LEBANESE AMERICAN UNIVERSITY

Professional and interpersonal ICT skills in Lebanon
By

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A thesis
Submitted in partial fulfillment of the requirements
for the degree of Master of Business Administration

School of Business
December 2015

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ACKNOWLEDGMENT

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ABSTRACT

As information technology (IT) development contributes to the economic growth of countries, studying the presence of required skills among IT professionals is critical to the use and diffusion of IT. In fact, enhancing skills in information technology may have a stronger effect in a company than pushing for more ICT investments. Our intent in this study was to determine if there is an IT skill shortage in Lebanon. The research identifies the required and existing skills in the information technology industry in Lebanon since studies on IT skills are lacking in this developing country. Interviews and surveys were conducted with ICT employees and managers. A gap between perceived held skills and perceived required skills was found in the results and different levels of competencies among IT units were also identified.

Keywords: Information Technology, Soft Skills, Hard Skills, Workforce, Perceptions, ICT Investment, IT User, Shortage, Workplace.

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Overview and Background

Information and Communication Technology (ICT) as a concept includes all systems and technologies that provide support to the information processing and communication among human beings, among people and among electronic devices (Hamelink, 1997). The definition of ICT contains a wide list of technologies that started from printed letter to satellites that can provide huge of amount of data to a mobile camped on a cellular network. Since their first development in the 1940s, the definition and the extent of accomplishments of computers and technologies have repeatedly expanded (Dede, 2007). Historical developments in IT have positively and hugely impacted companies' business processes. IT doesn't only entail using technology to automate existing processes, but thrives to achieve process transformation through the use of these technologies, to focus on the operation management and to take the right decision in the workplace. Yet, having well-trained workers to handle the IT developments and operations is considered a necessity for the effective use of ICT (Mutula & Van Brakel, 2007). Actually, enhancing skills in information and computer technology may have a stronger effect in a company than pushing for more ICT investments (Mutula & Van Brakel, 2007). However, an increasing concern about skill shortage in ICT jobs starts arising, and the rapidly changing skill requirements are causing a gap between skills

required by employers and those existing in the workplace (OECD, 2000; Lopez-Bassols, 2002). A report performed by IDAL (2014) shows that the ICT sector in Lebanon employs around 7000 high-skilled employees and the demand of ICT skills are significantly increasing. Our research is based on a case study of IT skills existing and required in a large IT organization in Lebanon. To the best of our knowledge, our research is the first one that investigates the gap in the Lebanese IT market.

Research Questions

Our study aims to answer the below questions:

- What are the required and existing soft skills in the IT industry in Lebanon?

- What are the required and existing hard skills in the IT industry in Lebanon?

- What are the main factors causing the shortage in IT skills?

- How can we improve the technical and personal competencies of IT applicants?

Chapter II

Literature Review

Introduction

This research is based on an in depth case study of ICT skills held and required of a large ICT company in Lebanon, and accordingly a literature review regarding the primary themes of ICT is conducted. The review commences with a definition of ICT, followed by a brief history about the stages of ICT in companies and businesses. Subsequently, we discuss the variation of new ICT developments within enterprises, with a differentiation between product-oriented firms and service-oriented ones. In addition, we explain the importance of regions in contributing to the adoption of ICT in firms of developing and developed countries. Consequently, we highlight the arising demand of ICT-related soft and hard skills by businesses, and their setting of usage with regard to ICT occupations. In turn, we measure the need for soft and hard skills through pertinent criteria, and consider perspectives of employers, educational institutions, and the workforce, in consideration of changes in these perspectives between regions.

Definition of ICT

According to Hamelink (1997), storage, communication and processing technologies required to store, retrieve and transmit data are example of information and communication technologies. Grace et al (2004, p.2) defined ICT as the technology that

produces, transmits and processes the information. Grace et al (2004) mark this broad definition by the new ICTs—telecommunications and the Internet. Information technology "encompasses any hardware, software, or communications technology that might be adopted by an organization to support or control a business process, enable management decisions, or provide a competitive advantage" (Gelinas et al ,2008,p.12). However, Silver et al (1995) argue that what defines technology is not only the IT basic components, but also the knowledge required to assess the infrastructure, describe the features of the system and examine the association between the capacity of the current infrastructure and the requirements of the target system. In result, information technology consists of all processes, tools and methodologies (such as coding, system analysis and control) and the related systems used to extract, process, and generate the information.

History of ICT

In an attempt to understand the practices and impacts of the different ICTs, one must account for the historical development of these technologies. Initially, information technology resources were utilized to process reports for management, to be later enhanced and developed into productivity programs (Obeidat & North, 2014). "From numerical calculators to data processors, to productivity enhancers, to information managers, to communications channels, to pervasive media for individual and collective expression, experience, and interpretation", technologies have been present since former times till the present (Dede, 2007, p.2). Along history, there have been several technological paradigms taking place. Venkatraman (1997) described these paradigms in the early 1970s through the mainframe computer primarily used by large organizations

for critical applications, in the early 1980s through the relational database that includes multiple sets of data, in the late 1980s through a network architecture client/server architecture, and the object-oriented techniques in which concepts are represented as objects in the early 1990s. With the internet revolution in the 1990s, communication tools emerged. In the early 1990s, computers' considerable effect on firms' productivity levels began to be noticed by analyses at firms. This concept was further emphasized by Lichtenberg (1995) who collected data from 300 firms, and deduced a positive relationship in firms' success with IT. In the mid-1990s, the IT department was viewed as a service center that leads the strategy of the business (Venkatraman, 1997).

As the 21st century dawns, we are witnessing changes in the way we live, work, communicate, and organize activities, due to the micro-electronically based information technologies surrounding us (Orlikowski and Barley, 2001). In the 2000s, more complex hardware and software have been developed such as business management software called Enterprise Resource planning (ERP) and cloud computing technology to deliver hosted services over the Internet (Orlikowski and Barley, 2001).

According to Gelinas et al (2008), information technology will allow the concerned parties to access all the data at different management levels. In operation management, the information that flows horizontally between business units has been enhanced with the introduction of IT. "Information systems mirror and monitor actions in the operations process by processing, recording, and reporting business events, such as processing customer orders; records sales to customers by updating sales, accounts receivable, and inventory data; and produces invoices and sales event summaries" (Gelinas et al , 2008, p.64). In managerial process, IS supports managerial activities and

decision making, such as "through using information to measure attainment of goals regarding product quality, timely deliveries, and cash flow" (Gelinas et al, 2008, p.64).

From the examples of how IT has helped organizations efficiently manage their business activities is the use of e-business. E-business has entirely reshaped how organizations perform their internal and external businesses. Organizations are dealing with good and service using a virtual marketplace that substitutes acquiring goods from wholesalers, affecting the purchasing prices from suppliers and decreasing the charges for customers (Gelinas et al, 2008). Chaffey (2009) emphasizes the role of technology in helping companies to overcome the distributors and deal with customers through a web site, so the companies will reach the customer through a new marketplace called B2C marketplace.

According to Burlton (2001), intranets have facilitated the spread of knowledge widely, quickly, and inexpensively to staff members. Previously, office workers need the agent's confirmation to launch orders through their computers, however today, employees can use handheld event recognition devices to trigger process flows as part of a wireless network to perform the same process. In turn, the data set recorded by companies traditionally in aim to maintain records and produce reports has been substituted by computerized information systems (Gelinas et al, 2008).

The evolving role of HR relative to ICTs

As business requirements increase, new technologies such as mesh networking are evolving and new applications are being created and adopted in the workplace (Obeidat & North, 2014). Technologies possess major economic benefits as they

enhance the production of complementary innovations. New disruptive technologies are emerging with the expansion of access and use of ICT, such as computing, mobile devices, big data and data analytics. According to the World Economic Forum (2014), all such developments influence the way people interact and connect with each other, the way objects and processes are shaped and the way socioeconomic development is created. For example, new personalized and smart services are "leveraging on geo-referencing techniques and connecting context-aware devices with other objects, contributing to improvements in quality of life" (World Economic Forum, 2014, p.9).

However, the effective use of information technology requires well-trained employees to develop the software, support in the operations of and maintain the IT system (Mutula & Van Brakel, 2007). To this end, the role of IT department has evolved from being merely a back office supporter, to a service, and to an opportunity creator, by acquiring IT professionals who possess diverse skills in the organization (Lee, 2003). The skills demanded by the job market are surpassing the general and technical skills of IT towards integrated application and problem solving capacities. Many IT graduates are handling jobs outside their technical departments. For instance, they may work in financial departments as data modelers (Liu, 2007). Data from many countries is showing that the IT revolution depends on the skills, and the demand of high-skilled employees is increasing (Kenny, 2003). Lee (2003) emphasizes this evidence by stressing the importance of skills possessed by IT professionals in determining the extent to which the organization transforms the IT diffusion into strategic opportunity and competitive advantage.

An important finding by Bresnahan et al (2000) states that when companies are more decentralized and invest more in human capital, information technology investment is greater. Moreover, several researchers have found that firms who are smaller and those who are less vertically integrated witness a bigger investment on IT (Brynjolfsson & Hitt, 2000). In regard of this concept, studies by Brynjolfsson et al (1994) mention that increasing the investment of information technology in the economy was accompanied by a decrease in average size of the firm in the economy sector, which is similar to IT systems leading to reductions in companies' vertical integration. In a survey conducted by Bresnahan et al in 2000 to study the aspect of IT relevance to organization' structure, 400 large firms were surveyed and the results showed that with greater level of IT in the organization, delegation of authority and teams increased, which was also associated with a higher level of skills and level of education.

ICT interpretation in product and service oriented firms

Information technology adoption by firms is presenting them with more growth opportunities, more investment opportunities, and higher productivity and profitability in comparison to firms without technology investments (World Bank, 2006).

In a non-service oriented business, product manufacturing becomes an automated process, whereas in service-oriented business, a higher number of labors with a real-time expertise are required to provide the services (Nijssen et al, 2006). Manufacturing organizations benefit strategically from the development of new technologies, such as design. According to Pennings (1988), ICT presents firms with a variety of design options that ensure workflow technology, such as IT manufacturing systems, robotic

cells, and other programmable production systems. In addition, "computer programming of manufacturing processes will replace the traditional functions of product design, production planning, pre-production engineering, materials handling, and quality control" (Pennings, 1988,p.11). According to Maropoulos (2003), product development can be shortened through systems of framework known as the digital enterprise technology.

The capability to use ICT for services is a strategic and basic resource for companies to compete in complex markets (Neu and Brown, 2005). In turn, Matthyssens and Vandenbempt (1998) state that by increasing service quality, providing customers with proactive solutions, and innovating robust designs for new services, ICT is assisting in creating superior customer value in the market. Hence, ICT not only allows better delivery of the service to clients, but it enhances communication across functions and service oriented strategies of the firm (Antioco, 2006). Canato & Corrocher (2004) give an example on the positive role held by ICT to service-based firms that provide intangible products such as accounting, banking and consulting, where ICT applications in Italian banks helped in the release of new financial facilities. Innovations within these banks included the 'virtual bank' which decreased the operation cost, but required hiring critical competencies in the ICT area. Vitale & Konsynski, (1988) and Short & Venkatraman, (1992) mention a system which electronically and directly let the hospitals to order the materials from wholesalers, creating costs savings in hospitals up to $10 to $15 million per year. According to Goldman Sachs (1999), computerized procurement and online markets reduce costs considerably through reducing the time needed for inventory procurement, ensuring deliveries, decreasing the need to dispose

inventories, and dropping the spoilage of certain perishable products. Goldman Sachs (1999) estimated that the cost reductions of purchased inputs caused by these systems reached 10 to 40 percent according to industry. With the increasing importance of IT usage in the firms' production processes, service producing sectors and service parts of product producing firms are aiming to take advantage of the intensive use of IT (Barras, 1990). Organizational change that is typically skill-using, creates high IT-based efficiencies in production, as it complements IT systems with the competence of high skill workers to reach the benefit employers seek (Bresnahan, 1997).

ICT differences among regions

However, for proper implementation of ICTs among enterprises, awareness highlighting the strategic value of ICT must be enriched (Maksoud & Youseff, 2003). ICT's strategic value, as indicated by Bhatt and Grover (2005), is highly correlated to the knowledge possessed by the IT staff. The skills of IT specialists are positively related to the contribution of IT in the organization (Bhatt & Grover, 2005).

Several studies illustrate massive developments in business environments due to IT, however, developing countries are witnessing several prominent challenges that hinder them from utilizing IT compared to developed countries (Kraemer and Dedrick 2001; Avgerou, 2008, Heeks, 2002, Mrad, 2006). For instance, Europe was the leader to develop a digital ecosystem that serves as a strategic element to foster innovation and competitiveness. According to the World Economic Forum (2014), several developed economies such as Finland, Sweden and Norway are an example of the extent of impact that a robust digital eco-system has on the socioeconomic development of a country. On

the other hand, developing countries still have a largely dormant ICT-initiated socio-economic development, despite the significant efforts to deploy ICT infrastructure, particularly mobile technology. These differences exist by means of several factors, such as ICT skills, ICT access, ICT use, and the ICT eco-system relevance to people and their influence on its evolution in the country. Countries tend to benefit more from the application of ICTs when they possess more educated actors and an enabling environment. In turn, IT serves as a unique strategic asset for both developed and developing countries (World Economic Forum, 2014). The concept was further developed by Papaioannou and Dimelis (2007) who performed a study on 42 developing and developed countries between 1993 and 2001, to elaborate the role of ICT as a factor in developing the economic sector. The findings showed that there is a positive impact of ICT growth in samples from developing and developed countries. However, a bigger IT impact was noticed in the developed countries. The output of the developed countries will increase while using the IT compared to that of developing countries.

Shih et al. (2008) asserts that economic and human development can be achieved by implementing information technology effectively. Studies have shown that ICT's contribution to overall economic growth in developing countries is limited due to resource constraints and other factors. As reported by Maksoud and Youseff (2003), a main cause that was preventing the ICT diffusion in small enterprises was the lack of awareness. Though studies agree that IT diffusion factors in developing countries are different than the factors in developed countries, it is noted that information technology could cause adverse impacts in developing countries as the developed world will benefit

more from the new technologies and will preserve the power on the international market (Nour & Satti, 2002).

Fast IT evolution may make it harder for less developed countries to narrow the gap. ICT impact is witnessed even between countries in the same regions but with different economies. According to the World Economic Forum (2014), although Asia and the Pacific employ an active and dynamic agenda for ICT development, The Asian Tigers[1], Japan and regional evolving economies from trailing nations witness a significant digital divide among them. In light of this research, Qiang et al (2004) highlights the challenge many developing countries encounter with regard to their low ICT investment and the decreased capacity for them to achieve high ICT investment returns. Estevez & Montoya (2015) compare between developed and developing countries' IT-ecosystems, where the former have the high ability to enrich itself through empowering actors and enhanced interactions to maintain its continuous growth, whereas developing countries' eco-systems face various difficulties to get similar outcomes. Yet, Estevez & Montoya (2015) propose that the challenges faced by developing countries, particularly by the countries in Asia, Africa and Latin America, could be changed into opportunities once these countries advance their learning process and the human and institutional capacity. To Lee (2001) developing and developed countries both face a shortage in professional skilled employees which hinders the IT diffusion in them.

On a closer term, the MENA region holds a diverse outlook on the countries' ability to improve competitiveness through proper leveraging of ICT competencies.

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[1] "The Four Asian Tigers are the highly developed economies of Hong Kong, Singapore, South Korea and Taiwan".

"Several Gulf Cooperation Council states have continued their efforts to improve ICT uptake and integrate ICTs better in more robust innovation ecosystems in order to obtain higher returns" (World Economic Forum , 2014,p.16). In contrast, many North African countries still suffer from significant limitations in their innovation capacity and their framework conditions, which force these countries to lag behind other countries and decrease their full leveraging of ICT competencies.

In an empirical study executed by Ashrafi (2011) that studied the strategic value of ICT in Oman from perspectives of senior IT executives and managers, results showed that companies in Oman believe in the strategic role of IT, and have moved towards integrating best adoption strategies and practices to benefit from the IT. Yet, some practices seem to be lacking in their extent of application and usage. Therefore, for Oman and other developing countries to acquire the advantages of IT, they should adopt a comprehensive plan in their usage of IT capabilities and assets, such that it complements the industry's best practices.

Nour & Satti (2002) argue that despite the ongoing growth in the demand for IT, the Arab ICT market is still very limited. According to the International Telecommunication Union (ITU), Lebanon is ranked as the country that has the highest increase in ICT Development Index value of 0.75 and it's ranked the third in the MENA region based on the ICT Development Skills Index which took into consideration the ICT skills and capabilities and following the Arab countries Jordan and Bahrain, but studies show that the supply and investments are very low compared to the industrialized world. Further studies suggest that the demand, supply and intensity of services differ between the Gulf countries and other Arab countries. ICT diffusion in the Arab world is

increasing, but the human capital development remains doubtful with respect to the Arab economic growth. Hence, Nour & Satti (2002) suggest that the potential to accelerate economic development lies in upgrading skills and enhancing capabilities.

Demand for ICT-related soft and hard skills

A balance between both ICT and human capital should be attained to increase productivity; however, after a certain point, enhancing skills in information and computer technology may have a stronger effect in a company than pushing for more ICT investments (Mutula & Van Brakel, 2007). Various industry-level studies (Berndt et al, 1992; Autor et al, 1998) show that high technology equipment investment relates strongly to the demand of skilled and educated workers. Bresnahan (1997) explains how computer business systems in production create routinization of white-collar jobs, which basically affect repetitive tasks. In clerical and bureaucratic work, results reached by humans are being substituted by computer software. However, to Bresnahan et al (1999), these IT innovations aim to complement the high cognitive skilled labor and not only substitute low-skilled ones, as computers are more effective once they are combined with the employees' intelligence. Bresnahan (1997) explains how an application consisting of data storage, allows the utilization of rapid, detailed memory of computers to complement the human judgment in decision-making.

According to Abell (2002), employers realize that employees are the assets of the organization and the key to its success and those employees stay in the organization by acquiring special unique qualities. Lopez-Bassols (2002) highlights that ICTs' transformations of advanced economies create new business and employment

opportunities, which in turn pressed on the need for skills to reach higher productivity gains. Consequently, companies recognize the importance of having IT employees that possess both hard and soft skills. Policy makers view this concept as an issue of concern, due to the widening of the gap between the current workforce skills and the skills sought by firms (Lopez-Bassols, 2002).

But what are the skills rigorously needed by employers that constitute an issue of concern in today's workplace? In IT professions, studies have shown that soft skills are perceived as more important than technical skills to perform a job effectively. Niehm et al (2010) defines soft skills similar to communication and management skills as personal characteristics that improve the performance, interactions and career vision of the employees. "They are the skills, abilities, and traits that pertain to personality, attitude and behavior rather than formal or technical knowledge" (Snell et al, 2002, p.1). Moreover, Muir (2004) stresses that the soft skills are essential skills for employees. To respond to the huge expansion and competition in the economy, the managers are looking for employees who are also skilled in soft skills. Although technical skills are required to perform tasks, soft skills pose as important attributes that improve performance and identify career vision. This concept is further emphasized by employer surveys (Natriello, 1989; NCEQW, 1995) and previous researches (Barley and Orr, 1997; Hull, 1992; Stasz et al., 1996) that indicate that the managers have more concern on soft skills or attitudes than technical or academic knowledge. In Canada, wage and other data suggest that personal skills are in high demand from employees (Gingras and Roy, 1998; ACST, 2000).

Silver et al (1995) explains that the IT professionals share the task of managing IT, therefore it is crucial for IT professionals to have knowledge about the managerial activities needed in IT. However, a main difficulty that prevents IT professionals from performing managerial duties has been identified by Keen et al (1991), who states that professionals are willing to participate in management but are hindered by their lack of vocabulary and skills needed in such tasks. Further research by Fernandez-Sanz in 2010 noted that a private university in Spain, which conducted a marketing study to analyze the social and organizational image of professionals, found that IT staff are seen as technically competent, but lack the ability to have an influence on the organization. HR specialists frequently remark on the need for IT experts to improve their personal competencies (Fernandez-Sanz, 2010).

The presence of soft skills in the workplace is important for employees, manager or leaders, however, the skills required for IT professionals depend on their positions. An analysis of non-technical skills was performed by Fernandez-Sanz (2010) on a list of IT positions extracted from 3064 ICT vacancies published in Spain. They found that 36.85% of job ads for CIOs ask at least for one soft skill while this requirement shows in 16.10 % of offers for programmers. In light of this research, a study on a number of operational, mid-line, and senior ICT managers in Spain to assess the occupational profiles of ICT employees performed by Garcia et al (2009) showed that the skills leadership, strategy, planning, and negotiation talent are most important for the profile of general directors and managers, leaving creativity as the least valued ability at this level. The customer service orientation and the communication skills are most important for middle managers, whereas leadership and negotiating ability less desirable. The research

to identify and classify skill requirements for IT professionals is further developed through prominent studies, such as those performed by Cash et al (2004) and Lee et al (1995). According to them, non-technical skills generally contain business skills (such as culture, processes, business environment and the proficiency in management skills and interpersonal skills (soft skills that include the communication skills, teamwork, relationship building, and leadership skills).

Employees who lack interpersonal skills such as the communication skills, leadership, motivation, teamwork and critical thinking will likely have difficulty leading teams and might demotivate employees causing a loss in the productivity. Management skills teach employees to manage the work properly and help them reach leadership positions. Stokes (1991) reported that IT managers consider managerial skills as a critical success factor for their career. There have been many other empirical studies that revealed that for IT managers, behavioral skills such as leadership and communication are more critical than technical ones. To prioritize the tasks and achieve a better output, employees should possess time management skills that reduce stress and allow for a greater capability to work.

Measuring the skill gap

Employees possessing a set of soft skills are very valuable to organizations, as soft skills have positive results in the workplace and positive effects to employers (Yunus & Hassan, 2012). However, the main concern for organizations is the gap between the current skills of employees and those required by firms. To frame this concern we assess it through a measurement criterion. A different approach is taken by

Brown et al (2003) and Houston (2005), to measure ICT skill mismatches through the concept of employability. Employability describes the "set of factors, processes, and training opportunities that enable people to progress towards or get employment, to stay in employment, and to move on in the workplace" (Garrido, 2009, p.2). The concept of employability stresses on the employees' skills and the development of these skills (Brown et al., 2003; Houston, 2005). "The UK Commission for Employment and Skills (UKCES) gives an accessible definition of employability in terms of skills: 'the skills almost everyone needs to do and almost any job" (UKCES 2009), and is referred to by some as 'soft outcomes', 'practical skills 'and 'soft skills' or 'character capabilities' (Sultana, 2014).

According to Garrido et al (2012), in many communities employment outcomes are hard to attain, and according to other studies employment is only binary concept where employment rates can be counted (Garrido, 2009). Whereas when employees improve their skills and experience, their employability improves as they acquire skills from different jobs (Garrido, 2009).

In his book "The Art of Building Windmills: Career Tactics for the 21st Century", Peter Hawkins (1999, p. 3), states the importance of employability in today's world, "To be employed is to be at risk, to be employable is to be secure". However, employees do not recognize the importance of soft skills in the work and don't comprehend the lack of soft skills that forces them to miss various opportunities. Therefore, various measures must be deployed on several domains to acquire and develop skills, such as education, experience, training, non-formal learning and self-training (OECD, 2001).

Educational Institutions' Perspective and Role

It has been noticed that the curriculum of IT students focus on technical courses only. This lack of soft skills may affect the meetings these graduates conduct with their colleagues in other units and their external partners (Goswami, 2013). In order to enter the job market, the candidate should be competent in both technical and non-technical skills. Higher education institutions are trying to react quickly to the challenges posed by the technologically-rapid moving environment. Schools should ensure that the right balance between theoretical skills and applied skills is fulfilled for graduates. Moreover, the business, management, and interpersonal skills should be added in the curriculum of technical degrees (Lopez-Bassols, 2002). According to Dede (2007,p.3), "education should prepare students for a world in which computers do almost all types of routine cognitive tasks and in which expert thinking and complex communications are the core intellectual skills for prosperity."

To study the role of IT curricula on developing soft skills in graduates, Lopez-Bassols (2002) states that academic institutions are reacting to the increasing concerns raised by employers that several IT jobs need a diverse set of non-technical skills. Several schools have started to provide innovative e-Business programs that merge technical and non-technical skills. Further research by Goswami (2013) emphasizes the importance of the role of faculties and academicians to provide the necessary soft skills and incorporate these subjects in the curriculum. These skills should be mandatory topics in the syllabus and updated regularly based on the industry needs, and performed by several measures such as conducting seminars, presentations, group discussions,

mock interviews and case studies are proposed solutions that help IT students practice many soft skills.

Employers' perspectives and roles

Employers are aware that graduates are short of many non-technical essential skills when applying to jobs. This is further emphasized by the movement of economies to create knowledge-based communities (OECD, 2001a). According to Lorens (2013), graduates don't acquire the skills necessary such as being client-oriented, or problem solving oriented during their university studies. Recent researches (Lawson et al, 2003) show that the significant lack of appropriate ICT skills needed explain the fact that SMEs have low levels of ICT adoption. Therefore, increasing ICT-related business skills will have a greater effect on the efficient adoption of information systems in businesses than by merely increasing technological competence of the firm (Ramsay et al, 2003). In addition, employers face the challenges of identifying the appropriate soft skills to perform the work effectively as possible, and identifying the required level of soft skills (Snell et al, 2002). According to Sultana (2014), employers choose employees who are dependable, ethical, resourceful, and good communicators, and tend to retain and promote them more than others.

Several empirical studies show the expectations of employers regarding ICT graduates' skills. The "National Skills Employer Survey" (2009) indicated that 69 per cent of owners reported expecting to upgrade the skills of their workforce in England. In a 2006 report, The "Conference Board, Corporate Voices for Working Families, the

Partnership for 21st Century Skills, and the Society for Human Resource Management",

surveyed more than 400 employers in the US including Dell Inc., Microsoft, SAP, Ford,

and others. The report addressed how businesses articulate the skill sets that new

entrants need to succeed in the workplace. Employers perceive that the young people

should have a diverse set of basic and applied skills. Moreover, when they are asked to

assess new workforce entrants such as teamwork, work ethic and communication,

employers highlight the lack of essential skills in the workplace. Furthermore, employers

are feeling frustrated because of the lack of skills noticed in the new employees,

exposing the fact that the reality is not matching expectations (Casner-Lotto &

Barrington, 2006). According to Mutula and Brackel (2007), large business enterprises

must provide professional development; workshops and seminars; on-job training and

courses to encourage the employees to get ICT skills.

Employers' strategies to develop employees' skills can take place on two sides,

internally and externally (Lopez-Bassols, 2002). To expand the pool of candidates and

attract potential recruits or hire external employees are examples of external strategies.

Lopez-Bassols (2002) explains that in external strategies, companies can outsource its

business processes towards skilled workforce, increase reward and benefits to get the

interest of high-skilled workers, expand the recruiting choice through use of recruitment

firms, campus recruiting, recruiting through internet, and working with academic

institutions to classify the required skills for the future.

However, taking into consideration the high costs when the IT staff is replaced,

companies are better off retaining IT staff longer, as IT leaders recognize the high

constituents of success are resulting from people more than from IT systems only (Mak

& Sockel, 1999; Moore, 2000; Roepke et al, 2000). The analyst firm Bersin & Associates have found that organizations allocate at least 20-25% of the budget to soft skills training (Goswami, 2013). Such mechanisms include employee training programs responsible for the development of skills and knowledge of the IT employees. Such strategies include using the current workforce effectively, such as training (or retraining) existing staff over skills basics, providing overtime opportunities to increase skill-using opportunities, increase wages or other forms of compensation for high skilled workers to motivate employees to expand their skill horizon.

Applicants' perspective and role

Deficiency in employability skills impacts both employers and employees, which challenges the organizations achieving the productivity goals and the individuals securing the rewards and the career (UKCES, 2010). Individuals are considered most employable when they possess wide education and training including basic and relevant skills, where the skills teamwork, communication skills ,problem solving and language skills allows individuals to retain their jobs and adapt to any change in the workplace (ILO, 2000). In a study conducted in Malaysia in 2012 to study the causes of unemployment of the ICT graduates, the majority of graduates interviewed gave the reason of success in the workplace to basic ICT skills, and less priority was given to communication and interpersonal skills (Ramakrishnan & Yasin, 2011). Graduates, who were engaged in the workforce, gave reverse results, as they emphasized the importance of having interpersonal and soft skills above ICT proficiency (Ramakrishnan & Yasin, 2011). Such results show the barriers graduates are facing when seeking employment, in regard to skill mismatch with the employers' requirements.

According to Acton & Golden (2003), companies regard training and development of the workforce as essential to the operations and advancement of the organizations, whereas employees view these factors as important for skill development and career advancement. According to Sultana (2014), soft skills can be learnt, improved and even developed both at home and at the work place. From the ways employees can personally upgrade their soft skills can be through practicing public speaking, practice listening skills, building relationships, managing conflicts, taking initiative, and practice leading.

Different perspectives among regions

Although all countries acknowledge the skills shortage present in its workforce, each region entails different views towards it. Prior reports and surveys have condemned the skill shortages in India and China, however, initiatives in China intend to enhance the skill level of the workforce as skill quality has a vital role in the growth of economy (Institute for Labor Studies in China, 2007). In Latin America, the quality of education has not provided graduates the requirements of the labor market, despite the claims that education and training have increased in the area. In the Arab world, employers highlight the lack of skills that prevent the expansion of business and employment. Research by Assad & Roudi-Fahimi (2007) states that the growing market and the introduction of advanced technologies in the region are causing the demand for specific skills to increase. According to the study, graduates are facing an extended and difficult transitional period when leaving university, as the gap between the soft skills required by the organizations and those existing in the work force are making it harder for graduates to find work. The types of training that takes place in countries differ between

each other, as the levels of linking the development of skills to productivity and to employment growth in each country varies. For example, Organization for Economic Co-operation and Development (OECD)[2] countries tend to increase the quality of workers' skills works by improving access to high quality job-entry training and expanding lifelong learning opportunities, especially with the presence of structural transformations and the intensified competition in their economies (ILC, 2008). Further points reached by the IDC in 2008 discuss less developed countries, who address skills shortages by improving coordination among employers and education and training providers, and increasing the number of trainings and encouraging learning in the workplace.

"[2] OECD countries include Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States."

Chapter III

Methodology

Contributions of this work

Our intent in this study is to determine first if there is an IT skills shortage in Lebanon. In case of a gap, we need to investigate if is it due to a communication issue between the IT departments and the HR departments; If there is a difference between the skills required by the managers and the ones held by the employees; Is the gap wider in specific IT units? In this research, we used the case study strategy which is applied in the intent of exploration, explanation, hypotheses generation and testing hypotheses. This allows us to add knowledge and insights to the few studies in the ICT field. Case studies provide a thorough interpretation of the changes that take place within single settings, through the dissemination of information and data (Merriam, 1998), as such research is considered an ideal method for performing a holistic and in-depth investigation (Feagin et al, 1991).

Case studies investigate deeply a current phenomenon and within the real-life environment. The researcher conducting the case study is able to view the topic of interest in depth and analyze the data collected based on knowledge and experience of the studied area, through circumscribing it and limiting it to a number of units (Farquhar, 2012).Several researches explain the importance of case studies such as to provide description (Kidder, 1982), to examine theories (Pinfield, 1986), or to create theories (Gersick, 1988; Harris & Sutton, 1986). By using case study research, particular

understanding or insight into the contemporary phenomenon will be gained (Farquhar, 2012).

In the information systems sector, Franz and Robey (1984) stated that the usage of idiographic research strategy, strategy that attempts to analyze a phenomenon, is the most effective way of research. The IS field is witnessing a change from technological to managerial and organizational questions, and is facing interest in how context and innovations relate. Case research strategy captures the knowledge of specialists and develops the concepts from it. Researchers can provide initial wisdom from novel ideas of experts. For example in the late 1970s and early 1980s, academics were not able to offer a set of guidelines to how an organization could manage effectively the introduction of end-user computing technology. However, researchers descriptively studied how organizations were managing end-user computing, and then transformed their studies to form the basis for the development of prescriptive management guidelines (Rockart and Flannery, 1983).

In result, case study research is a practical and versatile information systems research strategy due to its ability to allow the researcher to investigate in a natural setting, learn about the phenomenon, and generate theories from practice. The case method allows the researcher to answer questions that begin with "how" and "why" and understand the nature and complexity of the processes taking place. Moreover, "a case approach is an appropriate way to research an area in which few previous studies have been carried out" (Benbasat et al, 1987).

Our study is based on a mobile telecommunication and data operator in the Middle East and North Africa. The company provides voice and data wireless communication services to end users using a core infrastructure, transmission backbone, billing, provisioning computer and enterprise systems. The technical department in the company includes the following functions: billing operations and support, intelligent network (IN), web development, enterprise applications, Business intelligence, telecom, database administration, IT support, systems and storage, internet and security services. The Billing operations and support team handles the enterprise application system to extract and analyze the call detail records (CDR) that documents the details of a data or voice call. The intelligent network team is responsible to add the services without modifying the design of switching equipment. The Business intelligence unit interprets the data to develop and create new business opportunities. The systems and storage unit operates the storage platforms across the company to ensure the data quality, availability, and security. The IT support unit troubleshoots and solves the problems related to computers or electronic equipment. The Database administrator is responsible for the installation, configuration, monitoring and maintenance of databases in the company. The Enterprise applications are the computer software used to assist the organization in solving enterprise problems. The Web development unit includes programmers who develop the World Wide Web applications that run through a web server. The telecom unit is responsible for designing and overseeing the installation of telecommunications equipment and facilities. The telecom unit includes the sub-units: Acquisition and acceptance, Core network, Research and development, NOC team, quality and performance Site and implementation, radio team. The employees in the technical and information technology departments are considered as ICT providers that

deliver a set of information technology services. The organization includes also ICT users in the commercial, finance, accounting, revenue assurance, legal department, customer care units. These users use the computer system and software product without fully understanding the technical details.

Hypotheses

Figure 1 depicts the various hypotheses that were tested in our research. In relation 1, we studied the soft and hard skills levels required by managers in different IT departments. We tried to understand in relation 2 the self-assessment and technical understanding of the employees by comparing their perceived held skills to their perceived required skills. In order to examine relation 3, we compared the perceptions of employees versus the perceptions of managers on both soft and hard skills. In relation 4, we tried to assess the impact of soft and hard trainings on the employees' level of proficiency.
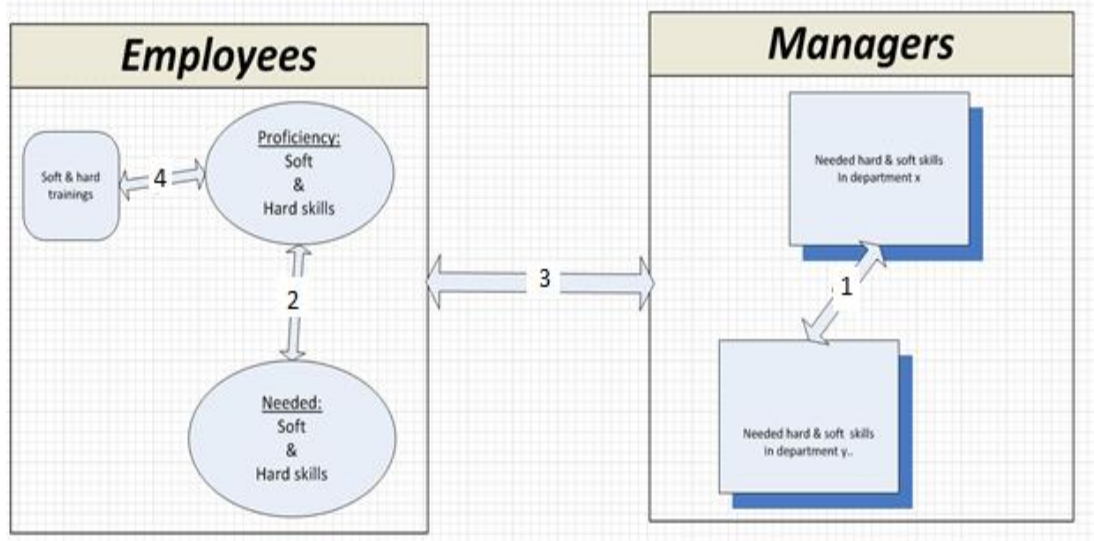
Figure 1 : Hypotheses

Based upon the information provided earlier in the literature part and according to the research problem under study and the goal of the research, the following null hypotheses were developed to study the gap between the required and existing information technology skills.

Relation 1:

-There is no difference in the soft skills level or common hard skills needed by managers across departments.

Relation 2:

-The employees' perceived held soft skill level is equal to the employees' perceived required soft skill level.

-The employees' perceived held hard skill level is equal to the employees' perceived required hard skill level.

-There is no significant difference in the perceived held soft skill level among the IT units.

-There is no significant difference in the perceived required soft skill level among the IT units.

Relation 3:

-The perceived held soft skill level according to employees is equal to the perceived required soft skill level according to managers.

-The perceived held hard skill according to employees is equal to the perceived required hard skill level according to managers.

-The perceived required soft skill according to employees is equal to the perceived required soft skill level according to managers.

Relation 4:

-The number of soft trainings attended by the employees is positively related to their soft skills level.

-The number of hard trainings attended by the employees is positively related to their hard skills level.

Our research tackles the gap between required and existing information technology skills, with a focus on soft skills in Lebanon. The study is exploratory and it assesses the current and needed skills that are held across the various areas of the IT field. It is seen exploratory as it's a novel topic researched and there are no research findings in Lebanon to rely on.

Case Study: Techno

Our sample consists of IT professionals working at a telecom operator called Techno that provides services for 2 million customers. Techno is a mobile and data services operator. Techno, established just over a decade ago, has more than 2 million

customers. In 2011, techno launched the 3G ("third generation of mobile telecommunications technology") service in the country and the LTE ("a standard for wireless communication of high-speed internet for mobile users") in 2013. In 2013, Techno simulates a successful LTE Advanced pilot test over the 800 and 1800 bandwidths. Techno is currently implementing an ongoing optimization on the 3G network and an expansion strategy for the LTE network in the Lebanese territories. Techno is committed to ensure high levels of professionalism, quality, customer satisfaction, and innovative services by having teams with expert-level knowledge, skills and experience. Techno is managed by a group and initiated an expansion strategy couple of years ago, and developed rapidly in MENA region by establishing many mobile operators. The group has thousands of employees who provide market-leading mobile voice and data services to more than 46 million customers. The group has mobile operators in eight countries ("Bahrain, Jordan, Kuwait, Iraq, Saudi Arabia, Sudan, South Sudan and in Lebanon").The number of employees in Techno increased to 800 in 2014 and are distributed into the following departments: technical, commercial, legal, information technology, finance and administration, corporate management and human resources. The employees in the technical and information technology departments are considered as ICT providers that deliver a set of ICT services, increase efficiency and improve the users' experience.

We chose the company Techno in our research due to many factors. First, Techno includes ICT providers that handle services from basic ones that aid in the management and optimization of the company's business processes to advanced ICT technologies delivered to customers such as voice over IP. The company contains ICT specialists that design and maintain the systems, and ICT end users that use the IT

applications, equipment and facilities. Studying both groups in one enterprise will also allow us to control for company related variables while assessing the soft and hard IT skills. Furthermore, Techno is delivering services to more than 2 million customer s in Lebanon and has a huge network infrastructure covering the voice and data access through all the country. A wide range of IT tasks with diverse career clusters, technical skills, knowledge and abilities is handled in the technical departments making techno as a perfect case study company.

Interviews were conducted with an HR specialist, Information Technology (IT) users and ICT managers from different IT job areas including "web development and administration, technical support, programming software engineering, network design and administration, enterprise system analysis and integration, database development and administration, and cybersecurity". Surveys were addressed to ICT employees belonging to these units. These interviews and surveys provide insight on the presence or absence of the perceived soft and hard skills required for success in the IT sector. Approvals from Institutional Review Board (IRB) were obtained on the surveys and interviews to ensure that ethical norms were adhered to. The study was conducted in two stages: a preliminary pilot study followed by interviews with IT managers and questionnaires with IT employees. A description of the research design, data collection, and sample design make up the topics in this chapter. The subsequent chapters highlight the procedures for statistical analysis and the results of this study.

Pilot Study

The first stage consisted of three pilot interviews and included only open ended questions. These interviews were conducted with an employee from the HR department, an ICT professional and a lawyer to help understand the perceptions surrounding the information and communication technology skills sought and needed among both ICT providers and ICT users in Lebanon. The questions were set to determine mainly the possible feedbacks regarding the needed, lacking and over-represented skills in the IT industry. The purpose was to check if any adjustments were needed in the survey and to determine the techniques that should be adopted in the next interviews. A pilot study gives indicators about the possible failures of the main research, the protocols that cannot be implemented and the complexity of the suggested topic (Teijlingen and Hundley, 2001). In the pilot interviews, in order to avoid bias, we tried to address the questions without stressing on the hard or soft types of the skills.

According to the technical IT manager in the pilot interview, the organization is offering mainly technical trainings to advance the employees' knowledge. Moreover, he mentioned that the technical experience, communication skills, and knowledge sharing are lacking among the employees working on the projects. According to the HR specialist, the company is willing to pay more for technical skills which are set by the unit manager in the job description. Moreover, the organization is offering trainings in both technical and non-technical topics. In the pilot interview with the lawyer, the communication skills were raised as a problematic issue. For the lawyer, information technology is regarded as the desktop, laptop, printers, scanners, IP phones and the applications used in the workplace. The pilot interviews are provided in Appendix B.

Interview Guides

Based on these interviews, we have designed seven additional interview guides consisting of six open ended questions and one closed ended question (see Appendix C). These interviews were addressed to the IT technical managers in different units. The same set of questions addressed to ICT professional in the pilot interview was also included in the interviews with managers. Moreover, the managers are requested to rate the importance of soft and hard skills in their units using a 5-point importance scale and are requested also to rate the proficiency for the same skills through a 5-point rating scale. The list of technical skills was set according to the "Skill Standards for Information Technology", developed by the "National Workforce Center for Emerging Technology" (NWCET, 2003). IT skill standards are sample tools to develop academic programs, job profiles, recruit and evaluate workforces and design academic and professional trainings (Hutchison et al., 1998).The skill standards help in conducting research into information technology workforce issues.

The "National Workforce Center for Emerging Technologies (NWCET)" has categorized the IT skill into eight clusters in the publication "Building a Foundation for Tomorrow: Skill Standards for Information Technology". These clusters represent a wide series of job roles from entry level employee to manager. Under each cluster in NWECT, there is a list of needed skills with sample titles. For our interview guides, we divided the IT departments in Techno into seven divisions and set a list of technical knowledge, skills, abilities associated with each division.

One set of common skills among all units includes "project management, task management and problem-solving/troubleshooting". We choose to conduct interviews instead of surveys in order to get extensive information from the managers. Managers play a critical role as they have a significant influence on the work. We also need to avoid item nonresponse which is less likely in a personal interview. Moreover, our target was to clarify and probe the respondents on all questions as our goal was a complete and reliable data. In an interview, the opportunity can be taken to follow up through probing if the response is brief or unclear. Furthermore, if some questions are particularly confusing, we can clarify these questions to the respondent and make certain changes so the surveys that will be conducted in the next data collection phase will be easier to understand.

Survey to Employees

After collecting the data from the managers in these interviews, we created an e-survey through Google forms that is simply filled and can be accessed by the employees, as some respondents would conduct the surveys on the mobile handsets. We also chose this type of survey to collect data, as it is a fast method. Respondents are more honest on sensitive subjects and their privacy is preserved and no interviewer bias will be noticed (Zikmund et al., 2010). Moreover, the goal of e-survey is to get the maximum number of respondents so the results are well representative of the organization population. The survey questionnaire contained 10 closed ended questions and two open ended questions. We have divided the survey into three main parts (see Appendix D):

- The first part consists of demographic data such as gender, respondent's nationality, level of education, job category and years of experience.

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(Questions 1, 2, 3, 4, 5 and 6).

- The second part of the questionnaire consisted of five questions regarding the professional certifications and trainings attended (Questions 7 and 8).

- The third part consisted of four questions used to identify the respondent's proficiency and perceived importance in performing the unit's tasks according to a set of soft and hard skills (Questions 9, 10, 11 and 12).

The soft skills listed on the surveys were taken from previous studies (Coll, et al., 2002) along with four others, namely: communication skills, creativity, and adaptability (see Appendix A). The respondents had the ability to add additional competencies they felt were relevant. The e-survey was sent to approximately 171 professional IT employees in the company out of which 113 employees responded; yielding a response rate of 66% after three months.

Table 1 presents the list of IT units in Techno along with the responsibilities, number of employees in each division, and the number of completed surveys.

Division	Major Responsibilities	Number of Employees	Number of completed surveys
Technical Support	"supervise, monitor and maintain the network	42	27
Web Development & Administration	develop websites	10	7
Network Design & Administration	Planning,implementation and operations	48	32
Programming Software Engineering	design, development, and maintenance of softwares	16	12
Enterprise Systems Analysis & Integration	Installing the applications, programming the databases and configuring the networks	33	20

Database Development & Administration	Installation, configuration, upgrading ,maintenance of database and systems in the company	12	8
Cybersecurity	protecting the network from attack, damage or unauthorized access	10	7

Table 1 : Divisions and responsibilities

The responses of surveys were analyzed using the SPSS package (IBM Corp, 2012) through a quantitative approach. We have entered the results of the surveys in SPSS into the data view sheet. The respondents can leave the answer blank if they don't know the answer. If no answer is provided to specific questions, "No reply" was entered. The data coding is shown in Table 2.

Questions	Answers	code
1.Your Gender:	Female	0
	Male	1
2. Are you Lebanese?	No	0
	Yes	1
3. What is the highest level of education you have completed?	High school	1
	Bachelor's degree	2
	Master's degree	3
	Doctorate	4
	Other	5
4. How many years of experience do you have in the IT industry?	0 to 2 years	1
	2 to 4 years	2
	4 to 6 years	3
	6 to 8 years	4
	8 to 10 years	5
	> 10 years	6
5. Do you possess any professional certification?	No	0
	Yes	1
6. Please rate your proficiency in the below soft skills from 1 to 5?	Poor	1
	Fair	2

	Good	3
	Very Good	4
	Excellent	5
7. Please rate your proficiency in the below hard skills from 1 to 5?	Poor	1
	Fair	2
	Good	3
	Very Good	4
	Excellent	5
8. Please rate the importance of the below soft skills in performing your tasks?	Unimportant	1
	Slightly Important	2
	Important	3
	Very Important	4
	Critical	5
9. Please rate the importance of the below hard skills in performing your tasks?	Unimportant	1
	Slightly Important	2
	Important	3
	Very Important	4
	Critical	5

Table 2: Data coding

After data coding, analysis was performed through frequencies, cross tabulation, T-test,

ANOVA and post hoc statistical methods on SPSS.

Chapter IV

Analysis of findings

In this chapter, we present the frequencies and cross tabulation results in the survey response rate per unit, the percentages of employees per unit who attended soft trainings and hard trainings, the level of education and the years of experience per unit. Then we use radar charts to show the level of agreement that each department manager expressed per each soft skill or common hard skill. The stock charts display the required skill level of all soft skills and common hard skills as perceived by the IT managers and employees. In addition, different statistical methods will be executed to test our hypotheses. In the next chapter, all the findings and the possible significant differences in each IT unit and between the units are investigated in order to understand the gap between management perception and employee perception.

In our research, the surveys were addressed to seven IT units. Table 3 shows the response rate per unit. The unit Programming Software Engineering has the highest response rate and the unit Enterprise Systems Analysis & Integration has the lowest response rate.

Unit	Response Rate
Technical Support	64%
Web Development & Administration	70%
Network Design & Administration	67%

Programming Software Engineering	75%
Enterprise Systems Analysis & Integration	61%
Database Development & Administration	66%
Cybersecurity	70%

Table 3: Response Rate per Unit

In the surveys, we asked the employees to list the trainings attended in the last two years. Table 4 has the percentages of employees per unit who attended soft trainings and hard trainings. In most units, there is lack of enrollment in soft courses especially in the departments of "Cybersecurity, Enterprise Systems Analysis & Integration, Network Design & Administration and Programming Software Engineering". In contrast, 25% of the employees in the Database Development & Administration unit and 28% in the Web Development & Administration unit have attended non-technical courses.

The percentages of enrolled employees in hard trainings also differ among the ICT units. Only 25% of the employees in the Database Development & Administration unit registered in technical courses during the last two years while significantly higher percentages of employees are found in the other units.

	Attended soft skills training	Attended hard skills training
Cybersecurity(7)	0%	71%
Database Development & Administration(8)	25%	25%
Enterprise Systems Analysis and Integration(20)	0%	70%
Network Design & Administration(32)	3%	78%
Programming Software Engineering(12)	0%	58%
Technical Support(27)	4%	74%
Web Development & Administration(7)	28%	57%

Table 4: Percentages of employees per unit who attended soft trainings and hard trainings

As for the highest level of education in Table 5, most of employees have a bachelor's degree or a master's degree. Within the Database development & administration unit, 12.5% of employees have only a high school degree and the rest of the employees in the unit have a bachelor's degree. In the "Enterprise Systems Analysis & Integration unit and the Web Development & Administration employees unit", 5% and 14.3% of the employees, respectively, have different degrees such as Technical Baccalaureate Degree and Superior Technician Degree.

	High School	Bachelor's degree	Master's degree	Doctorate	Other
Cybersecurity(7)	0%	85.70%	14.30%	0%	0%
Database Development & Administration(8)	12.50%	87.50%	0%	0%	0%
Enterprise Systems Analysis and Integration(20)	0%	80%	15%	0%	5%
Network Design & Administration(32)	0%	78.10%	21.90%	0%	0%
Programming Software Engineering(12)	0%	83.30%	16.70%	0%	0%
Technical Support(27)	0%	70.40%	25.90%	0%	0%
Web Development & Administration(7)	0%	71.40%	14.30%	0%	14.30%

Table 5 : Highest level of education per unit

The years of experience also differ among the employees across the units as shown in Table 6. The employees in the Web Development & Administration unit have a level of experience from 4 to 8 years. All of the units except the "Cybersecurity and Programming Software Engineering" units contain fresh ICT employees. The Network Design & Administration unit has the highest percentage of employees with more than 10 years of experience.

	0 to 2 years	2 to 4 years	4 to 6 years	6 to 8 years	8 to 10 years	>10 years
Cybersecurity(7)	0%	42.90%	28.6	0%	14.30%	14.30%
Administration(8)	12.50%	25%	37.50%	12.50%	0%	12.50%
Enterprise Systems Analysis and Integration(20)	10%	45%	20%	15%	10%	0%
Network Design &	6.30%	21.90%	18.80%	25%	12.50%	15.60%
Programming Software	0%	25%	33.30%	16.70%	16.70%	0%
Technical Support(27)	7.40%	29.60%	29.60%	14.80%	3.70%	3.70%
Web Development &	0%	0%	85.70%	14.30%	0%	0%

Table 6: Years of experience per unit

Radar Charts

The radar charts in Table 7 present the required soft skill level according to each manager. The radial axis reflects the level of agreement that each department manager expressed relative to the level of requirement for the skill noted in the title of each chart.

- All the IT unit managers regarded the soft skills "Communication skills, Developing others, Information Seeking, Teamwork and co-operation" as very important or critical.

- All the IT managers considered the soft skill Task Management as important or very important.

- The organizational awareness is perceived by the IT manager of Programming Software Engineering unit as unimportant and rated by the managers of "Network Design & Administration and Cybersecurity" units as slightly important.

- The soft skill Impact & influence on others is rated by the "Technical Support and Programming Software Engineering" unit managers as slightly important and perceived by the other unit managers as important or very important.

- Overall, the skills of least importance across the departments are: "organizational awareness , impact & influence on others ,directiveness ,organizational commitment and relationship building" .

Developing others

D1-Cybersecurity
D2-Database Development &…
D3-Enterprise System Analysis
D4-Network Design & Administrati…
D5-Programming Software…
D6-Technical Support
D7-Web Development &…
5
4
3
2
1
0

Communication skills

D1-Cybersecurity
D2-Database Devel…
D3-Enterprise System
D4-Network Desig…
D5-Programming Softw…
D6-Technical Support
D7-Web Development & Admin…
5
4
3
2
1
0

Team leadership

D1-Cybersecurity
D2-Database Development &…
D3-Enterprise Systems.
D4-Network Design & Administra…
D5-Programming Software…
D6-Technical Support
D7-Web Development &…
5
4
3
2
1
0

Self-control

D1-Cybersecurity
D2-Database Developm…
D3-Enterprise Systems…
D4-Network Design & Administra…
D5-Programming Software…
D6-Technical Support
D7-Web Development &…
5
4
3
2
1
0

Customer service orientation

D1-Cybersecurity
D2-Database Development &…
D3-Enterprise System
D4-Network Design & Admini…
D5-Programming Softwa…
D6-Technical Support
D7-Web Development & Admini…

Information seeking

D1-Cybersecurity
D2-Database Development &…
D3-Enterprise System Analysi
D4-Network Design & Adminis…
D5-Programming Softwar…
D6-Technical Support
D7-Web Development & Adminis…

Creativity

D1-Cybersecurity
D2-Dat Develo &
D3-E S An
D4-Network Design & Administrat
D5-Programming Software…
D6-Technical Support
D7-Web Development &…

Adaptability

D1-Cybersecurity
D2-Database Development &…
D3-Enterprise Systems Analysis &…
D4-Network Design & Administrati…
D5-Programming Software…
D6-Technical Support
D7-Web Development &…

Ability and willingness to learn

D1-Cybersecurity
D2-Database Developm...
D3-Enterprise Systems...
D4-Network Design & Administr...
D5-Programming...
D6-Technical Support
D7-Web Development &...

Interpersonal understanding

D1-Cybersecurity
D2-Database Developm...
D3-Enterprise Systems...
D4-Network Design & Administr...
D5-Programming...
D6-Technical Support
D7-Web Development &...

Self confidence

D1-Cybersecurity
D2-Data Develop & Adminis
D3-En Sys Ana Inte
D4-Network Design & Administratio n
D5-Programming Software Engineering
D6-Technical Support
D7-Web Development & Administrati...

Impact & influence on others

D1-Cybersecurity
D2-Database Developm...
D3-Enterprise Systems...
D4-Network Design & Administr...
D5-Programming...
D6-Technical Support
D7-Web Developme nt &...

Relationship building

D1-Cybersecurity
D2-Database Development
D3-Enterprise Systems
D4-Network Design & Administra...
D5-Programming Software...
D6-Technical Support
D7-Web Development &...

Teamwork and co-operation

D1-Cybersecurity
D2-Database Development &...
D3-Enterprise Systems Analysis
D4-Network Design & Administration
D5-Programming Software...
D6-Technical Support
D7-Web Development &...

Flexibility

D1-Cybersecurity
D2-Database Development &...
D3-Enterprise Systems
D4-Network Design & Administra...
D5-Programming Software...
D6-Technical Support
D7-Web Development &...

Project Management

D1-Cybersecurity
D2-Database Development &...
D3-Enterprise Systems Analysis &
D4-Network Design & Administrati...
D5-Programming Software...
D6-Technical Support
D7-Web Development &...

Concern for order, quality & accuracy

Organizational awareness

Directiveness
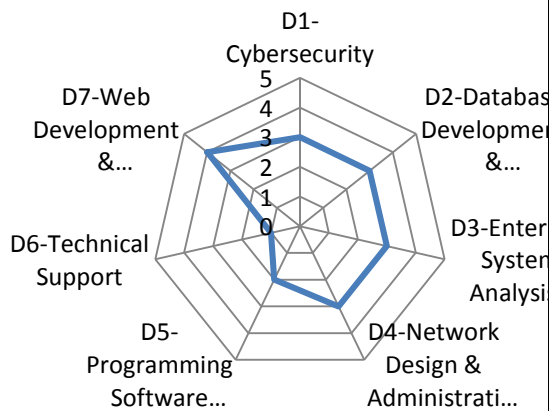
Organizational commitment
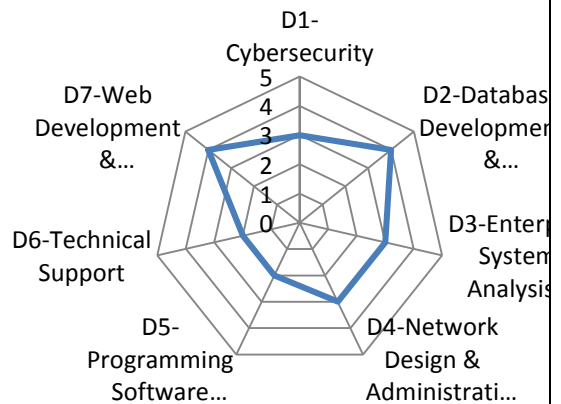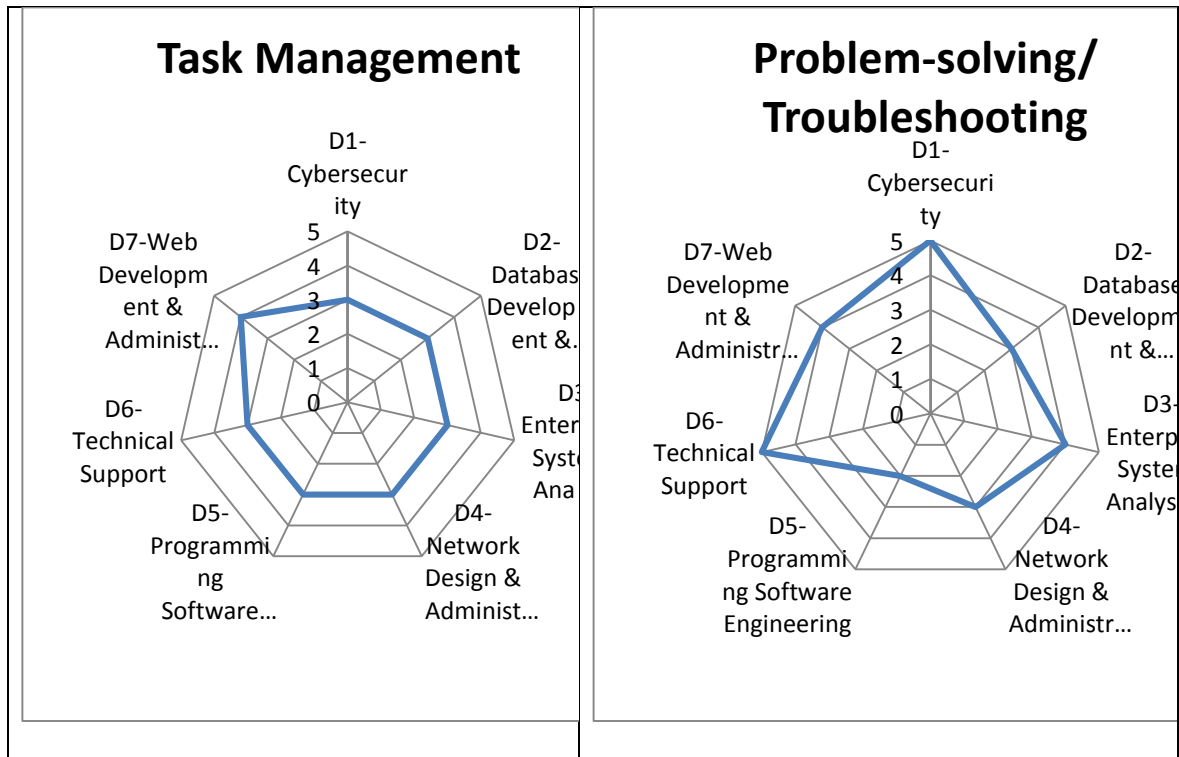
Figure 2 : Radar charts per skill type

To observe and analyze the managers' and employees' responses in each IT unit, we have created stock charts in Figure 3 to check if the manager's perceived required level per each skill falls between the standard deviation plus mean or the standard deviation minus mean of the perceived required skill level according to employees. The following observations were noticed:

- The manager of Cybersecurity unit considered all the soft skills and common hard skills as either important or critical except for two skills. Developing others is seen as very important and organizational awareness is regarded as slightly important. The soft skills "Communication skills, Ability & willingness to learn, Information seeking, Teamwork and co-operation" are rated higher than the

mean plus standard deviation while the hard skills " Project Management and Task Management" are rated less than the mean minus standard deviation.

- The manager of Database Development & Administration unit considered all the soft skills and common hard skills as either important or very important except for the soft skill information seeking, which is regarded as critical. The soft skills "Interpersonal understanding, Self-confidence and Information seeking" are rated higher than the mean plus standard deviation while the hard skills "Task Management and Problem-solving/ Troubleshooting" are rated less than the mean minus standard deviation.

- According to the manager of Enterprise Systems Analysis & Integration unit, no skill is regarded as unimportant or slightly important. Also, The IT employees didn't rate any soft skill or common hard skill as unimportant or slightly important. The soft skills "Customer service orientation, Developing others, Communication skills, Ability and willingness to learn, Information seeking and Teamwork and co-operation" are rated higher than the mean plus standard deviation while the hard skill Task Management is rated less than the mean minus standard deviation.

- The manager of Network Design & Administration unit perceived all the soft skills and common hard skills as important, very important or critical except for the soft skill organizational awareness which is seen as slightly important. The soft skills "Communication skills, Creativity, Ability and willingness to learn, Information seeking, Teamwork and co-operation and Flexibility" are rated higher than the mean plus standard deviation.

- In the Programming Software Engineering unit , the soft skill Creativity is rated higher than the mean plus standard deviation while the skills "Organizational awareness, Concern for order, quality & accuracy ,Impact & influence on others, Directiveness , Self-control, Organizational commitment ,Adaptability, Ability and willingne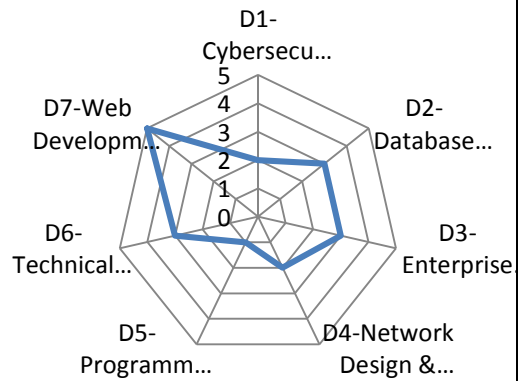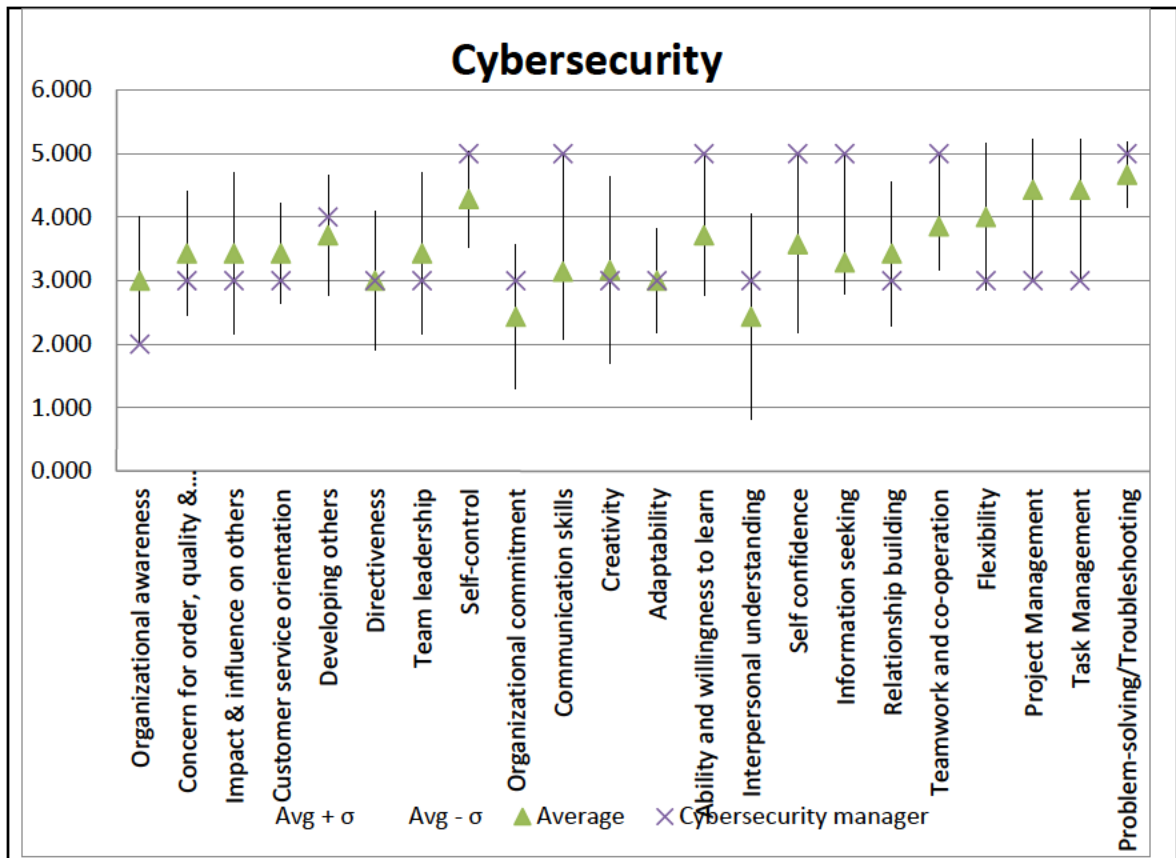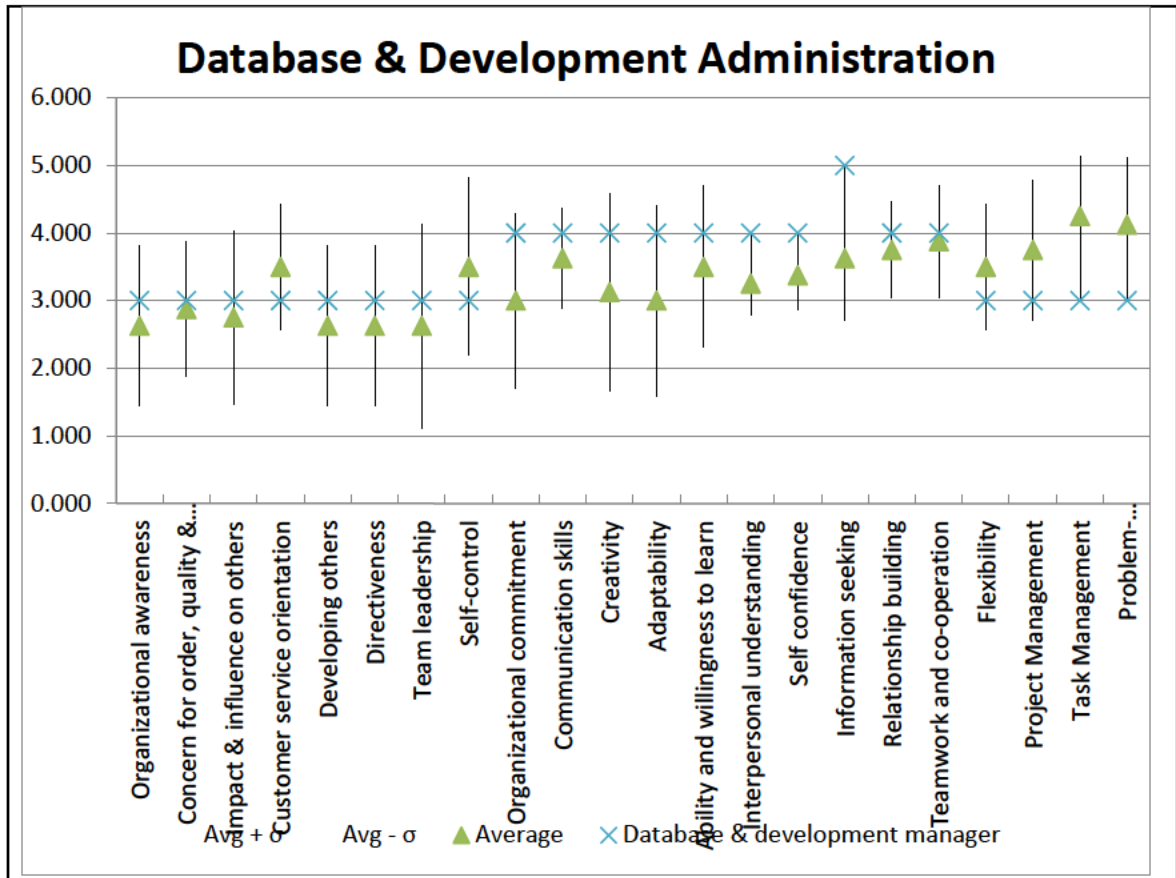ss to learn, Self-confidence, Relationship building, Teamwork and co-operation ,Task Management and Problem-solving/ Troubleshooting" are rated less than the mean minus standard deviation.

- The manager of Technical support unit considered all the soft skills and common hard skills as important, very important or critical except for the soft skills Impact & influence on others, Organizational commitment, Relationship building which are rated as slightly important and the soft skill Directiveness that is regarded as unimportant. The skills "Concern for order, quality & accuracy , Customer service orientation, Developing others ,Communication skills ,Ability and willingness to learn ,Teamwork and co-operation , Problem-solving/ Troubleshooting and Information seeking" are rated higher than the mean plus standard deviation while the skills "Impact & influence on others, Directiveness ,Organizational commitment, Creativity ,Self-confidence, Relationship building , Project Management and Task Management" are rated less than the mean minus standard deviation.

- The manager of Web Development & Administration unit considered all the soft skills and common hard skills as either very important or critical except the soft skill Interpersonal Understanding which is seen as important by the unit manager. As for the employees, most of the skills are perceived as less required

except all the common hard skills and the soft skill Interpersonal Understanding. The skills "Organizational awareness, Concern for order, quality & accuracy, Customer service orientation, Team leadership, Self-control, Adaptability, Ability and willingness to learn and Information seeking" are rated higher than the mean minus standard deviation.

Database & Development Administration

Y-axis: 0.000, 1.000, 2.000, 3.000, 4.000, 5.000, 6.000

X-axis categories: Organizational awareness, Concern for order, quality &..., Impact & influence on others, Customer service orientation, Developing others, Directiveness, Team leadership, Self-control, Organizational commitment, Communication skills, Creativity, Adaptability, Ability and willingness to learn, Interpersonal understanding, Self confidence, Information seeking, Relationship building, Teamwork and co-operation, Flexibility, Project Management, Task Management, Problem-...

Legend: Avg + σ   Avg - σ   ▲ Average   ✕ Database & development manager

Enterprise Systems Analysis & Integration

Avg + σ   Avg - σ   ▲ Average   ✕ Enterprise Systems Analysis & Integration Manager

Network Design & Administration

Avg + σ   Avg - σ   ▲ Average   ✕ Network Design & Administration Manager

Programming Software Engineering

Avg + σ   Avg - σ   ▲ Average   × Programming Software Engineering Manager

Technical Support

Avg + σ   Avg - σ   ▲ Average   × Technical support manager

Figure 3: Employees and Management perceptions on required skill levels

Hypothesis Testing

A. Paired Sample t-tests across the company:

To analyze the perceived held skill level versus the perceived required skill level according to the employees across all departments, we used paired sample t-test to see if the means on these two variables differ from one another. For example, using the "paired sample t-test" we will test if the mean of perceived held level in the soft skill

creativity is equal to the mean of required level according to the employees. We set up two hypotheses. The null hypothesis is the first hypothesis, which considers that the mean of two samples are equal. The alternative hypothesis is the second hypothesis, which considers that the means of two samples are not equal and we choose a 5% level of significance in our tests.

H0: The mean of perceived held level in the soft skill creativity is equal to the mean of required level according to the employees.

As the value of Sig (2-Tailed) value in the above test is 0.021 which is less than 0.05, we can conclude that there is a statistically significant difference between the mean of perceived held level in the soft skill creativity and the mean of the needed skill level in this unit according to the employees. Since the "Paired Samples Statistics box" revealed that the mean number of proficiency in creativity was less than the mean for the required skill level, we can confirm that the employees need to improve their proficiency in the skill creativity. Moreover, the t-value "-2.338" confirms that the actual skill level of creativity is less than the required level.

After repeating the tests for all the soft skills and the common hard skills in the surveys, we found that the means of the proficiency in the following skills are significantly different from the mean of the required skill level according to employees: "Creativity, project management, task management, problem-solving/ troubleshooting". Also the t-values of these skills are less than the lower values of "95% Confidence Interval of the Difference". Also the problem-solving/ Troubleshooting has the lowest p-value. The ICT employees' perceptions of the least important competencies compared to other

skills were: "organizational awareness and organizational commitment". Also the organizational awareness is considered by ICT employees as the least perceived held. According to ICT employees, the top competencies required in their jobs: "project management, task management and Problem-solving/ Troubleshooting". Table 7 summarizes the test results of all skills addressed in the questionnaires.

	P-Value
Organizational awareness	P=0.731>0.05 Failed to reject H0
Concern for order, quality & accuracy	P=0.505>0.05 Failed to reject H0
Impact & influence on others	P=0.702>0.05 Failed to reject H0
Customer service orientation	P=.364>0.05 Failed to reject H0
Developing others	P=0.721>0.05 Failed to reject H0
Directiveness	P=0.925>0.05 Failed to reject H0
Team leadership	P=0.937>0.05 Failed to reject H0
Self-control	P=0.574>0.05 Failed to reject H0
Organizational commitment	P=0.070>0.05 Failed to reject H0
Communication skills	P=.375>0.05 Failed to reject H0
Creativity	P=0.021<0.05 Reject H0
Adaptability	P=0.857>0.05 Failed to reject H0
Ability and willingness to learn	P=0.452>0.05 Failed to reject H0
Interpersonal understanding	P=0.739>0.05 Failed to reject H0
Self confidence	P=0.401>0.05 Failed to reject H0
Information seeking	P=0.105>0.05 Failed to reject H0
Relationship building	P=0.350>0.05 Failed to reject H0
Teamwork and co-operation	P=0.227>0.05 Failed to reject H0
Flexibility	P=0.807>0.05 Failed to reject H0
Project Management	P=0.008<0.05 Reject H0
Task Management	P=0.03<0.05 Reject H0
Problem-solving/ Troubleshooting	P=0.004<0.05 Reject H0

Table 7: Results of paired sample t-tests per skill type

For all common hard skills, there is a significant difference found in our results. The
employees do not perceive these common hard skills among all IT units to be as

important as soft skills. The employees perceive that they possess a level of expertise in these common hard skills higher than the proficiency of all soft skills. Yet they still consider that their proficiency level should be improved. Moreover, the soft skill Ability and willingness to learn is also rated the most perceived held and the skill Teamwork and co-operation is perceived by the employees as the most required soft skill in their jobs. Figure 4 contains a histogram showing the ICT employees ranking of workplace perceived held skills versus perceived required ones based on a 5-point Likert scale.
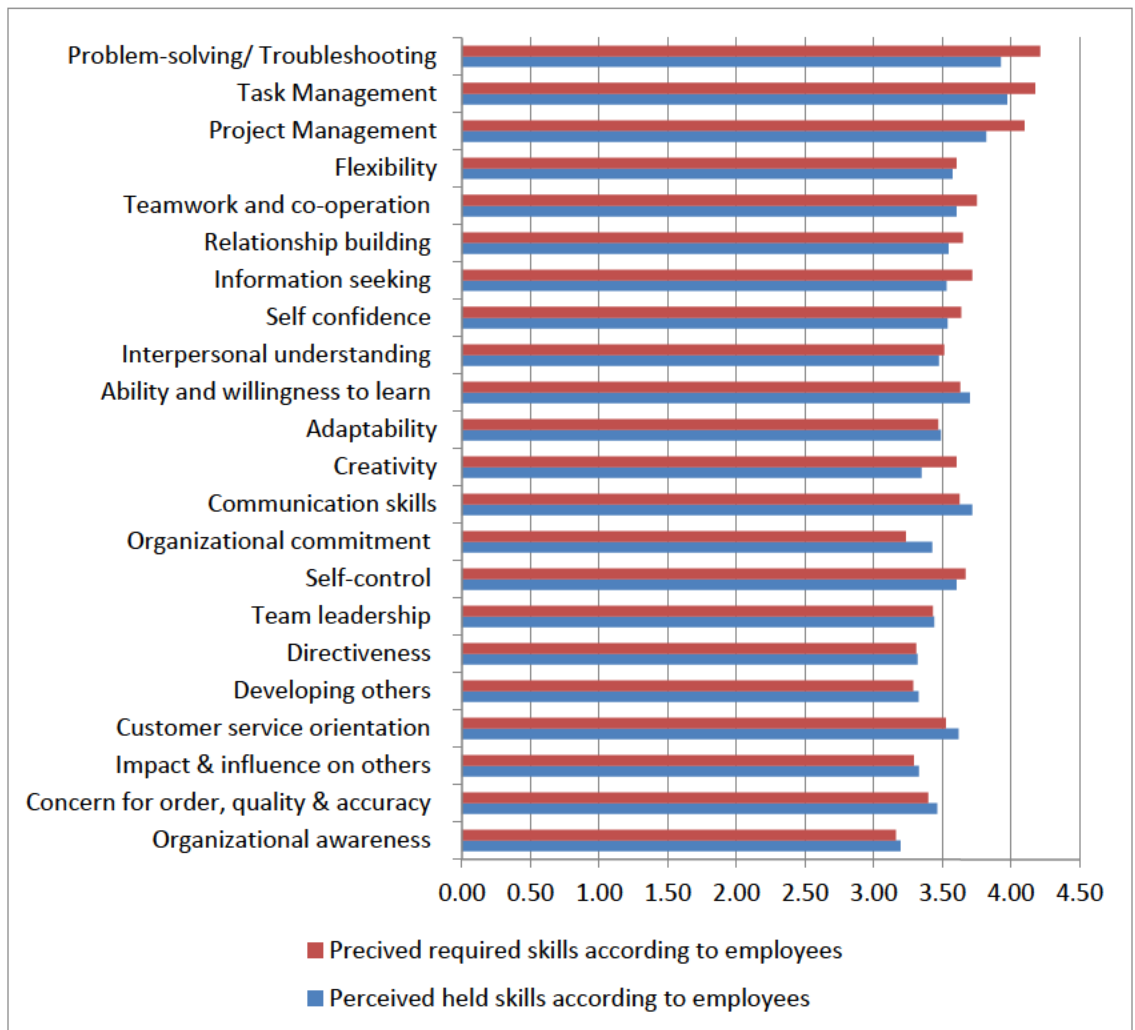
Figure 4 : Histogram showing ICT employees ranking of workplace perceived held skills versus perceived required ones based on a 5-point Likert scale

B. Independent Sample t-tests across the company:

To analyze the employees perceived held skill levels versus the managers required skill level across the whole company, we used the "Independent Samples t-test" to see if the means on these two variables differ from one another. In this research, the first group includes 7 managers and the second group consists of 112 employees. The mean of the perceived required skill level according to managers and the mean of perceived held skill level according to employees are shown in Figure 5.
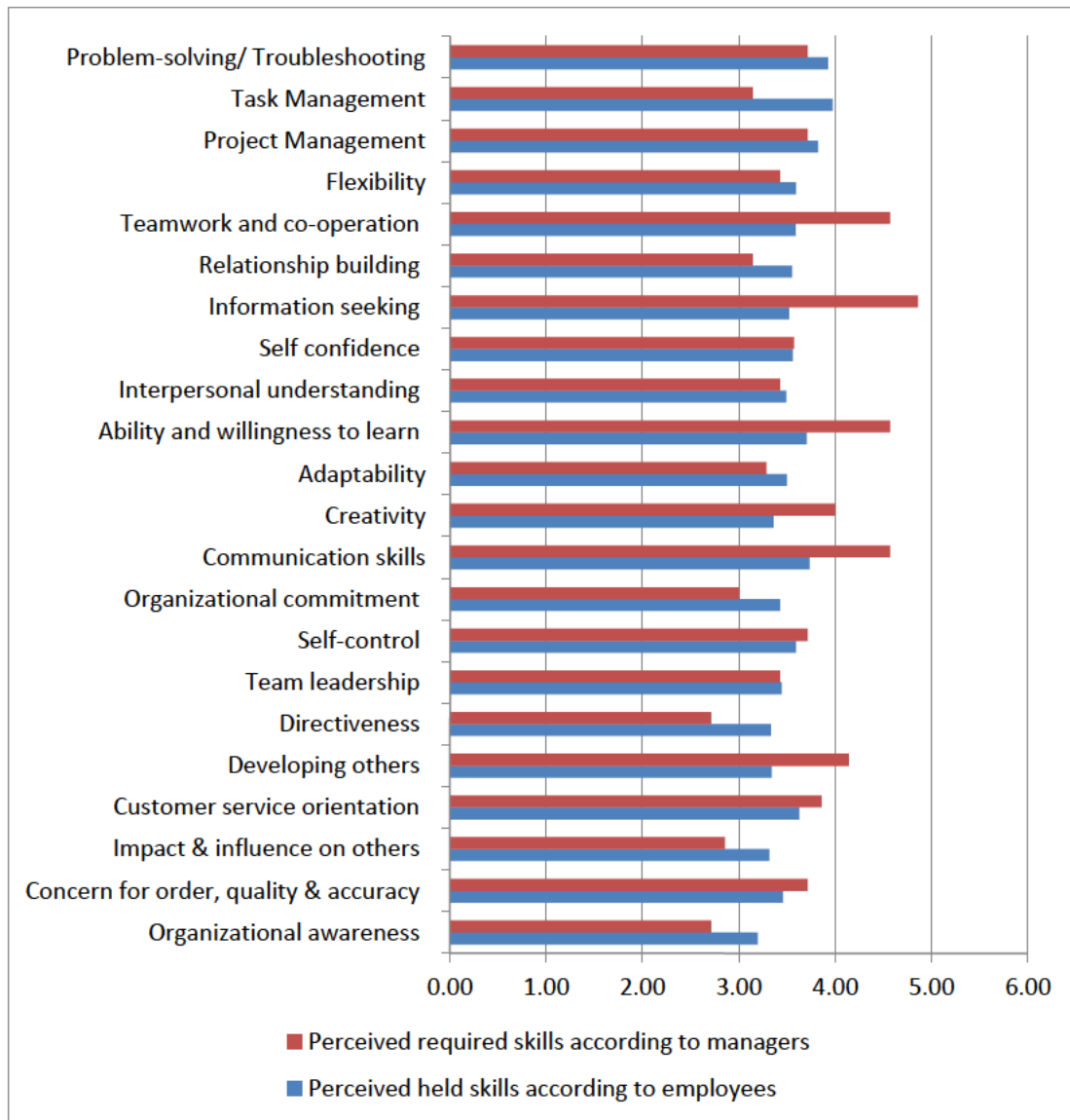
Figure 5: Histogram showing ICT employees and managers rating of skills based on a 5-point Likert scale

In all cases, the manager group and the employee groups exhibited equal variance, significant at 0.05. In comparing the means for the skills of each group, we find that the Sig. (2-tailed) is greater than 0.05 for the following skills : "Organizational awareness, concern for order quality & accuracy, impact & influence on others, customer service orientation , directiveness, team leadership, self-control, organizational commitment, creativity, adaptability ,interpersonal understanding, self-confidence, ,relationship

building, flexibility, project management, problem-solving/ troubleshooting". So we cannot reject the null hypotheses and conclude that that the mean of employees' perceived held skill and the managers' required skill level are not significantly different for these skills.

For the remaining skills "developing others, communication skills, ability and willingness to learn information seeking, teamwork and co-operation, task management", P-value < 0.05 so we reject the null hypotheses and determine that the mean of employees' perceived held skill level and the required skill level according to the managers are significantly different for these skills. Yet the mean difference is only positive for the following soft skills: "Developing others, communication skills, ability and willingness to learn, information seeking, teamwork and co-operation", which implies that the employees' expertise in these soft skills should be enriched. Table 8 summarizes the results of Independent Samples Tests for all the skills.

	P-Value
Organizational awareness	p=.352 >0.05 Failed to reject H0
Concern for order, quality & accuracy	p=.510 >0.05 Failed to reject H0
Impact & influence on others	p= .136>0.05 Failed to reject H0
Customer service orientation	p= .529>0.05 Failed to reject H0
Developing others	p= .021<0.05 Reject H0
Directiveness	p=.139 >0.05 Failed to reject H0
Team leadership	p= .961>0.05 Failed to reject H0
Self-control	p= .756>0.05 Failed to reject H0
Organizational commitment	p= .223>0.05 Failed to reject H0
Communication skills	p=.005<0.05 Reject H0
Creativity	p= .087>0.05 Failed to reject H0
Adaptability	p= .581>0.05 Failed to reject H0
Ability and willingness to learn	p=.026<0.05 Reject H0
Interpersonal understanding	p=.784 >0.05 Failed to reject H0
Self confidence	p=.970 >0.05 Failed to reject H0
Information seeking	p=.000004<0.05 Reject H0
Relationship building	p=.285 >0.05 Failed to reject H0
Teamwork and co-operation	p=.002<0.05 Reject H0
Flexibility	p= .613>0.05 Failed to reject H0
Project Management	p=.730 >0.05 Failed to reject H0
Task Management	p=.000456<0.05 Reject H0
Problem-solving/ Troubleshooting	p= .637>0.05 Failed to reject H0

Table 8 : Results of Independent Samples Tests per skill type

C. ANOVA tests

In the following section, we will use the "one-way analysis of variance (ANOVA)" to determine if there are any significant differences among the IT units. For example, we will run ANOVA to determine if rating the soft skill organizational awareness differs among units. The significance value in our case is 0.466 which is greater than 0.05. So, we can determine that there is no significant difference in the proficiency of soft skill organizational awareness among the units. The significance value can tell us that there is a significant difference among units but it will not identify the unit that causes the difference.

For the skills "Developing others, Self-control, Adaptability, Ability and willingness to learn", the P-value was less than 0.05 so we reject the null hypotheses and determine that there is a significant difference in the proficiency of these skills among units. For the skills "Organizational awareness, Concern for order, quality & accuracy, Impact & influence on others, Developing others, Organizational commitment, Interpersonal understanding, Project Management, Task Management", the P-value was less than 0.05 so we reject the null hypotheses and determine that there is a significant difference in the required skill level among units according to the employees. Table 9 summarizes the results of ANOVA tests per skill type.

	P-Value(percived skills)	P-Value(Required skills)
Organizational awareness	p=0.466>0.05 Failed to reject H0	p=0.007<0.05 Reject H0
Concern for order, quality & accuracy	p=0.173>0.05 Failed to reject H0	p=0.018<0.05 Reject H0
Impact & influence on others	p=0.740>0.05 Failed to reject H0	p=0.040<0.05 Reject H0
Customer service orientation	p=0.056>0.05 Failed to reject H0	p=0.154>0.05 Failed to reject H0
Developing others	p=0 021<0 05 Reject H0	p=0.030<0.05 Reject H0
Directiveness	p=0.397>0.05 Failed to reject H0	p=0.104>0.05 Failed to reject H0
Team leadership	p=0.684>0.05 Failed to reject H0	p=0.110>0.05 Failed to reject H0
Self-control	p=0 008<0 05 Reject H0	p=0.350>0.05 Failed to reject H0
Organizational commitment	p=0.691>0.05 Failed to reject H0	p=0.037<0.05 Reject H0
Communication skills	p=0.839>0.05 Failed to reject H0	p=0.094>0.05 Failed to reject H0
Creativity	p=0.319>0.05 Failed to reject H0	p=0.108>0.05 Failed to reject H0
Adaptability	p=0 008<0 05 Reject H0	p=0.288>0.05 Failed to reject H0
Ability and willingness to learn	p=0 022<0 05 Reject H0	p=0.518>0.05 Failed to reject H0
Interpersonal understanding	p=0.205>0.05 Failed to reject H0	p=0.023<0.05 Reject H0
Self confidence	p=0.302>0.05 Failed to reject H0	p=0.431>0.05 Failed to Reject H0
Information seeking	p=0.734>0.05 Failed to reject H0	p=0.654>0.05 Failed to reject H0
Relationship building	p=0.315>0.05 Failed to reject H0	p=0.743>0.05 Failed to reject H0
Teamwork and co-operation	p=0.803>0.05 Failed to reject H0	p=0.840>0.05 Failed to reject H0
Flexibility	p=0.161>0.05 Failed to reject H0	p=0.233>0.05 Failed to reject H0
Project Management	p=0.147>0.05 Failed to reject H0	p=0.016<0.05 Reject H0
Task Management	p=0.790>0.05 Failed to reject H0	p=0.020<0.05 Reject H0
Problem-solving/ Troubleshooting	p=0.422>0.05 Failed to reject H0	p=0.169>0.05 Failed to reject H0

Table 9: Results of ANOVA tests per skill type

D. Turkey's HSD and LSD tests

To identify the means that are significantly different from each other, we will run the Tukey's HSD and the Least Significant Difference (LSD) tests to determine which groups in the sample differ. While ANOVA can inform us whether groups in the IT

department differ, it cannot provide the IT unit that makes the difference. Therefore, determining which groups in the sample differ is a key issue as not all groups differ while comparing them to each other. Tukey's HSD will allow us to get the list of groups that have significant differences. The following section will present the results of Turkey's HSD.

Regarding the surveys that address the perceived held skill levels of employees, Table 14 shows the difference between the units for the skills with significant differences.

Perceived held skills differing between information technology units:

Developing Others	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity					X		
Database Development & Administration							
Enterprise Systems Analysis & Integration department							
Network Design & Administration							
Programming Software Engineering	X						
Technical Support							
Web Development & Administration							

Self-Control	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity				X	X		
Database Development & Administration							
Enterprise Systems Analysis & Integration department							
Network Design & Administration	X						
Programming Software Engineering	X						
Technical Support							
Web Development & Administration							

Adaptability	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity				X	X		X
Database Development & Administration							X
Enterprise Systems Analysis & Integration department							
Network Design & Administration	X					X	
Programming Software Engineering	X					X	
Technical Support				X	X		X
Web Development & Administration	X	X				X	

Ability and Willingness to Learn	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity							
Database Development & Administration							
Enterprise Systems Analysis & Integration department					X		X
Network Design & Administration					X		
Programming Software Engineering			X	X		X	
Technical Support					X		X
Web Development & Administration			X			X	

Table 10 : Matrices showing differences in perceived held skills between units

For the skill self-control, the mean of perceived held skill level in cybersecurity unit is lower than the mean of perceived held skill level in "Network design and administration and Programming software engineering" units.

For the skill developing others, the mean of perceived held skill level in Programming software engineering unit is higher than the mean of perceived held skill level in cybersecurity unit.

For the skill Adaptability, the mean of perceived held skill level in cybersecurity unit is lower than the mean of perceived held skill level in "Network design and administration, Programming software engineering, Web development & administration units". Also, the mean of perceived held skill level in web development & administration unit is higher than the mean of perceived held skill level in Database development & administration and technical support units. For the same skill Adaptability, the mean of perceived held skill level in technical support unit is lower than the mean of perceived held skill level in Network design & administration and Programming software engineering units

For the skill Ability and willingness to learn, the mean of perceived held skill level in Programming software engineering unit is higher than the mean of perceived held skill level in "Enterprise systems analysis & integration, Network design & administration and technical support" units. Moreover, for the skill Ability and willingness to learn, the mean of perceived held skill level in web development & administration unit is higher than the mean of perceived held skill level in "Enterprise systems analysis & integration, Network design & administration and technical support" units.

Regarding the surveys that address the perceived required skill levels of employees, Table 15 shows the difference between the units for the skills with significant differences.

Perceived required skills differing between information technology units:

Organizational awareness	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity							
Database Development & Administration					X		
Enterprise Systems Analysis & Integration department							
Network Design & Administration					X		
Programming Software Engineering		X		X			
Technical Support							
Web Development & Administration							

Concern for order, quality & accuracy	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity							
Database Development & Administration							
Enterprise Systems Analysis & Integration department							
Network Design & Administration					X		
Programming Software Engineering				X			
Technical Support							
Web Development & Administration							

Developing\nOthers	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity							
Database Development & Administration					X		
Enterprise Systems Analysis & Integration department							
Network Design & Administration							
Programming Software Engineering		X					
Technical Support							
Web Development & Administration							

Organizational Commitment	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity					X		
Database Development & Administration							
Enterprise Systems Analysis & Integration department							
Network Design & Administration							
Programming Software Engineering	X						
Technical Support							
Web Development & Administration							

Interpersonal understanding	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity					X	X	
Database Development & Administration							
Enterprise Systems Analysis & Integration department							
Network Design & Administration							
Programming Software Engineering	X						
Technical Support	X						
Web Development & Administration							

Task Management	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity							
Database Development & Administration							
Enterprise Systems Analysis & Integration department				X			
Network Design & Administration			X				
Programming Software Engineering							
Technical Support							
Web Development & Administration							

Impact & influence on others	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity							
Database Development & Administration					X	X	
Enterprise Systems Analysis & Integration department							
Network Design & Administration					X	X	
Programming Software Engineering		X		X			
Technical Support		X		X			
Web Development & Administration							

Project Management	Cybersecurity	Database Development & Administration	Enterprise Systems Analysis & Integration department	Network Design & Administration	Programming Software Engineering	Technical Support	Web Development & Administration
Cybersecurity				X			
Database Development & Administration							
Enterprise Systems Analysis & Integration department				X			
Network Design & Administration	X		X		X		X
Programming Software Engineering				X			
Technical Support							
Web Development & Administration				X			

Table 11: Matrices showing differences in perceived required skills between units

For the skill Organizational awareness, the mean of perceived required skill level in Programming Software Engineering unit is higher than the mean of perceived required skill level in "Database Development & Administration and Network design and administration" units.

For the skill Concern for order, quality & accuracy, the mean of perceived required skill level in Programming Software Engineering unit is higher than the mean of perceived required skill level in Network design and administration unit.

For the skill developing others, the mean of perceived required skill level in Programming Software Engineering unit is higher than the mean of perceived required skill level in Database Development & Administration unit.

For the skill Organizational Commitment, the mean of perceived required skill level in Programming Software Engineering unit is higher than the mean of perceived required skill level in Cybersecurity unit.

For the skill Interpersonal understanding, the mean of perceived required skill level in Cybersecurity unit is lower than the mean of perceived required skill level in Programming Software Engineering and Technical support units.

For the skill Task management, the mean of perceived required skill level in Enterprise Systems Analysis & Integration unit is higher than the mean of perceived required skill level in Network Design & Administration unit.

For the skill Impact & influence on others, the mean of perceived required skill level in Programming Software Engineering unit is higher than the mean of perceived required skill level in Database Development & Administration and Network Design & Administration units. Also, for the same skill Impact & influence on others, the mean of perceived required skill level in technical support unit is higher than the mean of perceived required skill level in Database Development & Administration and Network design & administration units.

For the skill project management, the mean of perceived required skill level in Network design & administration unit is lower than the mean of perceived required skill level in

"Cybersecurity, Enterprise Systems Analysis & Integration, web development & administration and programming software engineering" units.

E. One Sample t-tests per unit:

We have also used the "One Sample t Test" to determine if the sample mean of the proficiency in the employees hard and soft skills is equal to the mean of the required skill level set by the manager of each unit. Below are the results of the soft skills with significant differences per IT unit:

In the Cybersecurity unit, the soft skills "Organizational awareness, Developing others, Self-control, Communication skills, Ability and willingness to learn, Self-confidence, Information seeking, Teamwork and co-operation" are significantly different. In the Database development & administration unit, the soft skills "Self-control, creativity and Information seeking" are significantly different. In the Enterprise systems analysis and integration unit, the soft skills "Organizational awareness, Concern for order, quality & accuracy, Customer service orientation, Developing others, Directiveness, Self-control, Organizational commitment, Communication skills, Ability and willingness to learn , Self-confidence, Information seeking , Relationship building, Teamwork and co-operation and Flexibility" are significantly different. In the Network design & administration unit, the soft skills "Organizational awareness, Concern for order, quality & accuracy ,Customer service orientation , Developing others ,Team leadership ,Organizational commitment ,Communication skills, Creativity, Adaptability, Ability and willingness to learn, Interpersonal understanding , Self-confidence, Information seeking, Teamwork and co-operation and Flexibility" are significantly different. In the

Programming software engineering unit, the soft skills "Organizational awareness , Concern for order, quality & accuracy, Impact & influence on others ,Directiveness ,Self-control ,Organizational commitment , Creativity, Adaptability, Ability and willingness to learn, Interpersonal understanding , Self-confidence ,Relationship building and Flexibility" are significantly different. In the Technical support unit , the soft skills "Organizational awareness, Concern for order, quality & accuracy , Impact & influence on others , Customer service orientation , Developing others , Directiveness , Team leadership, Self-control , Organizational commitment , Communication skills, Ability and willingness to learn, Interpersonal understanding, Self-confidence, Information seeking , Relationship building and Teamwork and co-operation" are significantly different. In the Web development & administration unit, the soft skills "Organizational awareness, Concern for order, quality & accuracy, Team leadership, Self-control, Adaptability, Ability and willingness to learn, Interpersonal understanding and Information seeking" are significantly different.

The same test is applied to determine the hard skills with significant differences per unit. Below are the results after conducting all the necessary tests on SPSS:

In the Cybersecurity unit, the hard skills "Ensure Infrastructure and Network Security, Implement/test contingency and backup plans and coordinate with stakeholders, Perform Security Education and Training, Perform System Design and Analysis, Audit and maintain systems performance and ensure future readiness, Project Management, Task Management, Problem-solving/ Troubleshooting" are significantly different. In the Database development & administration unit, the hard skills "Identify backup and recovery requirements and create recovery plan, Develop and Implement Database,

Produce business and technical documents, Provide Data Assurance" are significantly different. In the Enterprise systems analysis and integration unit, the hard skills "Define Customer Requirements, Define security requirements, Determine Solutions for New and Existing Systems, Implement Systems, Manage Systems, Quality Assurance and Testing, Task Management" are significantly different. In the Network design & administration unit, the hard skills "Perform Analysis, Design Network, Configure and Deploy Network, Plan and document system configuration, Support, track and document change implementation, Perform network fault management, Perform Testing, Document, interpret and report test results, Manage and implement contingency and emergency recovery plans, Maintain Network and Manage Growth, Perform security administration, Contribute to and develop recommendations for long range security plans, Project Management, Task Management,   Problem-solving/ Troubleshooting" are significantly different. In the Programming software engineering unit, the hard skills "Perform Analysis, Identify risks and determine security requirements and risk reduction strategies, Develop Structure, Design/Develop Program   Review and provide input to user documentation, Implement Program, Test and validate Program, Perform post-project analysis and validation, Release Product, Train technical support staff, Evaluate, implement and document enhancements, Project Management ,Task Management, Problem-solving/ Troubleshooting" are significantly different. In the Technical support unit, the hard skills "Perform Troubleshooting, Document hardware and software problems and resolutions, Provide Facilitation and Customer Service, Perform Hardware and Software Installation, Configuration, Upgrades and Network Support, Perform quality checks on work outcomes, Perform System Operations, Monitoring and

Maintenance, Project Management, Task Management, Problem-solving/ Troubleshooting" are significantly different.

In the Web development & administration unit, the hard skills "Perform Technical Analysis, Perform Web programming, Implement and Maintain sites and applications, Manage web environment , Support systems recovery, Manage Enterprise-wide web activities, Perform Testing and Quality Assurance ,Problem solving /Troubleshooting" are significantly different.

F. Independent Sample t-tests per unit:

The Independent sample t-tests are also conducted per unit level to determine if the mean of the proficiency in specific soft or hard skill is significantly different from the mean of the required skill level according to employees in each IT unit.

In the Cybersecurity unit, the soft skills "Customer service orientation and Team leadership" are significantly different. In the Database development & administration unit, the soft skill Customer service orientation is significantly different. In the Enterprise systems analysis and integration unit, there is no significant difference in any soft skill. In the Network design & administration unit, the soft skills "Concern for order, quality & accuracy, Customer service orientation, Organizational commitment and flexibility" are significantly different. In the Programming software engineering unit, there is no significant difference in any soft skill. In the Technical support unit, the soft skills "Creativity, Adaptability and Interpersonal understanding" are significantly different. In the Web development & administration unit, the soft skills "Customer service orientation and Ability and willingness to learn" are significantly different.

Also, the Independent sample t-tests are executed for the hard skills to see if the mean of the proficiency in the any hard skill is significantly different from the mean of the required skill level according to employees in each unit:

In the Cybersecurity unit, the hard skills "Audit and maintain systems performance and ensure future readiness" are significantly different. In the Database development & administration unit, the hard skill "Produce business and technical documents" are significantly different. In the Enterprise systems analysis and integration unit, the hard skills "Define documentation and training requirements, Determine Solutions for New and Existing Systems, Define maintenance and enhancement strategies, Implement Systems, Project Management, Task Management, Problem-solving/ Troubleshooting" are significantly different. In the Network design & administration unit, the hard skills "Design Network, Integrate network components, Configure and Deploy Network, Plan and document system configuration, Perform network fault management, Manage and implement contingency and emergency recovery plans, Maintain Network and Manage Growth" are significantly different. In the Programming software engineering unit, there is no significant difference in any hard skill. In the Technical support unit, the hard skills Perform "Troubleshooting, Provide Facilitation and Customer Service, Make recommendations and support internal processes and operations" are significantly different. In the Web development & administration unit, there is no significant difference in any hard skill.

Chapter V

Discussion

Managers' perceptions

In our study, the IT managers consider that employees should possess a higher level of proficiency in the skills Developing others, Communication skills , Ability and willingness to learn, Information seeking, Teamwork and co-operation . The growing demand of these skills is highlighted in previous researches. Multiple studies, Chapple (2006), Green et al (2001), and Stasz (2001), show that in addition to the employees' ICT competence, the market demands "communication skills, teamwork, collaboration, critical thinking, decision making, and general social skills". "Problem-solving skills and teamwork are the most important for the operating employee" (Garcia et al, 2009, p.6). In December 2007, the British Broadcasting Corporation (BBC) News published Bill Gates' viewpoint about the skills needed to succeed: "A lot of people assume that creating software is purely a solitary activity where you sit in an office with the door closed all day and write lots of code. This isn't true at all. Software innovation, like almost every other kind of innovation, requires the ability to collaborate and share ideas with other people, and to sit down and talk with customers and get their feedback and understand their needs. Communication skills and the ability to work well with different types of people are very important too." "Communication skills" is the primary soft skill that gives a competitive advantage to IT employees. Having this talent, employees can explain their ideas well and they will be heard by others. Active listening comes

along with the communication skills. Listening effectively will allow them to respond to others' ideas. Communication skills are fundamental to other desired skills in the workplace such as teamwork on the assigned projects with teams (managing the project and the customer relations). Lee (2003) identified that programmers cannot carry out their programming work without communicating with users and understanding their business requirements. System analysis needs lot of interaction with clients and users. Therefore having strong communication skills is a necessity. The latest national employer survey in Wales shows the main skills gaps are focused on "problem-solving skills, customer-handling skills, communication skills and team-working skills" (Lee,2003, P.10). Communication skills is the only soft skill in high demand across Asia, Europe ,North America and Austria and all job IT titles (Ahmed et al .,2012). Without having the ability to clearly communicate the ideas, problems cannot be solved and the employees will lose lots of time. Communication skills are considered a central IT industry need as problems cannot be solved and plans cannot be set without the ability to convey information to others effectively and efficiently. Technical teams need to interact with non-technical employees on a regular basis. According to Hackett, Betz and Doty (1985), the communication skills and leadership skills are crucial soft skills in modern employees. As many IT units would be involved in the technical projects, the employees must exercise excellent communication skills when interacting with each other. The worker of the 21st century must have "science and mathematics skills, creativity, fluency in information and communication technologies, and the ability to solve complex problems" (Business- Higher Education Forum, 2005, P.4). According to a study that reports the perceptions of science and technology sector employers, the top workplace competencies required for the science and technology graduates are: "ability

and willingness to learn, teamwork and cooperation, initiative, and analytical thinking with concern for order, quality and accuracy, computer literacy, and written communication skills rated next most important"(coll et al. ,2002, P.10).

Surprisingly, the IT managers in Techno didn't perceive that the skill customer service orientation should be improved although the company has 2,211,000 customers and considering client needs and satisfaction should be a necessity in such workplace. The managers didn't ask for a high level of proficiency" even some of the work is in direct contact with customers. According to Bailey (1997), be the customer mentality can lead to increased customer satisfaction and help maintain an IT organization's competitive advantage. Also, the science and technology employers didn't rate the customer service orientation as highly needed but they perceive the importance of this skill as a necessity in the future (coll et al., 2002).

In our study, the soft skill ability and willingness to learn is rated also as the most important workplace competency by the managers. The employers are looking for employees who are able and willing to acquire new skills. This idea was also mentioned by Sweeny and Twomey (1997) that "employers are looking beyond content and focusing more on attributes and skills that will enable graduates to be adaptive, adaptable and transformative" (p. 299). According to a recent study of New Zealand employer's perception of job skills, the soft skill willingness to learn was perceived as the most important one by the industry specialists (Burchell, Hodges, & Rainsbury, 1999). Also, Stephenson (1997) stressed that the employees must be willing to learn to respond to the evolved technologies.

The skills of least importance across the departments according to the managers are: "organizational awareness, impact & influence on others, directiveness, organizational commitment and relationship building" although the Teamwork is perceived by the managers as very important and the skills "relationship building and influence on others" are components of the teamwork spirit. In a previous study where the perceptions of science and technology employers about the rank of a diversity of workplace skills are collected, the organizational awareness and organizational commitment are also reported as the least important competencies (Coll et al.,2002).

All the required soft skills "developing others, ability and willingness to learn and information seeking" with significant difference as per managers' perceptions fall under the same category on the way employees search and share the information with other colleagues. Interestingly, the results showed significant differences in soft skills that place a great importance on the personal behavior and the relation management among people. The soft skills have become increasingly important to employers as they contribute vastly to the success of a project and the organization. According to Snell et al, (2002), today soft skills are crucial factors to the success of a project. In particular, Snell et al (2002) have found that the failure rate of a project is between 40% and 70% and the major issue causing this failure is the lack of soft skills. Somerset (2001) and Bunker and Wakefield (2004) emphasize that organizational success in the workplace is widely influenced by the soft skills of the workforce. In India, the market's growth needs and increasing demands have led companies to promote people faster than before, however, firms are faced with candidates who do not have the necessary soft skills needed and are not eligible to be moved from a technical position to a managerial

postision. Companies like IT, KPO'S, Biotech, and pharmaceuticals industries found that the employees need to be proficient in soft skills to handle the work specially in projects involving many teams (Sultana, 2014).According to Amit Bhatia, CEO of an education services firm, students lack lots of hard and soft skills after completing their courses, which creates a gap between the skills required by employers and the existing skills in the applicant pool. This shortage is increasing the un-employability of IT students causing them to miss a competitive advantage when applying for jobs (Goswami, 2013). Snell et al (2002), state that employers are now looking for workforces that have a combination of both technical and soft skills, as IT professions require stress on the presence of soft skills in greater weight than the presence of hard skills. According to the science and technology employers(Coll et al.,2002) , the importance of hard skills is rated higher than that of soft skills and the results of the study found a statistically significant difference in the importance rate between soft and hard skills. So they perceived that the hard skills are more important.

Employees' perceptions

When we compare the employees' perceived held skill level to the employees' perceived required skill level across the whole company, we found significant differences in the skills: "Creativity, project management, task management, problem-solving/ troubleshooting". So the soft skill creativity shows a significant difference between the mean of the perceived held skill level and the mean of perceived required skill level as per employees' feedback. Interestingly, the employees consider that they should have the ability to provide creative solutions and their proficiency in this skill should be improved to solve problems and to create new opportunities. Actually, it is

reasonable that the ability to solve problems is highly required by the employees. As having the ability to locate, analyze and find the root cause of the problem is very important in the network operations, the employees consider that the hard skill problem solving is highly required. Also the problem-solving/ Troubleshooting has the lowest p-value which highlights the importance of this skill according to employees. For the ICT specialists to handle the technical projects, employees should possess the soft skill project management in order to plan, organize, monitor and evaluate the tasks throughout the project and meets its objectives. In a previous study, 325 IT professionals with representatives from different IT job clusters were asked to rate the importance of 32 non-technical competencies extracted from the site interviews and focus groups (Bailey & Stefaniak, 1999). According to the results of this study, "problem solving, idea initiation and project management skills" are listed among the most important skills mentioned by the IT professionals.

In our surveys, the ICT employees' perceptions of the least important competencies compared to other skills were: organizational awareness and organizational commitment. Also the skill organizational awareness is considered by ICT employees as the least perceived held and they consider that there is no necessity to enhance their expertise in this skill. According to ICT employees, the top competencies required in their jobs are the common hard skills "project management, task management and Problem-solving/ Troubleshooting". For all common hard skills, there is a significant difference found in our results which shows the great importance placed by the employees on these skills. In our study, the employees do not perceive these common hard skills among all IT units to be as important as soft skills. Surprisingly, the

employees perceive that they possess a level of expertise in these common hard skills higher than the proficiency of all soft skills. Yet they still consider that their proficiency level should be improved. Moreover, the soft skill Ability and willingness to learn is also rated the most perceived held and the skill Teamwork and co-operation is perceived by the employees as the most required soft skill in their jobs. As many teams will be involved in the technical projects, having a teamwork spirit and efficient cooperation among teams will accelerate the progress and achieve better results. Surprisingly, unlike the manager, the employees consider the soft skill creativity as most important and it should be improved. The employees might be facing problems that need creative minds and ideas to generate solutions specially that the creativity in information technology is driving the technological advancement.

Differences among units

The skills developing others, Self-control, Adaptability, Ability and willingness to learn show a significant difference in the perceived held skill level among units. Adaptability is a soft skill that differs among units as some units might experience more managerial and operational changes. Moreover, the IT field is a rapid change field and the IT hardware and software will be frequently upgraded or swapped. Some IT employees are more willing and able to adapt to these changes. Therefore the employees in these units have the ability to alter themselves to the changed circumstances. Part of the work scope in some IT units includes handling emergency cases, which requires working frequently 24-hour shifts under challenging conditions, to resolve problems and restore the interrupted service. The employees in these units are acquiring the capabilities to have self-control, work under pressure, have the patience to overcome

obstacles, and stay focused in stressful situations. Also, some units will include higher responsibilities and key functions in the IT department. IT specialists in these units would have the ability to handle the different tasks and control them in particular situations. The skills "Organizational awareness, Concern for order, quality & accuracy, Impact & influence on others, Developing others, Organizational commitment, Interpersonal understanding, Project Management, Task Management" show a significant difference in the perceived required skill level among units. Employee's ability to get along with others and develop each other differs among units. Skill differentiation based on IT job was widely discussed in the literatures. System analysts must possess interpersonal and analytical skills and the ability to work in a team in order to empathize with their customers and fully understand their needs (Ahmed et al, 2012). For software designers, tasks require communication, interpersonal, and organizational skills. According to Boivie et al (2006, p.601), "software designers should have strong communication, interpersonal, analytical, and problem-solving skills, and they should be team players who are open to change".

According to the matrices, the employees of Programming software Engineering unit consider that a higher level of required skills is needed on the skills "organizational awareness, Concern for order, quality & accuracy, developing others, Organization commitment, Interpersonal understanding, Impact & influence on others" compared to other units. In contrast, the manager of programming software Engineering didn't rate any of these skills as critical in the workplace. Moreover, the employees in the programming software Engineering unit didn't attend any soft skills training. Interestingly, there is no significant difference in any soft or hard skill between the perceived held and perceived required level according to employees. Moreover, the

mean of perceived required level of many skills in the Network Design & Administration unit is lower than the mean of perceived required level in many IT units. Although 3% of the employees in the Network Design & Administration unit have been enrolled in soft courses, we cannot determine that the training is the main reason leading to such difference as the percentages of employees who attended soft trainings in other units are also very low. In addition, the manager didn't perceive a low required level of soft skills and the employees didn't consider a lower perceived held level in these skills compared to other employees' IT units.

Managers' & Employees' perceptions per unit

The test results of the perceived held skills versus the perceived required skills according to employees indicate a significant difference in the soft skill customer service orientation in four out of seven IT units. Surprisingly, the skill creativity is significantly different only in the technical support unit. Moreover, the results of the perceived held skills versus the perceived required skills according to managers indicate a significant difference in the soft skill Task management in five out of seven IT units.   All the hard skills with significant difference between the perceived held skills versus perceived required skills according to employees are also found in the employees perceived held skills versus managers perceived required skills in the Cybersecurity, Database Development & Administration units. Furthermore, the average rating of all the perceived held soft skills according to employees in the programming software Engineering and Enterprise systems analysis and integration units is higher than the average rating of all perceived required soft skills. The same result was noticed in rating all the hard skills in the "programming software Engineering and Web development and

administration units". Some of the differences in the employee ratings relative to the manager ratings are due to the fact that the employee ratings are averaged across a group of people, while the manager is one person.

When we study the perceptions of employees perceived held skills versus employees perceived required skills, the number of hard skills with significant difference is higher than the number of soft skills with significant difference. So employees are stressing on the hard skills. Table 12 shows the results.

	Number of soft skills with significant differences	Number of hard skills with significant differences
Cybersecurity	2	1
Database development & administration	1	1
Enterprise systems analysis and integration	0	7
Network design &	4	7
Programming software engineering	0	0
Technical support	3	3
Web development & administration	2	0

Table 12: Employees' perception

When we study the perceptions of employees perceived held skills versus managers perceived required skills, the number of soft skills with significant difference is higher than the number of hard skills with significant difference (see Table 13). So managers are stressing on soft skills. Table 14 shows all the test results per company and unit levels.

	Number of soft skills with significant differences	Number of hard skills with significant differences
Cybersecurity	8	8
Database development & administration	3	4
Enterprise systems analysis and integration	13	6
Network design & administration	15	15
Programming software engineering	13	14
Technical support	16	9
Web development & administration	8	8

Table 13: Managers' perceptions

		Cybersecurity	Database development & administration	Enterprise systems analysis and integration	Network design & administration	Programming software engineering	Technical support	Web development & administration	Overall Company
Perceived held skills versus preceived required skills according to employees	Soft Skills	Customer service orientation,Team leadership	Customer service orientation	None	Concern for order, quality & accuracy, Customer service orientation ,Organizational commitment, Flexibility	None	Creativity,Adaptability ,Interpersonal understanding	Customer service orientation, Ability and willingness to learn	Creativity
	Hard Skills	Audit and maintain systems, performance and ensure future readiness	Produce business and technical documents	Define documentation and training requirements, Determine Solutions for New and Existing Systems, Define maintenance and enhancement strategies, Implement Systems, Project Management, Task Management, Problem-solving/ Troubleshooting	Design Network, Integrate network components, Configure and Deploy Network, Plan and document system configuration, Perform network fault management, Manage and implement contingency and emergency recovery plans, Maintain Network and Manage Growth	None	Perform Troubleshooting, Provide Facilitation and Customer Service, Make recommendations and support internal processes and operations	None	Project Management,Task Management,Problem solving/ Troubleshooting
perceived held skills by employees versus preceived required skills by managers	Soft Skills	Organizational awareness, Developing others, Self-control, Communication skills, Ability and willingness to learn, Self-confidence, Information seeking, Teamwork and co-operation	Self-control, creativity, Information seeking	Organizational awareness, Concern for order, quality & accuracy, Customer service orientation, Developing others, Directiveness, Self-control, Organizational commitment, Communication skills, Ability and willingness to learn , Self-confidence, Information seeking , Relationship building, Teamwork and co-operation, Flexibility	Organizational awareness, Concern for order, quality & accuracy ,Customer service orientation , Developing others ,Team leadership ,Organizational commitment ,Communication skills, Creativity, Adaptability, Ability and willingness to learn, Interpersonal understanding , Self-confidence, Information seeking , Teamwork and co-operation, Flexibility.	Organizational awareness , Concern for order, quality & accuracy, Impact & influence on others ,Directiveness ,Self-control ,Organizational commitment , Creativity, Adaptability, Ability and willingness to learn, Interpersonal understanding , Self-confidence ,Relationship building , Flexibility.	Organizational awareness, Concern for order, quality & accuracy , Impact & influence on others , Customer service orientation , Developing others , Directiveness , Team leadership, Self-control , Organizational commitment , Communication skills, Ability and willingness to learn, Interpersonal understanding, Self-confidence, Information seeking , Relationship building, Teamwork and co-operation.	Organizational awareness , Concern for order, quality & accuracy ,Team leadership, Self-control , Adaptability, Ability and willingness to learn, Interpersonal understanding , Information seeking.	Developing others,Communication skills , Ability and willingness to learn, Information seeking, Teamwork and co-operation
	Hard Skills	Ensure Infrastructure and Network Security, Implement/test contingency and backup plans and coordinate with stakeholders, Perform Security Education and Training, Perform System Design and Analysis, Audit and maintain systems performance and ensure future readiness, Project Management, Task Management, Problem-solving/ Troubleshooting.	Identify backup and recovery requirements and create recovery plan, Develop and Implement Database, Produce business and technical documents, Provide Data Assurance.	Define Customer Requirements, Define security requirements, Determine Solutions for New and Existing Systems, Implement Systems, Manage Systems, Quality Assurance and Testing, Task Management	Perform Analysis, Design Network, Configure and Deploy Network, Plan and document system configuration, Support, track and document change implementation, Perform network fault management, Perform Testing, Document, interpret and report test results, Manage and implement contingency and emergency recovery plans, Maintain Network and Manage Growth, Perform security administration, Contribute to and develop recommendations for long range security plans, Project Management, Task Management, Problem-solving/ Troubleshooting.	Perform Analysis, Design Network, Configure and Deploy Network, Plan and document system configuration, Support, track and document change implementation, Perform network fault management, Perform Testing, Document, interpret and report test results, Manage and implement contingency and emergency recovery plans, Maintain Network and Manage Growth, Perform security administration, Contribute to and develop recommendations for long range security plans, Project Management, Task Management, Problem-solving/ Troubleshooting.	Perform Troubleshooting, Document hardware and software problems and resolutions, Provide Facilitation and Customer Service, Perform Hardware and Software Installation, Configuration, Upgrades and Network Support Perform quality checks on work outcomes, Perform System Operations, Monitoring and Maintenance, Project Management, Task Management, Problem-solving/ Troubleshooting	Perform Technical Analysis Perform Web programming, Implement and Maintain sites and applications, Manage web environment , Support systems recovery, Manage Enterprise-wide web activities, Perform Testing and Quality Assurance ,Problem-solving/, Troubleshooting.	Task Management

Table 14: All results

Soft and hard Trainings

The percentages of employees who attended hard trainings are surprising as the enrollment in hard skills training and applying for certifications are effective ways for the organization to respond to the technical evolution and the emergence of advanced technologies. As high-skills jobs become more specialized, training and certifications are key solutions to enhance existing knowledge and skills. Yet the rapidly changing IT environment may hinder the value of generally accepted ICT certifications (Lindeman and Schiano, 2001). As new versions of IT hardware and software are frequently produced, the certifications of the IT products like oracle or Microsoft will not add a value for IT specialists over a long time period if these products become obsolete. While formal education and certified trainings increase the skills and knowledge of employees, often on-the-job training or experience contributes most to the formation of the employee's skill set.

Previous studies have highlighted the importance of training activities as the most source of competitive advantage as they have a direct impact on the productivity and the contribution and role on business objectives. The Digital Opportunity Task Force (DOT FORCE, 2002) highlights that the diffusion of ICTs in the countries requires the development of human resources through systematic training and education. Hwang (2004) found that the education and the training were very crucial to align the adjustment of skill changes with the rapid expansion of information technology sector. Most enterprises and especially the large ones have encouraged their employees to improve their ICT skills through professional development, attending workshops and seminar and enrolled in trainings (Mutula & Van Brakel, 2007). In Italy, the training in

new technology was limited and only 20% of the workers have basic IT skills. The skill shortage is also wide in advanced technical workplaces where it was estimated that 60,000 opportunities were not filled in 2002 (Stanca, 2002). As we are moving into the new ICT millennium, the technical skills are not sufficient anymore and the soft skills such as communication skills, problem solving and teamwork are being very important. As no curriculum can assure all the trainings required by the workers, identifying the needed set of knowledge, skills and abilities are becoming most important to ICT enterprises (Bailey & Stefaniak, 2000).

Role of academic programs

In this rapid changed IT field, the academic programs have to be frequently evaluated and updated. Lopez-Bassols (2002) considers that many actions have to be implemented from supply and demand sides to meet the IT challenging skill demands. From the supply side, students must be provided more information, the IT skills should be more developed in secondary schools, the teachers should be well trained, the opportunities of IT careers should be highlighted, the educational curriculum should be integrated with the workplace problems and the employees have to frequently update their skills. On the demand side, better recruitment procedures should be developed, lot of information on skill needs and pathways to IT opportunities have to be collected and the government should have a central role and behave as employers of IT experts. The ICT industry considers that the organizations, academic institutions and governments have to implement the necessary actions to resolve the gap in positions and available IT workers (SIM, 1998). Bridging the IT skills gap can be achieved by bringing ICT organizations and ICT academic departments together and developing a new curriculum

and programs that include all the IT skills required in the workplace (Bresnick, 1998).To narrow the gap between the school course content and the requirements of the industry, a greater collaboration between the schools and organizations is needed and the business involvement in the academic programs should be adopted (SIM, 1998). Therefore, various measures must be deployed on several domains to acquire and develop skills, such as education, experience, on-the-job training and self-training (OECD, 2001).

Chapter VI

Conclusion & Limitations

Conclusion

This research study has shown an ICT skill shortage as per employees' and managers' perceptions. Based on IT department level, the employees perceive a higher shortage on the hard skills and the managers identify a major lack on many soft skills such as Developing others, communication skills, ability and willingness to learn, information seeking, teamwork and co-operation. The managers are also placing a great importance on the relation management skills among people. Based on unit level, lots of hard and soft skills show a significant difference between managers' perceived required level and employees' perceived held levels. Having such small percentages of enrollment in interpersonal trainings in most of the IT units, the shortage in soft skills would be logical. Actually, as the training is a part of HR practices for organizations success, Techno should encourage the worker learning and training to acquire more competencies and improve the employees' soft and hard skills. As there is positive association between the investment in human capital and the organization success and growth, Techno should develop more training programs specially in soft skills and should strength the communication between the IT department and HR department to bridge the skill gap in all the IT units and reduce the impact of IT skills shortage. Furthermore, Techno should strength the communication between managers and employees as lot of discrepancies found between the employees' perceived required skill level and the managers' perceived required skill level.

Limitations of the study

The e-survey was sent to approximately 171 professional IT employees in the company out of which 113 employees responded. Therefore, the results cannot be generalized. The study was conducted with IT employees and managers and an extension of the study would involve collecting the perceptions of IT applicants. The IT sector includes lots of job categories and technical skills such as specific skills for certain products. Including the major product skills required in each unit and covering more IT units in the research would reflect better the IT work environment. The interviews were conducted with one manager in each IT unit and some of the differences in the employee ratings relative to the manager ratings are due to the fact that the employee ratings are averaged across a group of people, while the manager is one person. As the survey is self-administrated, a self-respondent bias may be faced while completing the survey. The research was limited to an ICT organization in Beirut although the aim of the study is to investigate the IT shortage in Lebanon. Although, Techno contains a big IT department but replicating the study in additional geographical areas would be better as some areas in Lebanon might be facing a higher shortage in ICT skills. Furthermore, as the results are based on one ICT company, not all the results can be generalized to the whole ICT sector

Bibliography

Abell, A. (2002). Softly Softly Approach. *Information World Review*, 56-58.

ACST. (2000). *Stepping Up: Skills and Oppotunities in the Knowledge Economy, Report of the Expert Panel on Skills.* Canada: Advisory Council on Science and Technology.

Acton, T., & Golden, W. (2003). Training the Knowledge Worker: A descriptive Study of Training Practices in Irish Software Companies. *Journal of European Industrial Training, 7(2/3/4)*, 137-146.

Ahmed, F., Capretz, L. F., & Campbell, P. (2012). Evaluating the Demand for Soft Skills in Software Development. *IT Professional*.

Ahmed, F., Fernando, L., & Campbell, P. (2012). Evaluating the Demand for Soft Skills in Software Development. *IT Pro, IEEE Computer Society*.

AISS/ITNTO. (1999). *Report for the Department of Trade and Industry and Industry and the Department for Education and Employment.* United Kingdom: Alliance for Information Systems Skills/ IT National Training Organization.

Ang, S., & Slaughter, S. (2000). *The missing context of information technology personnel: a review and future directions for research.* Cincinnati, Ohio: Pinnaflex Educatioal Resources.

Antioco, M. (2006). *Service Orientations of Manufacturing Companies: Impact on New Product Success.* Eindhoven: Technishe Universiteit Eindhoven.

Ashrafi, R. (2011). Strategic Value of IT in Private Sector Organizations in a Developing Country: Oman. *The Electronic Journal on Information Systems in Developing Countries, 47(4)*, 1-25.

Assaad, R., & Roudi-Fahmi, F. (2007). *Youth in the Middle East and North Africa: Demographic Opportunity or Challenge?* Washington: Population Reference Bureau.

Autor, D., Katz, L. F., & Krueger, A. B. (1998). Computing Inequality: Have Computers Changed the Labor Market? *Quarterly Journal of Economics, 113(4)*, 1169-1213.

Avgerou, C. (2008). Information Systems in Developing Countries: A Critical Research Review. *Journal of Information Technology, 23(3)*, 133-147.

Bailey, J. L., & Stefaniak, G. (1999). Preparing the information technology workforce for the new millennium. ACM SIGCPR Computer Personnel, 20(4), 4-15.

Bancino, R., & Zevalkink, C. (2007). Soft Skills: The New Curriculum for Hard Core Technical Professionals. *Techniques, 82(5)*, 20.

Barley, S., & Orr, J. (1997). *Between Craft and Science: Technical Work in US Settings.* Ithaca, NY: Cornell University Press.

Barras, R. (1990). Interactive Innovation in Financial and Business Services: The Vanguard of the Service Revolution. *Research Policy No 19*.

Benbasat, I., Goldestein, D. K., & Mead, M. (1987). The Case Research Strategy in Studies of Information Systems. *MIS Quarterly, 11(3)*, 369-386.

Berndt, E. R., Morrison, C. J., & Rosenblum, L. S. (1992). High-Tech Capital, Economic Performance and Labor Composition in US Manufacturing Industries: An Exploratory Analysis. *MIT Working Paper*.

Bhatt, G., & Grover, V. (2005). Types of Information Technology Capabilities and their Role in Competitve Advantage: An Empirical Study. *Journal of Management Information Systems*, 253-277.

Boivie, J., Gullisken, & Goransson, B. (2006). The Lonesome Cowboy: A Study of the Usability Designer Role in Systems development. *Interacting with Computers, 18(4)*, 601-634.

Bresnahan, T. (1997). Computerization and Wage Dispersion: An Analytic Reinterpretation. *Stanford University*.

Bresnahan, T. F., Brynjolfosson, E., & Hitt, L. M. (1999). *Information Technology and Recent Changes in Work Organization Increase the Demand for Skilled Labor.* Stanford University.

Bresnahan, T., Brynjolfsson, E., & Hitt, L. (2000). IT, Workplace Organization and the Demand for Skilled Labor: A Firm-level Analysis. *Mimeo, MIT, Stanford, and Wharton.*

Brown, P., Hesketh, A., & Williams, S. (2003). Employability in a Knowledge-Driven Economy. *Journal of Education and Work, 16(2)*, 107-126.

Brynjolfsson, E., & Hitt, L. (2000). Computing Productivity: Are Computers Puliing Their Weight? *Mimeo, MIT and Wharton*.

Brynjolfsson, E., Malone, T., Gurbaxani, V., & Kambil, A. (1994). Does Information Technology Lead to Smaller Firms? *Management Science, 40(12)*, 1628-1644.

Bunker, K., & Wakefield, M. (2004). In Search of Authenticity Now More Than Ever, Soft Skills Are Needed. *Leadership In Action, 24(1)*, 17-21.

Burlton, R. T. (2001). *Business Process Management.* USA: Sams Publishing.

Business, H. E. (2005). *A Commitment to America's Future: Responding to the Crisis in Mathematics and Science Education.* Washington, DC.

Bresnick, P. (1998). "Wanted: Experienced IT Pros:Q & A," Insurance & Technology, 23(9), 72.

Cash, E., Yoong, P., & Huff, S. (2004). The impact of E-commerce on the Role of IS Professionals. *The Database for Advances in Information Systems*, 50-63.

Casner-Lotto, J., & Barrington, L. (2006). *Are They Really Ready to Work? Employers' Perspectives on the Basic Knowledge and Applied Skilss of New Entrants to the 21st Century Worksforce.* USA: The Conference Board Inc., The Partnership for 21st Century Skills, Corporate Voices for Working Families, The Society for Human Resource Management.

Chaffey, D. (2009). *E-Business and E-Commerce Management: Strategy, Implementation and Practice , Fourth Edition.* UK: Pearson Education Ltd.

Chapple, K. (2006). Networks to Nerdistan: The Role of Labor Market Industries in the Entry-Level IT Labor Market. *International Journal of Urban and regional Research, 30(3)*, 548-563.

Chen, H., & Fang, W. C. (2005). A Comparative Analysis between SMEs and Large Comapanies in Relation to Integration Technologies Adoption. *Proceedings of the Fifth International Conference on Electronic Business*, (pp. 839-848). Hong Kong.

Chinomona, R. (2013). The Fostering Role of Information Technology on SMEs' Strategic Purchasing, Logistics Integration and Business Performance. *Southern African Business Review 17(1).*

Chinomona, R., & Pretorius, M. (2011). SME Manufacturers' Cooperation and Dependence on Major Dealers' Expert Power in Distribution Channels. *South African Journal of Economics and Management Sciences, 12(2)*, 170-186.

Clemons, E. K. (1993). Reengineering the Sales Function: reengineering Internal Operations. *The Wharton School*.

Coll, Richard K., Karsten Zegwaard, and Dave Hodges. "Science and technology stakeholders' ranking of   graduate   competencies   part   1:   Employer perspective." Asia-Pacific Journal of cooperative   education 3.2 (2002): 19-28

ConfederationofBritishIndustry. (2007). *Shaping up for the Future: The Business Vision for Education and Skills*. Retrieved from Confederation of British Industry: http://www.cbi.org.uk/pdf/skillssuftf0407.pdf

Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management. (2006, September). Are They Really Ready To Work? Employers' Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century U.S. Workforce. Retrieved January 1, 2007 from http://www.21stcenturyskills.org/documents/ReportCardFINAL_updated.pdf

Crosbie, R. (2005). Learning the Soft Skills of Leadership. *Industrial and Commercial Training*, 45-51.

Dede, C. (2007). Reinventing the Role of Information and Communications Technologies in Education. *Yearbook of the National Society for the Study of Education (Wiley-Blackwell), 106(2)*, 11-38.

DEWR. (2002). *ICT Vacancy Index.* Retrieved from Department of Employment and Workplace Relations, Australia: http://www.workplace.gov.au

DfEE. (2000a). *Skills for the Information Age.* United Kingdom: Department for Education and Employment , Information Technology, Communications and Electronic Skills Strategy Group.

DfEE. (2000b). *Skills for All: Proposals for a National Skills Agenda.* United Kingdom: Department for Education and Employment, National Skills Task Force.

EITO. (2001). *European Information Technology Observatory.* Frankfurt am Main: EITO 2001.

Estevez, E., & Montoya, M. S. (2015). Analyzing the Impact of Information and Communication Technology for Development Lessons Learnt from the SIRCA 2 Program. *The Electronic Journal of Information Systems in Developing Countries, 69(1)*, 1-17.

Farquhar, J. D. (2012). *Case Study Research for Business.* London: Sage Publications Ltd.

Feagin, J., Orum, A., & Sjoberg, G. (1991). *A Case for Case Study.* Chapel Hill, NC: University of North Carolina Press.

Fernandez-Sanz, L. (2010). Analysis of Non Technical Skills for ICT Profiles. *5th Iberian Conference* (pp. 1-5). IEEE.

Flyvbjerg, B. (2006). Five Misunderstandings about Case-Study Research. *Qualitative Inquiry (12)*, 219-245.

Forfas. (2000a). *Second Report of the Export Group on Future Skills Needs.*

Forfas. (2000b). *Report on E-business Skills Expert Group on Future Skills Needs.*

Forza, C., Romano, P., & Vinelli, A. (2000). Information Technology for Managing the Textile Apparel Chain: Current use, Shortcomings and Development directions. *Forza, C., Romano, P. & Vinelli, A. 2000. 'Information technology for managing the textile apparel chain: Current use, shInternational Journal of Logistics: Research and Applications 3(3)*, 13-25.

Franz, C. R., & Robey, D. (1984). An Investigation of User-Led System Design: Rational and Political Perspectives. *Communication of the ACM (27)*, 1202-1217.

Garcia, A. L., Audet, X. L., & Sabate, F. (2009). Professional and Interpersonal Skills for ICT Specialists. *IT PRO*.

Garrido, M., Badshah, A., & Coward, C. (2009). Deconstructing ICT Skills and Employability. *Information Technologies and International Development, 5(2)*.

Garrido, M., Sullivan, J., & Gordon, A. (2012). Understanding the Links between ICT Skills Training and Employability. *Information Technologies and International Development, USC Annenberg School for Communication & Journalism, 8(2)*, 17-32.

Gelinas, U. J., Sutton, S. G., & Federowicz, J. (2008). *Business Processes and Information Technology*. USA: Litten Editing and Production, Inc.GGS Information Services, Inc.

Gersick, C. (1988). Time and Transition in Work Teams: Toward a New Model of Group Development. *Academy of Management Journal (31)*, 9-41.

Gingras, Y., & Roy, R. (1998). Is there a Skills Gap in Canada? *Human Resource Development Canada*.

GoldmanSachs. (1999). B2B: To Be or Not 2B? *High Technology Group Whitepaper*.

Goswami, R. (2013). Importance of Soft Skills in the Employability of IT Students. *Proceedings of National Conference on Emerging Trends: Innovations and Challenges in IT*, (p. 20).

Grace, J., Kenny, C., Qiang, C. Z., Liu, J., & Reynolds, T. (2004). *Information and Communciation Technologies and Broad-Based Development: A Partial Review of the Evidence*. The International Bank for Reconstruction and Development - The World Bank No 12.

Grant, J. (2003). Growing Rural Female Entrepreneurs: Are They Starved for ICT Skills? *ICSB World Conference.* Belfast.

Green, F., Ashton, D., & Felstead, A. (2001). Estimating the Determinants of Supply of Computing, Problem Solving, Communications, Social and team Working Skills. *Oxford Economic Papers, 3*, 406-433.

Hamelink, C. J. (1997). *New Information and Communication Technologies, Social Development and Cultural Change.* Switzerland: United Nations Research Institute for Social Development (UNRISD).

Harris, S., & Sutton, R. (1986). Functions of Parting Ceremonies in Dying Organizations. *Academy of Management Journal (29)*, 5-30.

Hawkins, P. (1999). The art of building windmills: career tactics for the 21st century. Graduate into Employment Unit.

Heeks, R. (2002). Information Systems and Developing Countries: Failure, Success, and Local Improvisations. *The Information Society, 18*, 101-112.

Heizer, J., & Render, B. (2011). Operations Management, 10th Edition. In J. Heizer, & B. Render, *Operations Management.* Prentice Hall.

Hendry, C. (1999). Skills Task Force Research Paper No. 10. *New Technology Industries*.

HjYunus, N. H., & Hassan, C. N. (2012). The Importance of Emotional Intelligence and Soft Skills in the Workplace. *International Conference on Innovation, Management and Technology Research* (pp. 12-15). Malacca, Malaysia: IEEE.

Houston, D. (2005). Employability, Skills Mismatch and Spatial Mismatch in Metropolitan Labor Markets. *Urban Studies, 42(2)*, 221-243.

Howson, C. (2007). Successful Business Intelligence: Secrets to Making BI a Killer App, 1st Edition. McGraw-Hill Osborne Media.

Hull, G. (1992). *Their Chances? Slim and None: An Ethnographic Account of the Experiences of Low-Income People of Color in a Vocational Program and at Work.* Berkeley, CA: National Center for Researcg in Vocational Education, University of California.

Hutchison, Kae R., et al. "Partnering to Identify and Support High-Wage Programs." New Directions for   Community Colleges 1998.104 (1998): 61-67.

Iacovou, C., Benbasat, I., & Dexter, A. (1995). Electronic Dara Interchange and Small Organizations: Adoption and Impact of Technology. *MIS Quarterly ,19(4)*, 465-485.

IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.

IDAL. (2014). *Information Technology FactBook Report.* Beirut: IDAL - Invest in Lebanon.

IDC. (1999). India Corporate Growth Driving ERP Adoption. *Business Line*, 1.

ILC. (2008). Skills for Improved Productivity, Employment Growth and Development. *International Labor Conference, 97th Session* (pp. 1-160). Geneva: International Labor Office.

ILO. (2000). Conclusions Concering Human Resources Training and Development. *International Labor Office, 88th Session*, (p. 9). Geneva .

InstituteForLaborStudies. (2007). *China Employment Report 2006-2007.* Beijing: Ministry of Labor.

ISC. (2000a). *IT Access for All.* Ireland Information Society Commission.

ISC. (2000b). *New Technology in Irish Busines.* Ireland Information Society Commission.

ITAA. (2000). *Information Technology Association of America (ITAA) (20Information Technology Association of America. Bridging the Gap: Information Technology Skills For A New Millennium.*

Kagan, A., Lau, K., & Nusgart, K. R. (1990). Information System Usage Within Small Business Ffirms. *Entrepreneurship: Theory and Practice, 14 (3)*, 25-37.

Keen, P. G. (1991). Shaping the Future: Business Design through Information Technology. *Harvard Business School Press*.

Kenny, C. (2003). The Internet and Economic Growth in LDCs: A Case of Managing Expectations? *Oxford Development Studies*.

Kidder, T. (1982). *Soul of a New Machine.* New York: Avon.

Kowalkowski, C., Kindstrom, D., & Gebauer, H. (2013). ICT as a Catalyst for Service Business Orientation. *The Journal of Business and Industrial Marketing, 28(6)*, 506-513.

Kraemer, K., & Dedrick, J. (2001). Payoffs from Investment in Information Technology: Lessons from the Asia-Pacific Region. *University of California*.

Kuan, K. K., & Chau, P. Y. (2001). A Perception-Based Model for EDI Adoption in Small Businesses Using a Technology-Organization-Environment Framework. *Information and Management, 38(8)*, 507-521.

Lawson, R., Alcock, C., Cooper, J., & Burgess, L. (2003). Factors Affecting Adoption of Electronic Commerce Technologies by SMEs: An Australian Study. *Journal of Small Business and enterprise Development, 10(3)*, 265-276.

Lee. (2001). Education for Technology Readiness: Prospects for Developing Countries. *Journal of Human Development*, 115-151.

Lee, C. K. (2003). *Analysis of Information Technology Job Skills Requirement in Fortune 500 Corporations.* Lincoln, Nebraska: Graduate College at the University of Nebraska.

Lee, D. M., Trauth, E. M., & Farwell. (1995). Critical Skills and Knowledge Requirements of IS professionals: A Joint Academic/Industry Investigation. *MIS Quarterly*, 313-340.

Lichtenberg, F. R. (1995). The Output Contributions of Computer Equipment and Personal: A Firm-Level Analysis. *Economics of Innovation and New Technology, 3*, 201-217.

Lingard, R. W. (2010). Teaching and Assessing Teamwork Skills in Engineering and Computer Science. *Journal of Systemics, Cybernetics and Informatics*.

Liu, J. (2007). Computing as an Evolving Discipline: 10 Observations. *Computer (40)*, 111-112.

Llorens, A., Llinas-Audet, X., Ras, A., & Chiaramonte, L. (2013). The ICT Skills Gap in Spain: Industry Expectations Versus University Preparation. *Comput. Appl. Eng. Educ, 21*, 256-264.

Lopez-Bassols, V. (2002). ICT Skills and Employment. *OECD Science, Technology, and Industry Working Papers*, OECD Publishing.

Mak, B., & Sockel, H. (1999). A Confirmatory Factor Analysis of IS Employee Motivation and Retention. *Information and Management, 38*, 265-276.

Maksoud, S. S., & Yousseff, M. A. (2003). *Information and Communciation Technology for Small and Medium Enterprises in Egypy.* Cairo: SME Development Unit , Ministry of Foreign Trade.

Maropoulos, P. G. (2003). Digital Enterprise Technology - Defining Perspectives and Research Priorities. *International Journal of Computer Integrated Manufacturing, 16(7/8)*, 467-478.

Matthyssens, P., & Vandenbempt, K. (1998). Creating Competitve Advantage in Industrial Services. *Journal of Business and Industrial Marketing, 13(4/5)*, 339-355.

Medlin, B. D., Schneberger, S., & Hunsinger, D. S. (2007). Perceived Technical Information Technology Skill. *Journal of Information Technology Management, 18(3/4)*, 14-23.

Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education.* San Francisco, CA: Jossey-Bass Publishers.

Moore, J. E. (2000). One Road to Turnover: An Examination of Work Exhaustion in Technology Professionals. *MIS Quarterly, 24(1)*, 141-168.

Mouelhi, R. B. (2009). *MoueImpact of the Adoption of Information and Communication Technologies on Firm Efficiency in the Tunisian Manufacturing Sector.* Tunisia: Department of Economics, ISCAE, University of Manouba.

Mrad, F. (2006). Meeting Arab Socio-Economic Development Needs Through Information and Communicatoin Technologies. *Journal of Transnational Management, 11(3)*, 3-37.

Muir, C. (2004). Learning Soft Skills at Work: An Interview with AnnaleeLuhman. *Business Communication Quarterly*, 95-101.

Mutula, S. M., & Van Brakel, P. (2007). ICT Skills Readiness for the Emerging Global Digital Economy Among Small Businesses in Developing Countries. Case Study of Botswana. *Library Hi Tech*, 231-245.

Natriello, G. (1989). *What do Employees Want in Entry-level Workers? An Assessment of the Evidence.* New York: NCEE Occasional Paper No. 7, Teachers College, Columbia University.

NCEQW. (1995). *EQW National Employer Survey (EQW.NES).* Philadelphia, PA: National Center on theEducation Quality of the Workforce, University of Pennsylvania.

Nelson, H. J., Ahmad, A., Martin, N. L., & Litecky, C. R. (2007). A Comparative Study of IT/IS Job Skills and Jobs. *Proceedings of the 2007 ACM SIGMIS CPR Conference on Computer Personnel Research: The Global Information Technology Workforce*, (pp. 168-170).

Neu, W. A., & Brown, S. W. (2005). Forming Successful Business-to-Business Services in Goods-Dominant Firms. *Journal of Service Research, 8(1)*, 3-17.

Niehm, L. S., Tyner, K., Shelley, M. C., & Fitzgerald, M. A. (2010). Technology Adoption in Small Family-Owned Businesses: Accessibility, Perceived Advantage, and Information Technology Literacy. *Journal of Family and Economic Issues*, 498-515.

Nijssen, E. J., Hillebrand, B., Vermeulen, P. A., & Kemp, R. G. (2006). Exploring Product and Service Innovation Similarities and Differences. *International Journal of Research Marketing, 23(3)*, 241-251.

Nour, O., & Satti, S. (2002). *ICT Opportunities and Challenges for Development in the Arab World.* WIDER Discussion Papers/ World Institute for Development Economics.

NRC. (2001). *United States National Research Council. Building a Workforce for the Information Economy.* Washington, DC: National Academy Press.

NWCET (2003). Skill Standards for Information Technology, 2003 Edition. Bellevue, WA: The National Workforce Center for Emerging Technologies.

Obeidat, M., & North, M. M. (2014). A Comparative Review of Information Technology Project Management in Private and Public Sector Organizations. *International Management Review*.

OECD. (1996). *Technology, Productivity, and Job Creation.* Paris: Analytical Report, Vol. 2.

OECD. (1998). *Human Capital Investment: An International Comparison.* Paris: Centre for Educational Research and Innovation.

OECD. (2000a). *Information Technology Outlook.* Paris.

OECD. (2001a). *Knowledge, Work Organization and Economic Growth.* Paris: Labor Market and Social Policy, No. 50.

Orlikowski, J. W., & Barley, S. R. (2001). Technology and Institutions: What Can Research on Information Technology and Research on Organizations Learn from Each Other? *MIS Quarterly , 25(2)*, 145-165.

Papaioannou, S. K., & Dimelis, S. P. (2007). Information Technology as a Factor of Economic Development: Evidence from Developed and Developed Countries. *Economics of Innovation and New Technology*, 179-194.

Pennings, J. M. (1988). Information Technology in Production Organizations. *International Studies of Management & Organization, 17(4)*, 68-89.

Pinfield, L. (1986). A Field Evaluation of Perspectives on Organizational Decision Making. *Adminstrative Science Quarterly (31)*, 365-388.

Premkumar, G. G. (2003). A Meta-Analysis on Research on Information Technology. *Journal of Organizational Computing and Electronic Commerce*, 91-121.

Puksta, K., & Nedelea, A. (2012). Using Information Technologies to Raise the Competitiveness of SMEs. *The USV Annals of Economics and Public Administration 12 - 1(15)*.

Qiang, C. Z., Pitt, A., & Ayers, S. (2004). *Contribution of Information and Communication Technologies to Growth.* The International Bank for Reconstruction and Development - The World Bank No. 24.

Ramakrishnan, K., & Yasin, N. M. (2012). Employment Issues Among Malaysian Information and Communication Technology (ICT) Graduates: A Case Study. *African Journal of Business Management, 6(16)*, 5615-5621.

Ramsay, E., Ibbotson, P., Bell, J., & Gray, B. (2003). E-opportunities of Service Sector SMEs: an Irish Cross- Border Study. *Journal of Small Business and Enterprise Development, 10(3)*, 250-264.

Rangan, V., & Bell, M. (1998). Dell Online. *Harvard Business School*.

Rockart, J. F., & Flannery, L. S. (1983). The Management of End-User Computing. *Communications of the ACM (26)*, 776-784.

Roepke, R., & Agarwal, R. (2000). Aligning the IT Human Resource with Business Vision: The Leadership Initiative at 3M. *MIS Quarterly, 24(2)*, 327-353.

SamGnanakkan, S. (2010). Mediating Role of Organizational Commitment on HR Practices and Turnover Intention among ICT Professionals. *Journal of Management Research, 10(1)*, 39-61.

Sangster, D. (1999). *Critical Skills in Five Canadian Industries: A Summary Report on Sectoral Interviews.* Expert Panel on Skills.

Shih, E., Kraemer. K, L., & Dedrick, J. (2008). IT Diffusion in Developing Countries. *Communications of the ACM, 51(2)*, 43-48.

Short, J., & Venkatraman, N. (1992). Beyond Business Process Redesign: Redefining Baxter's Business Network. *Sloan Management Review, 34(1)*, 7-20.

Silver, M. S., Markus, M. L., & Beath, C. M. (1995). The Information Technology Interaction Model: A Foundation for the MBA Core Course. *MIS Quarterly 19(3)*, 361-390.

Society for Information Management (SIM). (1998)."Addressing the Information Technology Workforce Shortage," Position Paper, (Oct).

Snell, S., Snell-Siddle, C., & Whitehouse, D. (2002). Soft or Hard Boiled: Relevance of Soft Skills for IS Professionals. *The 15th Annual NACCQ*, (pp. 403-408). Hamilton, New Zealand.

Somerset, F. (2001). The Softer Side of Leadership . *CMA Management*, 12-13.

Stake, R. (1995). *The Art of Case Study Research.* Thousand Oaks, CA: Sage Publications.

Stasz, C. (2001). Assessing Skills for Work: Two Perspectives. *Oxford Economic Papers, 3*, 385-405.

Stasz, C., Ramsey, K., Eden, R., Melamid, E., & Kaganoff, T. (1996). *Workplace Skills in Practice: Case Studies of Technical Work.* Berkeley, CA: National Center for Research in Vocational Education, University of California.

Stephen, M., Mutula, P., & Brakel, V. (2007). ICT Skills Readiness for the Emerging Global Digital economy Among Small Businesses in Developing Countries. *Library Hi-Tech, 25(2)*, 231-245.

Stokes, S. L. (1991). The New IS Manager for the 1990s. *Journal of Information Systems Management, 8(1)*, 44-50.

Storey, D. J., & Cressy, R. (1995). Small Business Risk: A Firm and a Bank Perspective. *SME Centre , Warwick Business School*.

Sultana, N. (2014). Soft Skills for Employability. *International Journal of Organizaional Behavior and Management Perspectives, 3(1)*, 745-748.

Tagliavini, M., Faverio, P., Ravarini, A., Pigni, F., & Buonanno, G. (2002). Exploring the Use of ERP Systems by SMEs. *Proceeding of 6th World Multi Conference on Systematics Cybernatics and Informatics*, (pp. 14-18). Orlando, Florida.

Themistocleous, M. (2002). *Evaluating the Adoption of Enterprise Application Integration in Multinational Organizations.* Brunel University: Department of Information Systems and Computing.

Thong, J. Y. (2001). Resource Constrains and Information Systems Implementation in Singaporean Small Businesses. *Omega: The International Journal of Management Science, 29(2)*, 143-156.

UKCES. (2010). *Incentivisng Improvement.* London: UK Commision for Employment and Skills.

UNCTAD. (2007). The Least Developed Countries Report: Knowledge, Technological Learning and Innovation for Development. *United Nations Conference on Trade and Development*, (p. 6). Geneva.

van Teijlingen, Edwin, and Vanora Hundley. "The importance of pilot studies." Social research update 35(2001): 1-4.

Venkatraman, N. (1997). Beyond Outsourcing: Managing IT Resources as a Value Center. *Sloan Management Review 38(3)*, 51-64.

Vitale, M., & Konsynski, B. (1988). Baxter Healthcare Corp.: ASAP Express. *Harvard Business School*.

Wexley, K. N. (1984). Personal Training. *Annual Review of Psychology, 35*, 519-551.

Worldbank. (2006). *Information and Communications for Development: Global trends and Policies.* Washington, DC: World Bank.

WorldEconomicForum. (2014). *Global Information Technology Report 2014.* World Economic Forum.

Yin, R. (2009). *Case Study Research: Design and Methods, Fourth Edition.* Thousand Oaks, CA: Sage Publications.

Zikmund, W.G., Babin, B.J., Carr, J.C. and Griffin, M. (2010), *Business Research Methods (8E),* South-Western Cengage Learning, Mason, OH.

Appendices

Appendix A: List of soft skills

Organizational awareness (understands organization, knows constraints, power and political astuteness, cultural knowledge)
Concern for order, quality & accuracy (monitoring, Concern for clarity, reduces uncertainty, keeping track of events and issues)
Impact & influence on others (strategic influence, impression management, showmanship, persuasion, collaborative influence)
Customer service orientation (helping and service orientation, focus on client needs, actively solves client problems)
Developing others (training, Developing others, coaching, mentoring, providing support, positive regard)
Directiveness (assertiveness, decisiveness, use of power, taking charge, firmness of standards, group control and discipline)
Team leadership (being in charge, vision, Concern for subordinates, builds a sense of group purpose)
self-control (stamina, resistance to stress, staying calm, high Emotional Quotient, resists temptation, not impulsive, can calm others)
organizational commitment (align self and others to organizational needs, business mindedness, self-sacrifice)
Communication skills (conveying the information to others effectively and efficiently)
creativity (tendency to generate ideas, alternatives or possibilities)
Adaptability (ability to adapt yourself to the changed circumstances or environment)
Ability and willingness to learn (desire and aptitude for learning, learning as a basis for action)
Interpersonal understanding (empathy, listening, sensitivity to others, diagnostic understanding, awareness of others' feelings)
Self-confidence (strong self-concept, internal locus of control, independence, positive ego strength, decisive, accepts responsibility)
Information seeking (problem definition, diagnostic focus, looking deeper, contextual sensitivity)
Relationship building (Networking, establish rapport, Concern for stakeholders e.g. clients, use of resources, contacts use)
Teamwork and cooperation (Fosters group facilitation and management, conflict resolution, motivating others, good climate)
Flexibility (Adaptability, ability to change, perceptual objectivity, staying objective, resilience, behavior is contingent)

Appendix B: Pilot Interviews

Professional and Interpersonal ICT skills in Lebanon
Interview Guide
Introduction

This is a research project that aims to identify the required and existing skills in the information technology industry in Lebanon and determine if there is an IT skills shortage in the MENA region, in general and in Lebanon, in specific.

The interview will be conducted in an anonymous manner and your name will not be mentioned on the interview guide or any other documents related to this research. The confidentiality related to the protection of data collected will also be applied. Your participation is voluntary in this research and the autonomy of your participation will be also respected; you are free to withdraw the data provided any time.

The research will adhere to all ethical norms. You agree to participate in this study project by responding to the questions raised in the interview guide. If you need any clarification, kindly ask the research team listed below.

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Interview Guide – ICT Professionals
1. What is your job title and grade in the organization?
2. Can you describe the latest three projects on which you worked?
3. Considering these projects, what would you say are the most important skills for success on these projects?
4. What skills do you think are lacking among the employees working on these projects? What skills do you think are over-represented among the employees on these projects?
5. Does your organization offer trainings to its employees? If so, in what?
6. Could you describe or provide me with the advertisements for the latest 3-5 positions hired in

Interview Guide – HR Professionals

1. What is your job title and grade in the organization?
2. Can you describe the process that is used to advertise for jobs within your organization?
3. Who would say is responsible for writing the job descriptions and determining the required credentials?
4. On average, what is the salary range for a fresh IT graduate in your organization?
5. In your experience, for what kills or experience is the organization willing to pay more?
6. What's the selection criteria used in your organization to hire the right person?
7. How many levels of interviewing are you doing?
8. What information will you give to the candidate during the interview?
9. Do you offer training to your employees? If so, how many and on what topics?
10. Would you be able to provide me with the advertisements for the last 3-5 positions hired for in your organization?

Interview Guide – IT user

1. What is your job title and grade in the organization?
2. What types of jobs are required in your department?
3. When you hire new employees, what are the five most important skills for an employee to have?
4. Can you describe how you use IT within your organization?
5. Does your organization have a specialized IT department for handling IT related issues and/or rolling out organization specific software?
6. Thinking of the last time you communicated with somebody from the IT department, how would you describe that interaction?
7. In general, what do you think are the strengths and weaknesses within your organization's IT department?

Appendix C: Interview Guide with ICT Managers

Note: The Below interview's guide was conducted with the manager of Cybersecurity unit. The other guides are available upon request.

1. What is your job title and grade in the organization?
2. Can you describe the latest three projects on which you worked?
3. Considering these projects, what would you say are the most important skills for success on these projects?
4. What skills do you think are lacking among the employees working on these projects? What skills do you think are over-represented among the employees on these projects?
5. Does your organization offer trainings to its employees? If so, in what?
6. Could you describe or provide me with the advertisements for the latest 3-5 positions hired in your organization?
7. Please rate the importance of the below skills in your unit to perform the tasks? "1 = unimportant, 2 = slightly important, 3 =important, 4 =very important, 5 =critical"

Rating	Skills	Rating	Skills
	Organizational awareness		Provide Data/Information Assurance
	Concern for order, quality & accuracy		Ensure Infrastructure and Network Security
	Impact & influence on others		Implement/test contingency and backup plans and coordinate with stakeholders
	Initiative		Develop, Manage and Enforce Security Policies
	Customer service orientation		Perform Security Education and Training
	Developing others		Develop and Implement Physical Security, Deterrence and Detection
	Directiveness		Perform System Design and Analysis
	Team leadership		Audit and maintain systems performance and ensure future readiness
	Self-control		Project Management
	Organizational commitment		Task Management
	Communication skills		Problem-solving/ Troubleshooting
	Creativity		Others?
	Adaptability		
	Ability and willingness to learn		
	Interpersonal understanding		
	Self confidence		
	Information seeking		
	Relationship building		
	Teamwork and co-operation		
	Flexibility		
	Others?		

8. Please rate the proficiency of your employees in the below skills from 1 to 5?

"1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Excellent"

Rating	Skills	Rating	Skills
	Organizational awareness		Provide Data/Information Assurance
	Concern for order, quality & accuracy		Ensure Infrastructure and Network Security
	Impact & influence on others		Implement/test contingency and backup plans and coordinate with stakeholders
	Initiative		Develop, Manage and Enforce Security Policies
	Customer service orientation		Perform Security Education and Training
	Developing others		Develop and Implement Physical Security, Deterrence and Detection
	Directiveness		Perform System Design and Analysis
	Team leadership		Audit and maintain systems performance and ensure future readiness
	Self-control		Project Management
	Organizational commitment		Task Management
	Communication skills		Problem-solving/ Troubleshooting
	Creativity		Others?
	Adaptability		
	Ability and willingness to learn		
	Interpersonal understanding		
	Self confidence		
	Information seeking		
	Relationship building		
	Teamwork and co-operation		
	Flexibility		
	Others?		

Appendix D: Survey Guide with ICT employees

Note: The Below survey was conducted with the cybersecurity employees. The other surveys are available upon request.

Professional and Interpersonal ICT Skills in Lebanon

This is a research effort conducted by faculty at the Lebanese American University. The research is focused on collecting information about the skill sets needed in the IT industry.

The purpose of this survey is to assess, from the perspective of the employees in a large IT company, the skills that are held across the various subdivisions of that company.

The questionnaire is voluntary and the collected data is confidential. All participants will not be identified and you have the posssibility to not answer any specific question. The collected data will be studied and used at an anonymous, aggregate level.

In case of any questions, you can contact:

Mohamad Al Mallah, Tel:70 938502 , Email:mohamad.mallah@lau.edu
F. Jordan Srour, Ph.D. , Tel: 01-786456 x1235 , Email:Jordan.srour@lau.edu.lb

If you have any questions about your rights as a participant in this study, or you want to talk to someone outside the research, please contact the:

IRB Office,
Lebanese American University
3rd Floor, Dorm A, Byblos Campus
Tel: 00 961 1 786456 ext. (2332)

1. Your gender is:
- o Male
- o Female

2. Are you Lebanese?
- o Yes
- o No

3. What is the highest level of education you have completed?
- o High school
- o Bachelor's degree
- o Master's degree

- o Doctorate
- o Other

4. What is your job category?

- o Database development and administration
- o Enterprise systems analysis and integration
- o Network design and administration
- o Programming/software engineering
- o Technical support
- o Web development and administration
- o Cybersecurity

5. How many years of experience do you have in the IT industry?

- o 0 to 2 years
- o 2 to 4 years
- o 4 to 6 years
- o 6 to 8 years
- o 8 to 10 years
- o > 10 years

6. Do you possess any professional certification?

- o Yes
- o No

7. Please list your professional certifications?

8. Please list the trainings you have attended last two years?

9. Please rate your proficiency in the below skills from 1 to 5?

	Poor	Fair	Good	Very good	Excellent
Organizational awareness	O	O	O	O	O
Concern for order, quality & accuracy	O	O	O	O	O

	Poor	Fair	Good	Very good	Excellent
Impact & influence on others	○	○	○	○	○
Customer service orientation	○	○	○	○	○
Developing others	○	○	○	○	○
Directiveness	○	○	○	○	○
Team leadership	○	○	○	○	○
Self-control	○	○	○	○	○
Organizational commitment	○	○	○	○	○
Communication skills	○	○	○	○	○
Creativity	○	○	○	○	○
Adaptability	○	○	○	○	○
Ability and willingness to learn	○	○	○	○	○
Interpersonal understanding	○	○	○	○	○
Self confidence	○	○	○	○	○
Information seeking	○	○	○	○	○
Relationship building	○	○	○	○	○
Teamwork and co-operation	○	○	○	○	○
Flexibility	○	○	○	○	○

10. Please rate your proficiency in the below skills from 1 to 5?

	Poor	Fair	Good	Very good	Excellent
Provide Data/Information Assurance	○	○	○	○	○
Ensure Infrastructure and Network	○	○	○	○	○

	Poor	Fair	Good	Very good	Excellent
Security					
Implement/test contingency and backup plans and coordinate with stakeholders	○	○	○	○	○
Develop, Manage and Enforce Security Policies	○	○	○	○	○
Perform Security Education and Training	○	○	○	○	○
Develop and Implement Physical Security, Deterrence and Detection	○	○	○	○	○
Perform System Design and Analysis	○	○	○	○	○
Audit and maintain systems performance and ensure future readiness	○	○	○	○	○
Project Management	○	○	○	○	○
Task Management	○	○	○	○	○
Problem-solving/ Troubleshooting	○	○	○	○	○

11. Please rate the importance of the below skills in performing your tasks?

	Unimportant	Slightly important	Important	Very important	Critical
Organizational awareness	○	○	○	○	○
Concern for order, quality & accuracy	○	○	○	○	○

	Unimportant	Slightly important	Important	Very important	Critical
Impact & influence on others	○	○	○	○	○
Customer service orientation	○	○	○	○	○
Developing others	○	○	○	○	○
Directiveness	○	○	○	○	○
Team leadership	○	○	○	○	○
Self-control	○	○	○	○	○
Organizational commitment	○	○	○	○	○
Communication skills	○	○	○	○	○
Creativity	○	○	○	○	○
Adaptability	○	○	○	○	○
Ability and willingness to learn	○	○	○	○	○
Interpersonal understanding	○	○	○	○	○
Self confidence	○	○	○	○	○
Information seeking	○	○	○	○	○
Relationship building	○	○	○	○	○
Teamwork and co-operation	○	○	○	○	○
Flexibility	○	○	○	○	○

12. Please rate the importance of the below skills in performing your tasks?

	Unimportant	Slightly important	Important	Very important	Critical
Provide Data/Information Assurance	○	○	○	○	○

	Unimportant	Slightly important	Important	Very important	Critical
Ensure Infrastructure and Network Security	○	○	○	○	○
Implement/test contingency and backup plans and coordinate with stakeholders	○	○	○	○	○
Develop, Manage and Enforce Security Policies	○	○	○	○	○
Perform Security Education and Training	○	○	○	○	○
Develop and Implement Physical Security, Deterrence and Detection	○	○	○	○	○
Perform System Design and Analysis	○	○	○	○	○
Audit and maintain systems performance and ensure future readiness	○	○	○	○	○
Project Management	○	○	○	○	○
Task Management	○	○	○	○	○
Problem-solving/ Troubleshooting	○	○	○	○	○