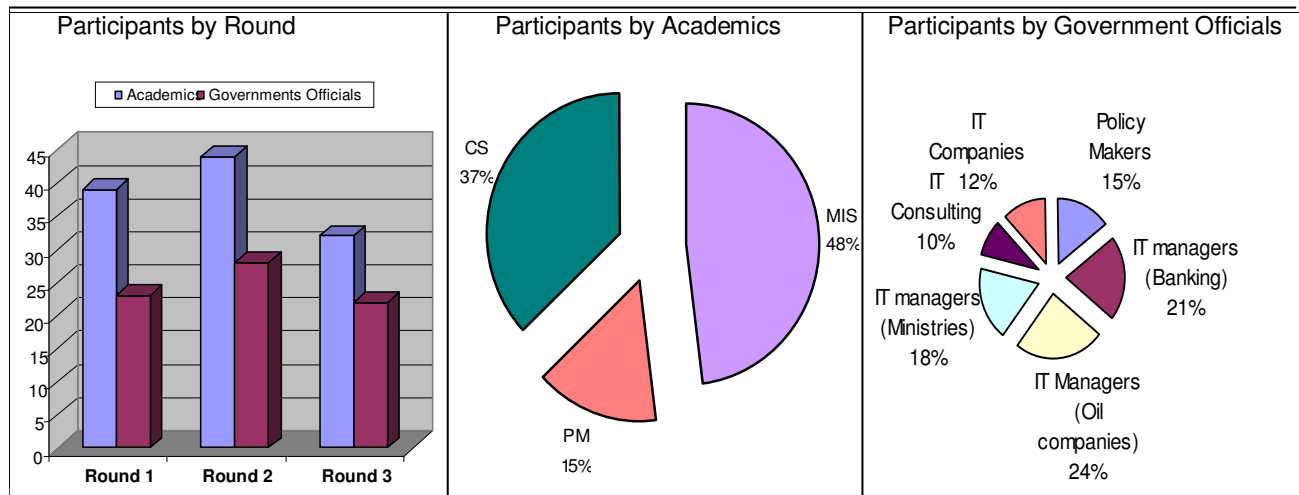


Figure 1. Delphi study participants.

pants. There is no exact sample size advocated for Delphi studies. For example, Martino (1972) suggest that five to ten, carefully selected, could be used for a heterogeneous population. Paliwoda (1983), and Okoli and Pawlowaki (2004) recommended that the Delphi panel size requirements be unassuming, and it would be practical to solicit up to four panels of 10 to 18 members in size. Because of the relatively limited number of experts in Libya with knowledge about IT transfer, 10 to 18 people in each panel was considered satisfactory, following the recommendations from Delphi literature (Okoli and Pawlowaki, 2004; Paliwoda, 1983; Zolingen and Klaassen, 2003). The experts participating in the study came from both academia (61%) and government officials (39%). Detailed categorizations of the participants are presented in Figure 1.

### Experts consensus

The reason for using the Delphi method is to gain consensus among a group of perceived experts (Keeney et al., 2006). The literature suggests that for results to be considered credible, the degree of consensus should be high amongst respondents. In empirical Delphi studies, the consensus of the Delphi participants has been determined by measuring the variance in the responses. The lower the standard deviation is the higher is the consensus achieved. Therefore, perfect consensus on an issue has a standard-deviation value of zero (Dickson et al., 1984). Accordingly, the success of a consensus process can be measured by the reduction in the standard deviation throughout the process (Park et al., 2006) The standard deviation is a measure of the dispersion of a set of data from its mean (Marquardt, 1993). We also compared the standard deviations of each issue's importance and urgency ratings at round two with their corresponding standard deviation at round three to test the experts consensus level (Preble, 1984). Tables 3 and 4 show the most standard deviations of the importance and urgency ratings of second and third round respectively.

It can be seen from Table 2 and 3 that standard deviations of the importance and urgency ratings in the third round are lower than their counterparts in the second round. This highlights that the experts' consensus on the importance and urgency of most issues improved over time, and that the study has reached a greater consensus from experts. As Keeney et al. (2006) mentioned, it would be difficult to gain 100% consensus and agreement in Delphi study because perception of issues heavily depends on several factors, for instance social culture, economic situation, and political

stability. Issue 4 which was ranked as the second important and third urgent issue, show a very steep decrease in its standard deviations on both ratings. The last column in Tables 2 and 3 presents the differences in the mean and standard deviations of the 15 issues. The tables also show that the issues with high importance and urgency ratings (that is, issue 1, 4, and 6) tend to get even higher ratings in the third round, while the issues with low ratings (that is, issues 14, 3 and 10) received even lower ratings in the third round. From these results, it is evident that the participating experts achieved a higher level of consensus on the importance and urgency of the 15 key emerging issues for successful IT transfer in Libya.

### Interpretation of the results

The three most important issues in round three include 'formulate and develop a strategic plan that focuses on the actual IT transfer process and its implementation' 'formulate flexible government policies, with assistance from private and public corporations, for the selection and introduction of technology' and 'develop technical skills in individuals, the labour force and organisations to achieve high standards in quality' with a mean value 8.51 or higher (Table 2). Furthermore, in terms of urgency issues, 'formulate and develop a strategic plan that focuses on the actual IT transfer process and its implementation' 'develop technical skills in individuals, the labour force and organisations to achieve high standards in quality' and 'formulate flexible government policies, with assistance from private and public corporations, for the selection and introduction of technology' are the three most urgent issues with a mean value of 8.10 or higher (Table 3). An interesting aspect of importance and urgency rating results is that the five issues ranked at the top of the important issue list are also ranked as the top five most urgent issues.

The results indicate that both academics and government officials consider 'formulate and develop a strategic plan that focuses on the actual IT transfer process and its

**Table 3.** Ranking of issues by importance.

Key Issues	Round Two		Round Three		Differences	
	Mean	SD	Mean	SD	Mean	SD
Issue 1	8.21	2.17	8.61	1.95	0.40	- 0.22
Issue 4	8.18	2.05	8.56	1.71	0.38	- 0.34
Issue 6	7.94	1.94	8.51	1.39	0.57	- 0.55
Issue 8	7.81	2.38	8.05	1.73	0.24	- 0.65
Issue 11	7.32	2.29	7.84	1.53	0.52	- 0.76
Issue 5	7.02	2.51	7.73	1.92	0.71	- 0.59
Issue 12	6.91	2.03	7.44	1.33	0.53	- 0.70
Issue 15	6.79	2.00	7.23	1.80	0.44	- 0.20
Issue 2	6.60	2.20	7.02	1.76	0.42	- 0.44
Issue 9	6.55	2.01	6.92	1.44	0.37	- 0.57
Issue 7	6.23	1.96	6.67	1.36	0.44	- 0.60
Issue 13	5.87	1.81	6.34	1.29	0.47	- 0.52
Issue 14	5.76	2.97	6.05	1.98	0.29	- 0.99
Issue 3	5.51	2.32	5.96	1.91	0.45	- 0.41
<b>Issue 10</b>	5.27	2.40	5.78	1.59	0.51	- 0.81

**Table 4.** Ranking of issues by urgency.

Key Issues	Round Two		Round Three		Differences	
	Mean	SD	Mean	SD	Mean	SD
Issue 1	7.91	2.84	8.49	1.98	0.58	- 0.86
Issue 6	7.63	2.67	8.28	1.76	0.65	- 0.91
Issue 4	7.54	2.13	8.10	1.55	0.56	- 0.58
Issue 8	7.21	1.95	7.97	1.34	0.76	- 0.61
Issue 11	7.01	2.79	7.81	1.91	0.80	- 0.88
Issue 12	6.79	2.43	7.76	1.83	0.97	- 0.60
Issue 5	6.59	2.84	7.05	1.97	0.46	- 0.87
Issue 2	6.39	2.29	6.96	1.49	0.57	- 0.80
Issue 15	6.04	2.53	6.78	1.63	0.74	- 0.90
Issue 9	5.84	2.40	6.49	1.59	0.65	- 0.81
Issue 7	5.75	2.24	6.10	1.36	0.35	- 0.88
Issue 13	5.46	2.67	4.75	1.80	- 0.71	- 0.87
Issue 3	5.22	2.31	4.54	1.41	- 0.68	- 0.90
Issue 14	5.07	2.71	4.39	1.66	- 0.68	- 1.05
Issue 10	4.92	2.55	4.11	1.71	- 0.81	- 0.84

implementation' is one of the most critical issues that needs to be urgently addressed. 'Formulate and develop a strategic plan that focuses on the actual IT transfer process and its implementation' is also ranked a very important and urgent issue for formulating and developing a new a strategic plan for successful IT transfer in Libya. While these two issues focus more on the strategic planning and government policies side of IT transfer and implementation, the experts also placed consultation, cultural, and quality of suppliers issues within the top five important and urgent issues. 'Develop technical skills in individuals, the labour force and organisations to achieve

high standards in quality' is another critical issue that emphasises the needs for developing IT technical skills for all people to achieve IT knowledge.

## DISCUSSION AND CONCLUSION

Libya, as a developing country needs to effectively promote social and economic growth, technological development, changing environment and competitiveness, must be aware of current emerging key issues for successful IT transfer process. The identification of these issues could enhance and improve the efficiency and effective

tiveness of its (Libya) IT transfer. According to Al-Mabrouk and Soar (2006), the success of IT transfer usually depends on identifying clearly the key issues. The objective of this study was to identify key issues on IT transfer process and draws a consensus domain from experts on the key issues. This study is an attempt to provide a basis for understanding clearly the key elements and requirement for the success and effectiveness of IT transfer process in Libya. A three-round Delphi method was conducted for this study, yielding 15 key issues for successful IT transfer in Libya, along with their importance and urgency ratings.

The analyses show that participating experts achieved a higher level of consensus on the importance and urgency of the issue as the rounds progressed. This study provides useful insights and several contributions to the IT transfer field in developing countries. First, the findings can benefit academics and researchers involved in the field to build models and provide a broader view and a better understanding of what the important issues are when dealing with successful IT transfer in Libya.

Second, policy makers and government officials in Libya require current information on these issues and key concerns to improve and formulate forecasting and policies to promote successful IT transfer. Third, the list of key issues identified by domain experts can help technology suppliers who seek to better understand the key issues surrounding IT transfer success in Libya. Consequently, this study focuses on an area of interest that has not been explored extensively in the IT transfer field in Libya.

## REFERENCES

- Ahmed NS, Gao SS (2004). Changes, problems and challenges of accounting education in Libya. *Acc. Edu.* 13(3): 365-390.
- Al-Gahtani SS (2004). Computer technology acceptance success factors in Saudi Arabia: an exploratory study. *J. Global Info. Tech. Mgt.* 7(1): 5-23.
- Al-Mabrouk K, Soar J (2006). Identification of major issues for successful IT transfer in the Arab World: the preliminary results. *Proceedings of the 3<sup>rd</sup> International Conference on Innovations in Information Technology*, Dubai, UAE. November 19-21.
- ArabNet (2002). Libya. (Online): [www.arab.net/libya/la\\_industry.htm](http://www.arab.net/libya/la_industry.htm)
- Avgerou C (1995). Transferability of information systems and organisation precipices. Paper presented to International Federation for Information Processing International Conference. Cairo, Egypt.
- Chang S (2006). An alternative methodology for Delphi-type research in IS key issues studies. *Int. J. Mgt. Ent. Dev.* 3(1/2): 147-168.
- Chang S, Gable G (2001). A Delphi examination of public ERP implementation, management and support issues. *J. Decision Systems.* 10: 29-48.
- Cohen G (2004). *Technology transfer: strategic management in developing countries*. New Delhi: Sage Publications.
- CIA World Factbook (2007). Report on Libya. (Online): [www.cia.gov/library/publications/the-world-factbook/geos/ly.html](http://www.cia.gov/library/publications/the-world-factbook/geos/ly.html)
- Deans PC, Karwan KR, Goslar MD, Ricks, DA, Toyne B (1991). Identification of key international information systems issues in U.S.-based multinational corporations. *J. Mgt. Info. Syst.* 7(4): 27-50.
- Delbecq L, Van de Ven AH, Gustafson DH (1986). *Group techniques for program lanning: a guide to nominal group and Delphi processes*. Middleton, Wisconsin: Green Briar Press.
- Dickson GW, Leitheiser, RL, Wetherbe JC, Nechis M (1984). *Key information systems issues for the 1980's*. *MIS Quarterly.* 8(3): 135-159.
- Gonzalez R, Gasco J, Liopis J (2006). Information systems managers' view about outsourcing in Spain. *Info. Mgt. Comp. Security.* 14(4): 312-326.
- Hasson F, Keeney S, McKenna H (2000). Research guidelines for the Delphi survey technique. *J. Adv. Nursing.* 32(4):1008-1015.
- Kahen G (1995). Assessment of information technology for developing countries: appropriateness, local constraints, IT characteristics and impacts. *Int. J. Comp. App. Tech.* 8 (5/6): 325-332.
- Kahen G (1996). Building a framework for successful information technology transfer to developing countries: requirements and effective integration to a viable IT transfer. *Int. J. Comp. App. Tech.* 6(1): 1-8.
- Keeney S, Hasson F, McKenna H (2006). Consulting the Oracle: ten lessons from using the Delphi technique in nursing research. *J. Adv. Nursing, Blackwell Publishing Ltd.* pp. 205-212.
- Kirlidog M (1997). Information technology transfer to a developing country: executive information systems in Turkey. *OCLC Systems & Services.* 13(3): 102-123.
- Libyan Central Bank (2001). *Economic bulletin*. vol. 41, 1<sup>st</sup> Quarter, Research and Statistics Department. Libyan Central bank, Tripoli.
- Libyan Central Bank (2006). *Economic bulletin*. vol. 46, 1<sup>st</sup> Quarter, Research and Statistics Department. Libyan Central Bank, Tripoli.
- MacCarthy BL, Atthirawong W (2003). Factors affecting location decisions in international operations – a Delphi study. *Int. J. Op. Prod. Man.* 23(7): 794-818.
- Martino PM (1972). *Technological forecasting for decision making*, New York: Elsevier Publishing.
- Marquardt DW (1993). Estimating the standard deviation for statistical process control. *Int. J. Qual. Reliability Man.* 10(8): 57-64.
- Nahar N (2001). Information technology supported technology transfer process: a multi-site case study of high-tech enterprises. *Jyvaskyla, Finland: University Library of Jyvaskyla.*
- Nahar N, Lyytinen K, Huda N, Muravyov SV (2006). Success factors for information technology supported international technology transfer: finding expert consensus. *Info. Mgt.* 43(5): 663-677.
- Odedra M (1990). *The transfer of information technology to developing countries case studies from Kenya, Zambia, and Zimbabwe*. Doctoral Dissertation, London School of Economics, London.
- Odedra M (1991). Information technology transfer to developing countries: IS it really taking place?" in Berleur J, Drumm J (Eds.) *Information technology assessment*, North-Holland. (139-149).
- Okoli C, Pawlowski SD (2004). The Delphi method as a research tool: an example, design considerations and applications. *Info. Mgt.* 42: 15-29.
- Paliwoda SJ (1983). Predicting the future using Delphi', *Manage. Decision.* 21(1): 31-38.
- Park I, Lee J, Rao HR, Upadhyaya SJ (2006). Guest editorial part 2: emerging issues for secure knowledge management – results of a Delphi study. *Systems and Humans.* 36(3): 421-428.
- Preble JF (1984). The selection of Delphi panels for strategic planning purposes. *Strategic Management J.* 5(2): 157-172.
- PROJEX Libya (2007). *Infrastructure Libya*. (Online): [www.project-libya.com/infrastructure.php](http://www.project-libya.com/infrastructure.php)
- Samil AC (1985). *Technology transfer: geographical, economic and technological dimensions*. Quorum Books: New York.
- Smith RI, Campbell B (1981) *Information technology revolution*. Longman: Now York.
- Twati JM, Gammack JG (2006). The impact of organisational culture innovation on the adoption of IS/IT: the case of Libya. *J. Enterprise Information Management.* 19(2): 175-191.
- Wie TK (2005). The major channels of international technology transfer to Indonesia: an assessment. *J. the Asia Pacific Economy.* 10(2): 214-236.
- WTO News (2004). Libya given green to negotiate WTO membership. *World Trade Organization.* (Online): [www.wto.org/English/news\\_e/news04\\_e/libya\\_stat\\_27july04\\_e.htm](http://www.wto.org/English/news_e/news04_e/libya_stat_27july04_e.htm)
- Zolingen SJ, Klaassen CA (2003). Selection processes in a Delphi study about key qualifications in Senior Secondary Vocational Education. *Technological Forecasting & Social Change.* 70: 317-340.