



Information and communication technology workforce employability in Malaysia

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Abstract

Purpose – The purposes of the study are to understand ICT workforce employability in Malaysia, to identify the causes that influence the growth of skill gaps in the ICT workforce, and to determine ways to reduce these gaps.

Design/methodology/approach – The methodology of the study comprised project reports and a literature review.

Findings – The findings show that not only Malaysia but also Australia and India are facing the challenges of demand-supply gap as regards a quality ICT-related workforce. The study also indicates that these countries do have similar obstacles and issues of sufficiently trained and experienced ICT graduates.

Practical implications – This study suggests that in the light of the skills demanded by industries and organizations, ICT workers could be trained through an updated course curriculum in line with the needs of industry.

Originality/value – The employability of the workforce in general has been discussed in many papers. This paper specifically discusses employability issues of the information and communication technology (ICT) workforce, and provides values to ICT educators and employers, as well as to potential ICT graduates.

Keywords Information technology, Educational institutions, Training, Curriculum, Skills, Malaysia, Labour specialization

Paper type Research paper

Introduction

ICT has become the key enabler in business success, and an essential element in the foundation of today's dynamic business environments (Bailey and Mitchell, 2006). As ICT offers more opportunities and strategic value to organisations, the demand for quality ICT professionals is increasing day by day. Even though institutions produce IT graduates, there is a shortage of quality ICT graduates (workforce) produced by institutions to meet unmet demand (Birrell *et al.*, n.d.). As a result, the issue of the non-employability of the ICT workforce has risen. The understanding of employability must be clear in this aspect, and can be defined as the extent to which employees have skills that the market and employers consider attractive features (see Scholarios *et al.*, 2004).

The reasons behind focusing on ICT workforce employability are:

- the adequate supply of a skilled ICT workforce; and
- the utilisation of ICT skills to a greater extent, because they help to fuel economic growth in every country (Scholarios *et al.*, 2004).



From overall perspectives, the ICT workforce has proven to be a vital resource as business and IT strategy are perceived and expected to be aligned to each other.

The skills gap among the ICT workforce creates differences in wage range. Over the past 30 years the wage discrepancy between high and low skilled workers has increased in the USA and, to a lesser extent, in Europe (Mahony *et al.*, 2008). This factor has led to the conclusion that the demand for skilled a ICT workforce has increased faster than the supply of a skilled workforce. Even though many developing and developed countries are supplying ICT workforce at a high rate to meet demand, the gap between demand and supply is still widening due to ICT graduates lackinm appropriate skill sets (soft and technical skills).

The scenario of ICT workforce employability in the context of Malaysia is quite similar to Australia and India. The demand for ICT workforce in Malaysia has increased in the recent years, but not supply. Those graduates who are unemployed are those who do not meet industry requirements (PIKOM, n.d.).

ICT workforce

Before comparing and matching the similarities among India, Australia and Malaysia on the issue of ICT workforce employability, it is necessary to provide a brief and simple definition of an ICT workforce. An ICT workforce is composed of organisational employees undertaking designing, building, testing, maintaining, and operating organisational applications and infrastructure. People who perform similar tasks to those mentioned above but who are positioned in a functional area within the organisation such as marketing are also information technology workers. However, the definition sometimes is unclear, as more workers in all fields increasingly attempt to shift their roles toward information processing (Pfeffer, 1998). Central to the concept of the ICT workforce are employees who are assigned to manage information systems (IS) or data processing departments for developing new applications, integrating diverse vendor products, and maintaining an information infrastructure at firms whose main products may not be information- and computer-oriented (Niederman and Crosetto, 1999).

Therefore, the definition and nature of the ICT workforce for this study will refer to those workers who are directly involved with the creation of new information technology and the maintenance of existing processes. However, this boundary of understanding the ICT workforce may vary from organisation to organisation depending on the type of organisation and roles of its employees.

ICT workforce employability

This section explains the findings regarding the demand and supply of ICT workforce together with the skills gap, bridging this gap, and government initiatives in the context of Australia, India and Malaysia

ICT workforce demand in Australia, India and Malaysia

The ICT field is blooming by almost any standard worldwide. The scenario in Australia is not different from that growth. "The number of workers in the computer and software industries has almost been tripled in the past decade" (Freeman and Aspray, 1999), and according to the projections by the Bureau of Labour Statistics for the period 2000-2010 (Noll and Wilkins, 2002), computer-related vacancies occupied

eight of the top ten positions among the fastest growing occupations. Those computer-related occupations included software applications engineers, support specialists, systems software engineers, network and systems administrators, network systems and data communications analysts, desktop publishers, database administrators, and systems analysts (Noll and Wilkins, 2002). From the projections by the Bureau of Labour Statistics above, it is clear that the demand for ICT workforce will be very high in Australia in the coming years. The scenario in India is not much different from the Australian perspective. Although the number of ICT graduates has increased rapidly in the past decade, it is still a very small number compared to the overall number of graduates emerging in various fields in India. On average each year, more than 2.5 million university graduates are produced in India, of which 20 per cent (0.50 million) are from technical majors. According to the National Association of Software and Services Companies (NASSCOM; see Cisco, n.d.), only 25 per cent of those technical graduates (125,000 out of 0.50 million) are from engineering majors, and approximately 15 per cent of the rest of the two million graduates (300,000) are considered employable by fast-growing IT companies. However, the remaining 75 per cent of technical graduates (375,000 out of 0.50 million) are unemployable. Thus, the demand for a skilled ICT workforce remains high in India due to ICT graduates lacking soft and technical skills. From the Malaysian perspective, ICT or computer-related work opportunities have increased rapidly, even though there was a worldwide economic downturn in 2009.

According to Multimedia Super Corridor (MSC) Malaysia Supply-Demand Study of the ICT Industry (MSC/KDI, n.d.), there will be a need for more than 45,000 ICT workers from only two sub-areas of ICT – software development and network security – by the year 2012. Overall there will be a demand for more than 70,000 ICT professionals within the next two years. This means that ICT workforce demand in all three countries (i.e. Australia, India and Malaysia) is similarly high.

ICT workforce supply in Australia, India and Malaysia

Knowing the demand, it is then necessary to know the supply side of the ICT workforce. From the Australian perspective, the current demand for skilled ICT workers is greatly exceeding predictions, whereas the supply of skilled ICT graduates is not that high. One of the main causes is that the capacity of Australian training institutions is not sufficient to meet demand. This helps us understand the clear evidence of both the increased number of job vacancies that evidences the high demand, and on the other side, recruitment problems in the computing field due to a lack of a supply of skilled workers. As a result of that evidence, alarm bells have been ringing in both industry and government sectors in Australia. The situation is that if Australia cannot produce the required number of ICT professionals, then its capacity to be a competitive global player in knowledge industries may be under threat (Birrell *et al.*, n.d.). The supply of the ICT workforce in India seems to be the same as Australia. There was a shortage of supply in previous years. The National Association of Software and Services Companies (NASSCOM) predicted that India's IT sector was expected to face a shortfall of half a million professionals by 2010, while it was suggested by an International Data Corporation (IDC) report (Cisco, n.d.) that India was expected to experience a shortage of 118,000 skilled IT networking professionals in the year 2008 alone. The situation for the years 2009 and 2010 is still unknown, but

perhaps through forecasting of the ICT workforce in India, may have been that current demand was met. The scenario in Malaysia is surprising too, as Malaysia has addressed the shortage of a skilled ICT workforce. A study conducted by the consulting firm AT Kearney (Chow, n.d.) indicated that after securing a rank of 22nd, Malaysia had fallen out of the top 25 destinations for foreign direct investment (FDI) in the past two years, and in the Central Intelligence Agency (CIA) *World Factbook* for 2009, Malaysia secured 35th position in the FDI rankings. Among many reasons for Malaysia falling down the FDI rankings is its shortage of highly skilled ICT labour.

Skill gap among the ICT graduates

A skill gap is defined as a shortage of skills in any graduate needed by industry at the time of appointment as an ICT worker. There is huge shortage of skilled ICT workforce in Australia, although universities are producing quite a large number of ICT graduates; however, the skills gap among these ICT or computer related graduates is wider. A similar scenario is also found in India. There is a wide skills gap among the ICT workforce in India. One of the main causes for the skills gap lies in the quality of talents being mixed out (Cisco, n.d.). It is not surprising that Malaysia too has a huge skills gap in the ICT workforces. Government and industry have addressed the ICT skills shortage, and Malaysia's Ministry Of Higher Education (MOHE) has signed an agreement with networking solutions firm Cisco to help address the country's growing ICT skills shortage (Kumar, 2010). Thus, it is clear that in all three countries (i.e. Australia, India and Malaysia) there is a shortage of skilled ICT graduates among the overall workforce.

Bridging the skills gap and government initiatives

In Australia, in response to the shortage of skilled ICT workforce, the government has announced a series of initiatives and approaches related to ICT. First of all, these initiatives included more research on the skills needed and a survey to understand student demand for computing courses in universities, as many qualified students cannot secure a place on particular courses. Second, there was expected to be better information flow between industry and the higher education institutions to encourage more appropriate training programs for the students of computing on a regular basis. The third initiative was to improve communications between industry and educational institutions, such as industry-funded internship programs for undergraduates and graduate students and perhaps industry-university partnership in teaching and learning. Finally, the Australian government launched an initiative from an immigration point of view to understand the opportunity of overseas students to go to Australia to study in computing-related fields that would allow those students to apply for permanent residence under the skilled Australian linked (SKL) and independent categories directly upon completing their courses. In all these ways, the Australian government initiated essential steps to reduce the gap in the ICT skilled workforce (Birrell *et al.*, n.d.).

In the context of India, a good initiative has undertaken to engage industry and academia to develop an updated curriculum focusing on industry demands for students in ICT-related fields. The current state of the ICT workforce in India shows a compelling case for public-private partnership through industry-academia alliances to enhance capacity development amongst university students. As well as the

industry-academia memorandum, NASSCOM's IT Workforce Development (ITWD) program is specifically designed to address the issues and concerns of the industry as well as the challenges and opportunities of the higher learning institutions. Many IT companies have partnerships with engineering colleges, and about 20 universities have established expanded engagement between industry and the academic world to create universally accepted benchmarks such as some certifications and policy-driven changes in academic curriculum (Cisco, n.d.). Therefore, educational institutions can now update their syllabus for certain specialised academic courses in order to make them more relevant to meet industry needs, with regular revisions and updates from high-profile corporate professionals who have a deep understanding of current business developments and various technical standards around the world.

In the context of Malaysia, to address the issue of the shortage of skilled labour in the ICT sector, the Malaysian government is investing money in a high-quality, comprehensive education system that is designed to meet the demands of the competitive global economy. There are several additional efforts that have been made to increase ICT literacy in Malaysia (Chow, n.d.). The MOHE is excited to partner with Cisco as the country constantly needs such strategic initiatives to bridge the gap between Malaysian graduates and the demands of the current job market, especially from the private sector. According to MOHE Secretary-General Y.Bhg. Datuk Dr Zulkefli Bin A. Hassan: "As we continue striving for a higher value-added knowledge-based economy to amplify the country's growth, it is certainly encouraging to see leading industry players lending their support by creating relevant opportunity and environment for the academia" (Kumar, 2010).

The Multimedia Super Corridor (MSC), Malaysia Undergraduate Apprenticeship and Development (UGRAD)-Scope International Programme is designed to enhance the employability of fresh graduates in Malaysia. It offers practical training for undergraduates nationwide, and aims to develop an industry-relevant talent pool for ICT industries in Malaysia (Kumar, 2008). In addition, the CEO of the Multimedia Development Corporation (MDeC), has stated that the UGRAD programme will not only provide an edge for Malaysian graduates to face the challenges ahead, it will also prepare them for seamless entry into the highly competitive global ICT and banking sectors upon graduation.

Discussion on the findings

Australia has a lack of IT training institutions as well as low enrolment opportunities for talented students in universities for ICT-related programmes. India has a very low percentage of students entering higher education. However, Malaysia has a small number of skilled ICT professionals. Graduates are coming out of each higher learning institution, but the question is whether they have the quality skills that are required by employers, or whether there is a skills gap between what skills are currently in demand and the skills that university graduates possess. The answer is yes, there is a huge gap between demand and supply in the ICT workforce in Malaysia. In most of cases top IT companies prefer graduates from certain universities due to the perceived good quality of their graduates. This scenario may not have happened if there had been a strong understanding and good relationships among universities and industry in Malaysia. India could be a good example here. In India links are maintained among the engineering colleges and industry, together with 20 + universities collaborating in

order to exchange ideas, information and knowledge to trying to reduce the skills gap of the ICT workforce.

There is also a need to ensure that Malaysian young people and graduates are sufficiently skilled and well trained to meet the demands of the job market. ICT graduates should not only have the relevant paper qualifications but should be suitably skilled in the practical and commercial aspects of business. Therefore, the potential ICT graduates need to have a proper mindset based on the current and potential market demands. Some higher learning institutions have established training institutions or departments such as a Centre for IT Advancement or a Centre for IT Excellence in order to offer professional and practical IT courses, vocational training courses, but they still are very few compared to the number needed to meet the demands of the market.

Though some excellent efforts have been made by MSC and MDeC through their various training programmes, they have not been sufficient to cover demand. Thus, creating and maintaining industry-academia ties is very important in this regard.

Table I presents a summary of these discussions

Implications for higher education

According to the study conducted by Abraham *et al.* (2006), the top entry-level skills desired by employers are programming, system analysis, system testing, system design, voice/data telecommunication, help desk, IT architect, database design and management and operating systems in the technical domain; and communication and industry knowledge in the business domain (see Figure 1).

No.	Criteria	Malaysia	Australia	India
1	Low enrolment in IS program	✓	✓	✓
2	Public-private partnership: memorandum between industry and academia	×	×	✓
3	Demand for skilled ICT workforce	✓	✓	✓

Table I.
Comparison based on the
specific criteria found in
the study

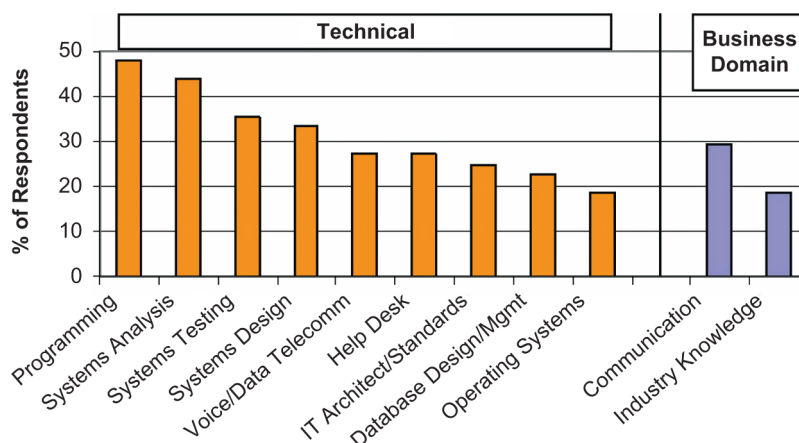


Figure 1.
Top entry-level skills
desired by the employers

After determining which skills are very important for fresh ICT graduates to obtain, we now aim to understand how the most desired entry-level skills provide useful insight into the value of IS or IT programs at the undergraduate and graduate levels. Initially, the basic technical skills are those required of entry-level employees; these are the most likely to be outsourced in larger organisations. Thus, we can conclude that there will be little opportunity for technical graduates at larger firms. This may vary depending on the curriculum of the IS program. The more significant message is that in most cases IT senior management wants to hire ICT or information system (IS) graduates with a foundation in technical skills, but also with knowledge of the business domain and project management skills, and in addition, the capability to work closely in a team in non-technical departments.

From the context of higher learning institutions, having IS programs in business schools is the right approach to preparing tomorrow's ICT workforce by teaching technical skills together with business fundamentals, analysis and design, and the capabilities to communicate and work on projects effectively through learning project management skills. In many universities, the information systems programs offered in the business schools are designed to emphasise a combination of skills and capabilities for students. The aim of IS programs is to produce graduates with adequate technical knowledge to manage IT and understand its critical role in the organisations. Understanding the alignment of information systems to business is vital in IS programs. This orientation equips IS graduates with a diverse and more relevant set of skills and capabilities as compared to those acquired by a graduate with a computer science degree, which teaches technology without having a solid grounding in the areas of management and business. Thus, it is suggested that each business school has an IS program that is developed with an influence of both technical and soft skills that will suit IS graduates in any business organisation.

Future recommendations for the IS or IT curriculum

The study conducted by Abraham *et al.* (2006) shows the skills required by IT or IS graduates and emphasised the significance of a management focus and the business context in IS programs. There is a need to integrate the following areas for a comprehensive IS program:

- business domain knowledge such as company and industry knowledge, and related problem solving;
- project management and related team skills; and
- technical skills, analysis and the design of solutions to meet real-world problems.

Therefore, the key recommendation is that IS programs must provide a business-context driven education to offer students with the business and client-meeting skills that most industries demand. A conventional classroom setting using traditional ways of teaching and learning such as lectures, assignments, and individual homework may not easily present a business setting. A business-context oriented education benefits IS students and future IT employees more than a traditional education system. Morello (2005) discussed the change in the IT profession to a more business-oriented focus than the technical drive of the past. George *et al.* (2005) emphasised that IS programs focus more on why IT is valuable to a company or a business organisation rather than on how it works. They recommend a more integrated

curriculum that is more closely tied to industry. That means establishing public-private partnerships and maintaining two-way industry-academia communication as happens in India nowadays: this is highly recommended for producing successful IS graduates who are better suited to real-world problems.

It is recommended and expected that IS or IT programs should respond to the findings of this study on the basis of three sections:

- (1) the academic curriculum;
- (2) industry alliances; and
- (3) enrolment issues.

In higher learning institutions, the organisational structure of departments and the program structure of curricula may need to be adapted in order to offer business-driven IS programs. This adaptation becomes quite challenging when institutional systems do not support integration and collaboration across disciplines and alliances with industry. Finally, it is strongly recommended to accept more student enrolments in IS, IT or CS programs given the current shortage of skilled ICT workforce, especially in the Malaysian context.

As regards the structure of the curriculum, although the Association for Computing Machinery (ACM) provides guidelines for IS or IT programs, its body of knowledge only technical aspects and core courses are emphasised regardless of business context, from which arises the issue of the poor employability of IS graduates. From the Malaysian point of view, the country has its own government agency – the Malaysian Qualifications Agency (MQA) – which also provides a body of knowledge for IS or IT programs with the exclusion of business contexts. Thus, it is really challenging for higher learning institutions in Malaysia to adopt a standard industry-focused IS or IT program nationwide when such a program is not emphasised in the academic curriculum. Therefore, higher learning institutions in Malaysia have to take the initiatives to adopt the necessary business courses in IS programs in order to meet real-world demand, as overcoming the shortfall of the skilled ICT workforce is obviously possible.

Conclusion

ICT workforce employability is not only an issue for Malaysia, but also for Australia and India. The employment market for ICT graduates in Malaysia is competitive, as are other sectors. It is important to realise that the demand for skilled ICT graduates and IT professionals is very high, even though universities are producing quite large numbers of ICT graduates per year. However, in terms of quality, most of those graduates do not meet the skill requirements desired by IT employers. The dilemma is that what industry expects from potential graduates in most cases is unknown to the universities, and what universities are producing seems not to be welcomed by IT employers in many companies. This scenario may not be true in all cases, but is in the majority. This study has pointed out why the demand-supply gap is getting wider, and how Malaysia especially could overcome this situation. While key players in the country, such as the government, universities and industry, are aware of and inclined to bridge the skill gap of ICT graduates, there is no satisfactory strategy in the first place that would allow universities and industry to play their roles effectively. Therefore, this study provides some implications for higher education, and proposes

recommendations for IS curriculum reform based on the business context in Malaysia. In a triangulated approach, government, universities and industry need to sort out the shortage of a skilled workforce in the future. A collaborative link and an agreement to produce graduates with the required skills to meet the future demands and contribute to the economic growth of Malaysia is needed.

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