Assessment of the impact of IT outsourcing on IT education in Malaysian institutions of higher learnings

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Abstract— Malaysia is aggressively promoting its shared services and outsourcing (SSO) business models across vertical industries as a preferred hub in Asia. It is projected for multiple growths in demand for IT graduates to fulfill this IT outsourcing phenomenon by 2012. This poses a question to the Institutions of Higher Learnings (IHLs) in Malaysia. Can the present IT curriculum equip the graduates with skills and knowledge for different vertical industries and produce knowledge workers? In this study, we not only examined and reviewed available literature, newspaper and web articles, companies' websites and press releases but also sought in-depth insights and experiences from senior executive managements in service provider firms in Klang Valley on the skills and capabilities requirements of fresh IT graduates to fulfill the market needs of IT outsourcing in Malaysia. In addition, a CEO roundtable discussion was held in International Islamic University Malaysia which also discussed on the topic. The research team found that technical, soft and problem-solving skills are the main areas of concerns necessary to develop knowledge workers that meet the requirements of the SSO industry.

Keywords—curriculum of Institutions of higher learnings (IHLs), IT education Malaysia, International Islamic University Malaysia (IIUM), skill sets.

I. Introduction

THE rapid change in information and communication technology (ICT), businesses practices, and innovations warrant for realignment of the IT curriculum to suit the needs for business strategies. IT outsourcing (ITO) phenomenon has sparked this new requirements for skills, knowledge and

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capabilities of IT graduates in Malaysia. Businesses are currently outsourcing the following jobs: maintenance/repair, training, applications development, consulting and reengineering, and mainframe data centers; and executives are considering outsourcing: client/server development, networks, desktop systems, end-user support, and full IT departments.

Multimedia Development Corporation (MDec) is a government arm entrusted to spearhead the growth of IT industry with its Multimedia Super Corridor (MSC) flagship initiatives. Recently, the Prime Minister of Malaysia has launched the Shared Services and Outsourcing (SSO) initiative in Austin, Texas in 2005 in an effort to promote Malaysia as a preferred SSO hub in Asia. Experts predict that although many entry-level jobs are being moved offshore, there is a looming shortage of technical workers in the US [8] [11] [14].

Recent media reports on the frantic efforts by Malaysia to become the top shared services and outsourcing hub in Asia has opened up the issue on IT workforce to complement this noble business move by the government.

A. Growth of SSO market

The global worldwide Shared Services and Outsourcing (SSO) market is expected to grow at a CAGR of 15 per cent over the next few years, reaching USD1.43 trillion by 2009 as compared to USD930 billion in 2006.

"The outsourcing need is growing and we intend to fully leverage on our achievements to meet this need," said MDec Chief Executive Officer. He added that ICT services like SSO contributed RM2.8 billion to the Malaysia Gross Domestic Product of RM495.6 billion. Multimedia Development Corporation (MDec) is a government arm to spearhead the growth of IT industry with its Multimedia Super Corridor (MSC) flagship initiatives. Outsourcing Malaysia and PIKOM chairman cited that the local SSO industry is currently worth USD300 million growing at a CAGR of 30% year on year, compared with the current global IT outsourcing size of USD24 billion. In 2012, the Malaysian SSO industry is targeted to be worth USD2 billion providing 300,000 jobs.

B. Research Question

There are 46 public and private universities excluding colleges throughout Malaysia today. The Ministry of Education is responsible for primary and secondary education while Ministry of Higher Education (MOHE) is responsible for policy and administration of institutions of Higher Learning (IHL). MOHE recognizes the evolving changes in education requirements to meet industry needs. Various policies were drawn to make IT education is always relevant to practice and not merely providing the theoretical foundation to the students. In our faculty, Kulliyyah of Information and Communications Technology (KICT), International Islamic University Malaysia, the curriculum has always been reviewed frequently to align with the current needs. In addition, education-industry collaboration or partnership continued to be fostered and strengthened every year for various strategic purposes.

In light of the rapid adoption and innovation of ICT in all sectors generally and the recent ITO phenomenon particularly, we undertook a study to investigate (i) the ITO practices in Malaysia and (ii) the entry-level skills and capabilities based on Malaysia IT curriculum and the requirement of the ITO industry. This paper summarises our findings, and discusses the implications for our research question:

R1: Does the current IT curriculum in Malaysian university, IIUM particulary, suffice and meet the requirements of industry in light of ITO phenomenon?;
R2: What are the skills and capabilities highly sought for by the practitioners in SSO industries?

II. LITERATURE REVIEW

It is clear that industry involvement is a very valuable part of the educational process, particularly in technical fields that are prone to rapid change. What is not so clear is how to make the connections needed to successfully and meaningfully integrate industry input into curriculums and courses [5]. It is well recognized that a trained, skilled and well-educated workforce is critical in enhancing work and economic performance and sustaining competitiveness as Malaysia transforms into an ICT-driven and knowledge-based society [18].

In KICT, IIUM, the IT/CS courses curriculum is designed based on the requirements of higher education ministry (MOHE), Malaysian Qualifications Agency (MQA) and industries. For engineering students, including computer engineering, however, another accreditation has to be followed. Since February 2005, all Public IHLs offering engineering programmes were instructed to move towards outcome based education (OBE) in order to satisfy the main criteria of the Washington Accord [1].

Malaysia Qualification Framework (MQF), 2005 promotes outcome based education (OBE) learning process [3] [17]. OBE calls for the evaluation of the subjects Learning Outcomes (LO) as specified in the Program Specification. Zaharim et al [17] conducted a study on Universiti Kebangsaan Malaysia's (UKM) engineering and IS students' perception towards an introduction to engineering course using the outcome-based education approach at the University in 2006. A survey was conducted to obtain feedback from students and it was found that the OBE learning method was well accepted by the students and they achieved the identified learning outcomes designed for the course. Three outcomes were identified that is the ability to communicate effectively, attainment of life long learning skills and having the knowledge of contemporary issues. In a study using Rasch-based measurement model as performance assessment tool to measure the subject LO, Aziz et al. [3] shows that the measurement model results in more accurately classified examinees and that the students' competency gap with industry expectation can now be put under better control.

Lah [12] proposes that AL (Action Learning) and AR (Action Research) can be used as catalysts to improve learning in the contexts of knowledge-based activities and tools for k-workers and k-professionals in order to develop their capacities to implement k-based programs. He examines the basic concepts of AL and AR approaches that are widely used and suggests relevant learning strategies to develop work place or on-the-job learning in a k-based economy and k-society. A few critical success factors in AL and AR approaches are discussed in order to highlight human capacity building for k-workers and k-professionals.

III. RESEARCH APPROACH

To answer the research questions, we review relevant literature, newspapers and non-academic articles, reports and presentations and also websites. In particular, we obtained information on curriculum structures from two universities namely IIUM and MMU on their undergraduate IT and CS courses. In addition, we held a outsourcing Malaysia CEO roundtable discussion on strategic sourcing and further explored seven key senior executive managements in ITO service provider firms in Klang Valley, Malaysia through a focus group. They were randomly selected. These key informers are responsible for operations and human resource management in their organizations and therefore, are suitable respondents for us to get their in-depth insights and experiences for our study. All of them have more than ten years working experience. Most of the firms have overseas clients.

IV. FINDINGS

To understand the current curriculum, we present IIUM and MMU Bachelor of IT and CS courses. In KICT, IIUM, Bachelor of IT and Bachelor of CS are offered to local and international students. A student shall complete 128 credit hours of coursework including a successful completion a minimum of 8 weeks of Practical Training. Table 1 shows the curriculum structure of BIT (July 2002 intake onwards).

University required courses (23 credit hours) include general studies (12 credit hours) such as Islamic Worldview, Islam, Knowledge and Civilization, Ethics and Fiqh for Everyday Life and Methods of Da'wah with three credit hours each. For language courses (5 credit hours), students can elect from either Business Communication for Malaysian Students (2 hours), Language for Academic Purposes (3 hours) or Language for Occupational Purposes (3 hours). Co-curricular (3 credit hours) requires a student to select either Spiritual package, Leadership package or Interest-based package.

A minimum of 33 credit hours have to be completed from the Kulliyyah required courses. The 3-credit hour subjects are Introduction to Management, Introduction to Database, Internet Applications, Structured Programming Language, Mathematics for Computing, Introduction to Computer Organization, Foundation of Quantitative Analysis, Information Retrieval, ICT & Islam, Computer Networking and Cyber Law and Ethics.

A minimum of 60 credit hours have to be completed from the Department required courses. The subjects include Introduction to Marketing, Introduction to Organizational Behavior, Decision Science, Introductory Economics for Engineering, Financial Accounting 1, Data Structures & Algorithms, Java Programming, IT Security I, Principles of Artificial Intelligence, Operating Systems, Database Programming, Multimedia Technology, System Analysis & Design, Management Information Systems, E-Commerce, Human Computer Interaction, IT Project Management, Information Resource & Strategy Management, Final Year Project I and Final Year Project II.

During the final year, students are given the flexibility to freely select their elective courses which best suit their career goals. A minimum of 12 credit hours (or four courses) have to be fulfilled from the following Department elective courses list. These include 3-credit hour subjects such as Advanced Database, Data Mining, Web Programming, Creative Design Technique, Animation Technique, Web Programming, Software Engineering, IT Security II, Network and System Administration, Advanced Networks and Network Programming.

Faculty of Information Technology, MMU, offers Bachelors of Information Technology in Information System Engineering, Software Engineering, Knowledge Engineering, Multimedia Systems, Multimedia Technology Management, Bachelors of Multimedia in Software and Animation and Software Engineering and Games Design and Bachelor of Computer Science.

For Bachelor of IT in Information Systems Engineering for instance, students must complete Mathematical Sciences, Core, Major, Elective, University Subjects/MQA Compulsory Subjects and Arts and Humanities subjects. For Mathematical Science, students study Mathematical Techniques I (3h), Mathematical Techniques II (3h), Probability & Statistics (4h) and Resource Management Techniques (3h). The core subjects include Computer Programming l, Computer Programming ll, Operating Systems I for 3-credit hour subjects and Digital Systems, Discrete Structures and Introduction to Machine Architecture for 4-credit hour subjects. For major subjects such as 3-credit hour Logic Programming, Object Oriented Programming, Computer Graphics, Data Structures & Algorithms, Database Systems, Information Systems Development, System Analysis & Design, Decision Support Systems, Database Design & Management, Information Systems Audit, Software Engineering Fundamentals, Computer Networks, Artificial Intelligence, Information Systems Planning, Software Reliability and Quality Assurance, Expert Systems, Human Computer Interaction and Ethics and Professional Conduct. Data Communication & Telecommunication Systems (4h) and Technopreneur Venture (2h) are also major subjects. A three credit hour elective subject entitle students to select one from Data Mining and Machine Learning System, Web Services, Introduction to Knowledge Management, Parallel Processing, Wireless Computing and Mini Project. For Arts and Humanities subjects, students complete Technical Communications (3h) and Basic Economics, Accounting and Management.

These two universities curriculums for BIT for example, is not easily comparable like with like. However, interesting to note is that all courses give much emphasis on technical and non-technical subjects with different credit hour equivalents. In addition, each university tries to equip their students with different skill-sets. For example, IIUM and MMU, as part of national MQA requirements, require students to complete general studies, language courses and co-curricular activities besides the technical skills taught by respective faculties or departments. This aims to balance the strengths of graduates in moral/ethics, social responsibilities and specific relevant job skills. Depending much on the graduates and also preferences of potential employers, we can say that the curriculum in Malaysia is equivalent with International curriculum such as ACM, AICTE (see [10]), North American and European universities curriculum.

Based on the two curriculum offered by two universities above, we investigate the industries' expectations on IT graduates. Client services department of MDec in 2004 conducted a survey to 760 MSC-status companies with a 87% response rate (Ahmad, U.H.A., 2004). 59% of the respondents indicated that Malaysia does have the ability to supply sufficient number of ICT talents for MSC status companies. The most wanted technical skills are (i) Software Programming, (ii) Database & E-Commerce, (iii) Software Engineering & Project Management, (iv) System Administration, Networking & Telecommunications and (v)

Creative Multimedia and Security. Writing and communication skills, however, seem to be the major skills that we are lagging in. The survey done in 2007 also revealed that English communication is the top response by MSC-status companies. This is followed by Java Technologies, Microsoft Technologies, Animation, Operating Systems, Helpdesk Management, Business Analyst, Network Design/Management, Project Management, Data Warehousing and SAP Packaged Implementation as the ten top skills required by the respondents.

To support the MDec's survey findings, we further interviewed seven ITO firms senior management. The respondents described a variety of knowledge and skills desired in IT graduates entering their organizations. One thing was obvious, company needs vary. There were, however, common themes that emerged from the discussions to help answer our two research questions. The summary of the skills and capabilities are tabulated in Table 1.

Table 1. Summary of skills and capabilities responses from interviews

Skills and Capabilities / Subjects	Frequency
A) Technical Skills	
i) Computer science subject	
- Programming	3
ii) Computer engineering subject	1
- Databases	4
iii) Multimedia subject	1
iv) Laboratory simulation	1
v) Practical exposure	5
vi) Professional certification	1
B) Non-technical / Soft Skills	
i) Communication skills	1
- Ability to express	1
- Self-confidence	1
- Self-esteem	1
- Courage	1
- Culture understanding	2
- Public speaking	1
ii) Language subject	
- English	5
- Japanese, Mandarin, Korean	1
iii) Writing skills	1
iv) Skills exposure	4
vi) Thinking ability	1
vii) Business skills	2
C) Problem solving	2
D) Career-oriented thinking	1
E) Quality of talent	1
F) Right attitude	1
G) Employability	1
H) Training	2
I) Ethics	1

The respondents highlighted the need for both technical and non-technical skills and capabilities to work in IT fields. The most sought after technical skills are programming, databases and multimedia. Whereas among the important non-technical skills and capabilities raised by the informants include communication and business skills, multi-lingual spoken and written and thinking abilities. The informants also raised concerns on the ethical and attitudes of IT graduates in job market. Moral values and correct work attitudes are essential to differentiate between good or bad workers. One informant mentioned that "staff needs to have correct work attitude and attitude to learn". This is due to some junior staff are reluctant to spend longer hours for training and certification purposes which are provided jointly by the employer and MDec. In addition, fresh graduates are said to expect good salary while not giving enough return expected by employers.

All informants agree that practical work exposure is important to equip the students for job market. Some informants express their willingness and recommendation that final year practical training are offered by their firms to students as part of their collaboration and commitment with the institute of higher learnings (IHLs), MDec and other relevant bodies in the industry. An issue of employability encapsulates all the qualities and attributes that IT graduates must have before they enter job market. This is due to some reports claiming that IHLs do not provide relevant practical courses to students which are much sought after by the industries. As a result, dialogues have often been organized between ministry of higher education, industry practitioners and IHLs to bridge this expectation gap.

In short, merging the curriculum with interviews responses show an almost fit alignment between the two. This shows those current curriculums are adequate and only requires the occasional updates on new changes in technologies such as programming languages or platforms.

V. DISCUSSION

The Malaysia Ninth National Economic Plan (RMK9) is adopting a holistic approach to human capital development and training, encompassing not only knowledge and skills but also ethical values, progressive mindset and cultural awareness. The National Education Blueprint (2006-2010) has six strategic thrust areas which will contribute directly towards the achievement of the National Mission through educational sustainability. The six thrust areas are:

i. Nation Building;

ii. Developing Human Capital;

iii. Strengthening National Schools;

iv. Bridging the Rural-Urban Educational Gap;

v. Improving the Teaching Profession; and

vi. Accelerating Excellence at Educational Institutions.

To ensure that all the above thrust areas are given due attention, the Ministry of Education (MOE) has introduced

innovative staff development programmes as well as enhanced the existing programmes On top of that, the MOE, Malaysia endeavours to make national schools the school of choice, the quality of teaching in national schools will be improved with 100 per cent and 25 per cent of teachers in secondary and primary schools, respectively, having first degree qualification by 2010. The MOE had taken a more integrated approach when enhancing and introducing programmes so that they complement with one another in an effort to bring excellent culture into the education system.

Our findings concur with [4] study who investigated current and future entry-level IT workforce needs in organizations. They attempt to answer two prevailing questions: (1) How are entry-level IT positions evolving? and (2) How well prepared are today's MIS graduates for these positions? In doing that, they interviewed thirteen IS executives in the US organizations to learn their views on the state of the entry-level ARE job market and what skills IS graduates lack most at that time. Their findings revealed that programming skills are still needed, and project management skills are both highly desired and lacking. Other soft skills, such as communications skills, business knowledge, and leadership skills are also desired and, project management, is projected to increase in importance. In essence, they divided the knowledge and skills into technical and non-technical aspects.

Society for Information Management (SIM) [15] comprising 20-US and European investigator-team conducted the research in 2005 and found that the skills and capabilities identified by respondents as being sourced to independent contractors or third-party providers are technical in nature. On the responses for entry-level skills their study found that, overall, the data paints a picture of IT managers building an organization of IT professionals who know the industry and business and who can work well with clients and colleagues. However, of significant concern is the apparent divergence between entry-level skills sought by organizations and skills identified as critical to keep in-house, raising questions about how to groom staff from one to the other as they move through the pipeline.

Ferguson [7] explored the possibility of curriculum change in light of offshore outsourcing trend. His suggested curriculum modifications assume that most of the technical content of the majors remain intact. These proposed topical additions include:

• Enhanced communication skills both oral and written.

• Project management integrated throughout program.

• Expanded business background to include Intellectual property laws, Accounting, Managerial economics and International management

• Expanded risk assessment

• Expanded computer/network security coverage

• Expanded CMM or Six Sigma content

• Addition of multicultural component

The curriculum topics that follow the ACM/IEE Computer Society recommendations [9] are as follows:

• Algorithms

• Datamining and AI

• Computer Architecture

• Database

• Data Structures

• Distributed and Parallel Computing

• eSystems Development

• Knowledge Based Systems

• Information Management

• IT Practice

• Networks

• Network-Centric Computing

• Operating Systems

• Programming Fundamentals

• Programming Languages

• Security

• Software Engineering

• Systems Analysis and Design

Furthermore, students graduating will

• have a broad knowledge and understanding of the technological aspects of IT, in particular:

• software development, system software, Internet programming, computer networks and distributed systems and programming; and

• the technological and management requirements of businesses and other organizations, management aspects of e-Systems, systems development and network security;

• have skills that will allow them to analyze, design and develop application and system software;

• be able to write applications in modern object oriented (OO) programming languages with experience using current development environments and tools;

• be familiar with new technologies and have skills to become .Net and Sun One developers—technologies such as:

• WinForms and WebForms

• Relational database concepts

• ASP.Net, ADO.Net, XML, SOAP

• Java

• Client-server system & Web Service

• possess generic skills enabling them to be effective and efficient employees and citizens;

• be able to be involved in continuous learning to keep pace with fast technology-driven

IT changes;

• be able to communicate with clients and translate user requirements into formal system specification;

• be able to manage projects effectively and efficiently;

• be able to work in groups that are formed of members from different countries and cultures;

• be eligible for professional membership in the Australian Computer Society and other societies.

In summary, the aims of the BIT course are:

• To offer a modern and learning-oriented course in IT, in particular a fundamental core supporting the selected areas of specialism, computer science and software development and e-Systems, there is a need for a fundamental core;

• To develop a life-long learning culture and life-long skills in students;

• To enable graduates to become professionals.

Achieving these aims should improve the level of teaching of IT, increase students knowledge and understanding, help to acquire skills in Microsoft and other technologies, and build professional and generic skills to make them more employable.

VI. INDUSTRIAL IMPLICATIONS

The IT outsourcing phenomenon has had a significant impacts on IT workforce and the industry. In many developed countries, there is a shift of jobs overseas (offshoring) and SIM2005 acknowledged the lower registration in IT courses in many universities.

In Malaysia, the boom of shared services and outsourcing (SSO) particularly IT outsourcing, has generated many interests and discussions on IT workforce education, curriculum and skill-sets to support Malaysia's SSO hub initiative. Particularly, the government has aggresively promoted english and information technology in primary and secondary schools. The institutes of higher learnings also try to realign with industries' expectations and continuously revising its curriculum to produce relevant and employable knowledge

workers. In 2012, the Malaysian SSO industry is targeted to be worth USD2 billion providing 300,000 jobs.

VII. CONCLUSION

The results of this study suggest the adequacy of Malaysian universities' IT curriculum to meet the expectations of SSO industry. The large emphasis is on technical aspects while non-technical/soft skills and moral/ethics values are not being compromised. This confirms many other findings such as [4] [7] [8] [9] [10] and [15] studies. This study, however, arrived at those results differently as subjects were free to identify their own skill and knowledge categories rather than selecting from predetermined categories as done in the previous works. The results were the same which confirms and strengthens previous findings.

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Table 2: Comparison of credit hours in two Malaysian universities

Subjects\Universities	IIUM[1]	Subjects\Universities	MMU[2]
Bachelor of Computer Science			
Total credit hours		Total credit hours	127 hours
- Local students	125 hours		
- International students	123 hours		
A) University required courses	20 hours	A) University/MQA[§] required subjects	12 hours
B) Faculty required courses	33 hours	B) Mathematical sciences	10 hours
C) Department required courses	57 hours	C) Core subjects	30 hours
D) Department elective courses	12 hours	D) Major subjects	60 hours
E) Co-curricular activities	3 hours	E) Elective subject	3 hours
		F) Arts and humanities subjects	12 hours
Final year project	Yes	Final year project	Yes
Practical training	Yes	Industrial training	Yes
Bachelor of Information Technology			
Total credit hours		Total credit hours	127 hours
- Local students	128 hours		
- International students	126 hours		
A) University required courses	23 hours	A) University/MQA[§] required subjects	12 hours
B) Faculty required courses	33 hours	B) Mathematical sciences	13 hours
C) Department required courses	60 hours	C) Core subjects	20 hours
		D) Major subjects	66 hours
D) Department elective courses	12 hours	E) Elective subject	3 hours
		F) Arts and humanities subjects	12 hours
Final year project	Yes	Final year project	Yes
Practical training	Yes	Industrial training	Yes

1: International Islamic University Malaysia – Faculty of Information and Communication Technology
2: Malaysian Multimedia University – Faculty of Information Technology

§: Malaysian Quality Agency (formerly known as LAN-National Accreditation Board)