

An Input–Output Analysis of the Philippine BPO Industry

Nedelyn Magtibay-Ramos, Gemma Estrada and Jesus Felipe*

This paper provides a profile of the Philippine business process outsourcing (BPO) sector, makes comparisons with India and other BPO providers, and summarises the results of an input–output analysis of the Philippine BPO industry’s inter-sectoral linkages and its potential impact on compensation and employment. The input–output analysis shows that the BPO industry is not a key sector in terms of stimulating production in other sectors of the Philippine economy. Growth in the sector’s revenues, however, can have a significant impact on compensation and employment. If appropriate policies are enacted and human capital improved, it is estimated that the Philippine BPO sector may become an important employment-generating sector.

Introduction

For the past 25 years, the Philippines has had high unemployment and low-to-moderate economic growth. Unemployment stood at 4.5 per cent in the 1970s but increased significantly after the economic crisis of the early 1980s, and peaked during the mid-1980s (Felipe and Lanza 2006). While economic recovery in the latter half of the 1980s led to a decline in unemployment, the poor performance of the economy in the early 1990s once again pushed the country toward double-digit unemployment rates. Since 1980, the unemployment rate has hovered between 8 and 11 per cent.

Over the past two decades, much of the increase in the labour force was absorbed by

an expanding services sector. The share of the services sector in employment increased from 38.9 per cent in 1990 to 48.1 per cent in 2005. In contrast, industry’s share in employment remained virtually unchanged at 15–16 per cent. Analysts have blamed the past economic policies, which were carried out to pursue industrialisation and growth. For several decades, the industrial sector was accorded heavy protection, which inhibited backward integration, export expansion and labour absorption (Balisacan and Hill 2003; Bautista 1983).

In the Medium-Term Philippine Development Plan (MTPDP 2004–2010), the Philippine government acknowledged the need to address the country’s unemployment problem and set a target of creating about 1.5 million jobs a year, or a total of 10 million jobs during

* Nedelyn Magtibay-Ramos and Gemma Estrada are Economics Officers in the Economics and Research Department and Jesus Felipe is Principal Economist in the Central and West Asia Department, Asian Development Bank. The authors are grateful for the comments of the participants in the Technical Workshop on Growth and Structural Change in Developing Asia, held on 2 November 2006 at the ADB Headquarters, Manila. Albert Mitchell Locsin of the Business Processing Association of the Philippines, Nerissa Ramos of the Philippine Long Distance Telephone Co., Candido Astrologo and Vivian Ilarina of the National Statistical Coordination Board, Jeanette Carillo and Paul Tajon of the Board of Investments, Weenie Naguit of the Philippine Economic Zone Authority, and Teresa Peralta of the Bureau of Labor and Employment Statistics provided very valuable information.

the period 2004 to 2010. Early indications, however, point to the government's lack of success in achieving this goal. In 2004, about 977,000 new jobs were created, but since there were 1,289,000 new entrants, an additional 312,000 were added to the already large pool of unemployed (Felipe and Lanzona 2006). Further, in 2005 only about 455,000 jobs were created. Although this led to a drop in the unemployed by 100,000, the total unemployment rate remained high at 11.4 per cent. The inability to create enough jobs implies that the government's policy lacks a cohesive strategy for addressing unemployment. Recently, however, the government has given its support to sectors it considers important for employment generation.

In the 2006 Workforce Development Summit, the government identified nine key employment-generating sectors in order to match the country's skilled human resources with emerging industries in local and global markets. These sectors are cyberservices, aviation, agribusiness, health services, mining, creative industries, hotels and restaurants, medical tourism, and overseas employment (Catiang 2006). By identifying jobs and competencies that are currently in demand, the government hopes to set up a system that works with schools and training institutions to provide the types of education suited for today's workplace. While this appears to be a step in the right direction, its success in substantially bringing down unemployment depends not only on the mechanisms that the government implements to support each of the nine sectors but also on the capacity of each sector to generate employment for future labour entrants.

One of the key employment-generating sectors identified is cyberservices, a term that covers teleservices, e-services, information technology (IT) outsourcing, and IT and information communications and technology (ICT)-enabled services, all of which are linked to business process outsourcing (BPO). The Philippine BPO industry measures its output in terms of total revenues, which consists entirely of exports. The BPO sector was estimated to account for only 0.075 per cent of the economy's GDP in 2000, but this share increased to

2.4 per cent in 2005. As of the end 2005, the BPO sector employed 163,000 workers. The government and the Business Processing Association Philippines (BPA/P) have jointly forecast employment in the sector to increase by 16 per cent annually during the period 2005 to 2010 and to employ one million workers by 2010. This forecast implies that around 27 per cent of all new jobs in the country by 2010 would be generated by the BPO industry.

While the Philippines is part of a large global outsourcing industry (world-wide revenues in 2005 amounted to US\$67 billion), the country's capacity to benefit from this huge and expanding sector will depend on several key factors, including the quality of the existing and potential workforce, infrastructure support, and policy environment. These factors will also determine how well the country can compete against India, the leading BPO provider, and other emerging BPO providers such as People's Republic of China, Malaysia, Mexico and Russia.

Nearly 70 per cent of the BPO workers in the Philippines are in the contact-centre sub-sector. Since the minimum qualifications for employment in contact centres are a college degree, good English proficiency and computer literacy, any college graduate can apply regardless of educational background. As a result, the contact-centre industry attracts college graduates whose training has been directed toward other highly skilled professions, and thus may have created an employment-education mismatch.

This paper explores the status of the BPO industry in the Philippines, as well as examining how the country fares *vis-à-vis* India and other BPO providers. It reports the results of a quantitative analysis of the potential impact of the BPO industry in the Philippines on compensation, employment, and output using the input-output (I-O) framework.

The paper provides a brief profile of the Philippine BPO sector and an overview of the Indian BPO sector. Cross-country comparisons of key elements affecting BPO-growth potential are also included. It then continues to investigate the prospects of the BPO sector, report the results of I-O analysis on the sector's

inter-sectoral linkages, and provide an impact analysis on compensation and employment, given the sector's expected revenue growth based on government and industry projections. Further, the paper explores employment dynamics in the BPO sector with reference to the attrition rate and training requirements to see if there will be a sufficient number of people to occupy the predicted number of BPO jobs. The industry's contribution to the labour force is also determined.

The analysis leads to the following main conclusions: (i) given its very low inter-sectoral linkages, the Philippine BPO sector has very little interaction with the rest of the economy; (ii) with a large increase in revenues, the total wage bill of the sector as well as that of the other sectors will grow significantly; and (iii) by 2010, with a workforce of 500,000 to 600,000, the sector will provide around 11 per cent of the jobs for labour force entrants.

Industry status and comparison with India and other BPO providers¹

Offshore outsourcing enables companies in industrialised countries to conduct business operations through more cost-efficient means by tapping the stream of highly skilled workers in developing countries who command wages far lower than in industrialised countries. Even when other costs such as business set-up and infrastructure access are factored in, cost savings through outsourcing have been estimated to be 20 to 40 per cent (Schaaf 2005). A large number of contracts have been forged between large companies in industrialised countries and offshore suppliers in other—mostly developing—countries with the capacity to deliver low-cost outsourcing services in customer support, IT and business processes (Clark 2006).

In recent years, the Philippines BPO industry has grown vigorously to become one of the significant offshore providers in the Asian Pacific region.² As of the first quarter of 2006, at least 600 firms in the Philippines were considered part of the BPO industry. BPO services are generally classified into seven subsectors, namely, contact centres, back office, data transcription, animation, software development, engineering design, and digital content. Of these, the biggest is the contact-centre subsector (also known as call centres), worth about US\$1.8 billion in revenues in 2005, and equivalent to 75 per cent of the total revenues generated by the entire Philippine BPO industry during the year. The number of contact centres increased from about four in the year 2000 to 114 as of the first quarter 2006. In 2005, contact centres accounted for nearly 70 per cent of the total employment in the BPO sector. After contact centres, the next biggest BPO subsectors in terms of total revenues and employment generated in 2005 are software development and back-office operations (Magtibay-Ramos et al. 2007).

Various markets are currently being served by the Philippine BPO sector. These include primarily companies in the UK and the US, and to a lesser extent, in Australia, Canada and France as well as in some Asian countries such as India, People's Republic of China (PRC), Republic of Korea and Singapore (DTI 2006).

While BPO began in the 1990s, it was only in the early part of the new millennium that outsourcing opportunities gained ground in the Philippines. During the period 2000 to the first half of 2006, the cumulative amount of investment projects registered under the Philippine Board of Investment and the Philippine Economic Zone Authority reached US\$830 million, corresponding to a total of 420 investment projects. Of these, 3 per cent were investments in contact centres while 35 per cent

1 Additional information can be found in Magtibay-Ramos et al. (2007).

2 India is the leading BPO provider (NeIT 2006b). The People's Republic of China, Malaysia, Singapore, Thailand and Vietnam are important providers but are well below India.

were investments in software development projects.

Government support for the BPO industry is evident.³ Coinciding with the surge of the BPO industry, the government formed the Information Technology and E-Commerce Council (ITTEC) in 2001 to provide policy directions on ICT. In 2005, the government launched the Philippine Cyberservices Corridor, an ICT belt stretching over 950 kilometres and capable of providing a variety of BPO services. It covers Metro Manila, Cebu and Davao, and 15 other provinces. The BPA/P—a private sector organisation composed of companies engaged in IT enabled services and BPO—acknowledges that the government has been very supportive in marketing the country among BPO investors, often working in close coordination with the BPA/P. Government support for the industry is important in helping it grow and taking advantage of the large global BPO market.⁴

India holds about 46 per cent of the global market for BPO (Kaka et al. 2006). Its global dominance is mainly based on the reputation it has built throughout the years by delivering high-quality software services (Banerjee 2006). One strand of the literature attributes the success of India's BPO sector to a shift in economic policy and strong government support. The year 1984 marked the end of the country's narrow strategy of 'technological autarchy, import substitution and export pessimism' (Schaaf 2005:5), a catalyst that would eventually lift the country's BPO industry to where it currently stands. A primary stimulus was the formation of the Software Technology Parks of India (STPI) in 1990 that would manage IT-related infrastructure resources, provide single-window government services, and promote development and export of software services, among others (STPI 2006).

Another view is that the private sector has provided the initiating force in the growth of the Indian BPO sector, with the government playing almost no role (Pack and Saggi 2006). While the government was instrumental in providing good university education, such action cannot be regarded as a selective industrial policy that favoured only the BPO.

A third view is that past policy errors were instrumental in bringing about dramatic changes in the Indian economy (Banerjee 2006; Kochar et al. 2006). In particular, the government's heavy investment in tertiary education led to the creation of a pool of highly-skilled (for example, engineers) but under-utilised workers. For lack of challenging projects to do, these workers took on contracts from new firms in the software industry. While initially working on a fixed-price basis, Indian workers gradually built a strong reputation, which later shielded them from price competition. Banking on an impressive track record, the Indian software industry soon became highly competitive and dominant in the global market.

Despite India's current dominance, a number of factors could dampen the sustained growth of its BPO sector. There is the risk that the country might be unable to meet the growing demand for BPO specialists, owing to the low quality of education of many of its universities. Only 10 to 20 per cent of graduates have the requisite training for international business. The industry also has a high level of turnover (15 to 30 per cent per annum), and employee compensation has been rising by 12 to 15 per cent a year (Schaaf 2005).⁵

While India is recognised as the leading global outsourcing destination, in recent years it has faced competition from other providers, including the Philippines. However, it is unlikely that its leadership will be disputed in the next few years. Being the forerunner,

3 The Philippine government has allocated US\$7.3 million in scholarship funds to train potential workers for the BPO industry and is expected to sign a memorandum of agreement with BPA/P for the implementation of this plan (Oliva 2008).

4 As indicated by the Business Processing Association of the Philippines through communications with its Executive Director.

5 Such an increase in compensation is not necessarily unfavourable if related to productivity gains.

India's BPO industry has gained a high level of maturity and continues to have a large resource pool for BPO activities (Schaaf 2005). Indian firms are moving up the value chain toward knowledge process outsourcing (KPO) activities, covering services in market analysis, research, procurement and logistics; leaving low-end BPO services to be supplied by other countries. Despite rising salaries in recent years, India's IT sector remains the most competitive: the average salary in the Indian IT outsourcing sector is the lowest among key offshore destinations (NeoIT 2006).

An important issue to examine is whether the Philippines can emulate India's successful model. In 2005, revenues of Philippine BPO firms were only about 14 per cent those of India's. Moreover, while only 13 per cent of the revenues of the Philippine BPO sector were from software and IT services, the corresponding percentage for India was 70 per cent (Magtibay-Ramos et al. 2007).

It may be some time before the Philippines can mature to a level similar to that of India. One reason is that the growth of the BPO sector in the Philippines is largely shaped by the expansion of contact centres. In the case of India, KPOs (particularly IT-related) currently hold a substantial part of the BPO business. Although software development in the Philippines has also been marked by considerable growth, its expansion has not been as rapid as that of contact centres. Recent government support also appears to be biased toward contact centres, given the disproportionate share of funding for training that goes to contact centres (Villafania 2006). Proficiency in English—a key requirement for contact-centre work—has often been highlighted as the main skill demanded by the BPO industry. But for high-value KPOs to grow vigorously, more specialised skills in areas such as IT, science and engineering are needed. The impression may be held that the BPO industry is merely waiting for a natural process to occur, where, at some point in the future, the industry will move up the value-chain ladder. However, it is not clear how this will occur.

The expansion of the BPO industry will greatly depend on high-quality, reliable and

low-cost infrastructure services. A comparison with other offshore providers indicates some advantages and disadvantages of the Philippines. Telephone costs are lower in the Philippines than in the PRC, though higher than in India. While the Philippines has an advantage in terms of electricity costs over offshore providers in South America and Eastern Europe, it fares worse than its Asian counterparts. This also holds true for internet costs, which are higher in the Philippines than in PRC, India, Korea, Singapore and Taiwan. However, one clear advantage of the Philippines over other BPO-provider countries is its low office-rental cost, which is just 32 per cent and 40 per cent of the rates in India and the PRC, respectively (Magtibay-Ramos et al. 2007).

The quality of human capital is another critical factor in the BPO sector. The Philippines enjoys a high literacy rate (97 per cent in the National Capital Region; 89 per cent across the country) and is a popular destination among call-centre operators due to the fact that English is widely spoken (NeoIT 2004). Compared to India, the Philippines also has a higher proportion of population in the 25–34 age group with tertiary education. Average salaries in the Philippine BPO sector are also lower than those of many key offshore destinations (NeoIT 2006).

Government fiscal policy and the quality of governance are also important influences on investment. The corporate tax rate of 32 per cent in the Philippines is comparable to those of the PRC and Thailand, and lower than India's. However, the Philippines performs poorly in terms of governance. Out of 61 countries, the Philippines ranks only 51st in terms of transparency, and 59th or third-worst in both performance of custom's authorities and public service (International Institute for Management Development 2006).

While the Philippines is comparable to or ranks better than other emerging BPO providers in areas such as quality and cost of labour and certain infrastructure costs, there are problems that the country needs to address in order to be more competitive and help push the BPO sector toward sustained high growth. Based on cross-country comparisons, the most

serious constraints are high electricity costs and weak governance as outlined above. Industry analysts highlight other issues related to human capital such as low hiring rates, high turn-over rates, and weaknesses in broad IT skills and English proficiency (BPA/P 2006; Clark 2006; Mapa 2006; Rodolfo 2005). If the country can effectively address these constraints and achieve what India has done so far, what are the implications of a large BPO sector for the country? Can it indeed play a substantial role in employment generation and output expansion? This issue is explored using the I–O framework.

Input–output analysis of the BPO sector

In this section and the next, we analyse the interdependence between the BPO sector and other sectors of the Philippine economy. We also investigate the prospects for the sector by examining the effects of its projected growth on the rest of the economy and evaluating the factors that affect personnel recruitment in the industry to determine if the supply of qualified workers will be sufficient. The Philippine government and the BPO industry claim that the BPO sector is a key employment-generating sector. They are predicting a huge increase in both industry revenue and workforce, reaching almost US\$12.2 billion and about one million employees, respectively, by 2010.

We use the Philippine I–O tables as a tool to generate employment projections. The I–O framework is based on the assumptions of homogeneity and proportionality.⁶ Homogeneity involves three premises: (i) each sector produces a single output (that is, products are

either perfect substitutes for one another or are produced in fixed proportions); (ii) each sector has one input structure that is fixed; and (iii) there is no substitution between the products of different sectors. Proportionality implies that in any sector all inputs are used in fixed proportion so that any change in inputs will cause a corresponding change in the level of output.⁷

This study used the 2000 I–O accounts of the Philippines to examine the above questions.⁸ The I–O accounts include the 240-by-240 transactions table, the technical coefficients matrix, and the inverse matrix. The transactions table shows the production flows within the economy during the year for each of the 240 sectors.⁹ These flows are recorded in monetary terms. Each sector's output is distributed as a row of the table and the corresponding column gives the sector's input requirements.

The technical coefficients matrix gives the unit-cost structure of production in an economy. Each coefficient is the value of input required in the production of a unit of a sector's output. The inverse or Leontief matrix gives the direct and indirect output requirement per unit of final demand in each sector.

Using the I–O framework, two types of analyses were conducted: (i) linkages between the BPO sector and other economic sectors, and (ii) the impact of changes in BPO revenues on compensation and employment.

Inter-sectoral linkages

The interrelationship of the BPO sector with the rest of the economy can be determined by investigating its linkages with the other sectors. The backward, forward, and total linkage indices are summaries that gauge the

6 A good text on I–O analysis is Miller and Blair (1985).

7 These may be viewed as a set of extremely restrictive assumptions that, one way or another, invalidate, *ex ante*, the analysis. However, any model and/or statistical technique depends on assumptions. The purpose of sound economic analysis is to provide a guide for discussion. This is always better than operating in a vacuum. The I–O analysis is an excellent tool if one wants to understand inter-sectoral linkages—one of the main issues discussed in this paper. Also, we have designed a number of scenarios that lead to a total of six sets of estimates, ranging from the most pessimistic to the most optimistic.

8 This is the latest in the series produced by the National Statistical Coordination Board in collaboration with the National Statistics Office.

9 This section draws heavily from the Technical Notes of the 2000 Input–Output Accounts of the Philippines (NSCB 2006).

inter-sectoral dynamics of a sector with the other sectors as providers of inputs (that is, backward linkages) and as a source of inputs to the other sectors (that is, forward linkages).

The backward linkage measures the relative importance of a sector as a buyer of inputs. The forward linkage measures the relative importance of a sector as a supplier of inputs to other sectors. The linkage index of a sector is the ratio of its linkage, backward or forward, to the average of all the sectors' linkages. The total linkage index is the sum of the backward and forward-linkage indices. These measures assume an identical increase in demand by one unit for all the sectors. Since this is not likely to occur, Hansda (2003) proposed multiplying each element of the inverse matrix by the share in final demand. The resulting weighted inverse matrix is used to calculate the linkages and the indices. Sectors having indices of backward and forward linkages greater than one are regarded as key sectors of the economy. Key sectors are important in terms of investment because growth in these sectors will stimulate production in other sectors of the economy.

In the Philippine BPO sector, the backward linkage (0.007) is greater than the forward linkage (0.0006). This indicates that the BPO sector is more a consumer of inputs than a provider. The I-O transactions table shows that the BPO sector requires the output of 40 other sectors in its operations, with banking, electricity, and telecommunication services as its three most important suppliers. The BPO sector provides services, however, to only three other sectors—tour and travel agencies, wholesale and retail trade, and banking.¹⁰

The forward, backward and total-linkage indices for the Philippine BPO sector are 0.04, 0.45 and 0.49, respectively. These indices rank 138th, 178th, and 177th, respectively, out of 240. The low indices of the BPO sector indicate that this sector is neither a very significant supplier of inputs to other sectors, nor is it an

important buyer of inputs. The low rank of the indices also indicates that the BPO sector is not a major stimulus in terms of economic interdependence.

To see which sectors have a high degree of forward or backward linkages, one can refer to Table 1, which presents the ten top sectors for each type of index. The wholesale and retail trade sector tops the list for all three indices. Obviously, this industry provides products as input to many other sectors of the economy and it also purchases a significant quantity of goods and services from the rest.

The majority of the BPO industry's clients are companies outside the Philippines. Hence, most of its output is exported to other countries. In fact, the total final demand of the sector consists entirely of exports whose share of the sector's total output is 92 per cent (while the share of total intermediate demand is only 8 per cent). Also, the processes involved in the industry do not require inputs from a large number of other sectors. The share of total intermediate inputs in total gross output is only 35 per cent while the share of gross value-added is 65 per cent. This is not to say that the BPO sector does not stimulate activities in other sectors. Rather, the level of inducement is not as large as that of some other sectors. The higher than average compensation of BPO employees, as shown in the next section, may increase personal consumption if this sector's workforce has a high propensity to consume.¹¹

Impact analysis

To assess the impact of changes in the BPO sector's final demand, estimates were made of output and compensation multipliers. Simulations were performed to determine (i) the additional compensation that would result under different scenarios; and (ii) the number of new jobs generated under the different scenarios.

Output multiplier. In undertaking the impact analysis, the concept used is that of the output

10 For instance, the Philippine BPO sector used US\$ 1.72 million worth of telecommunication services as inputs and provided US\$ 3.96 million worth of its services to the banking sector in 2000.

11 Also, the 24-hour activities in BPO firms may increase the need for transportation and food supply around the BPO locations. But these are not direct inputs to the industry; they represent personal consumption.

Table 1
Top ranking sectors with respect to the linkage index

Index rank	Backward linkage index	Forward linkage index	Total linkage
1	Wholesale and retail trade (8.1)	Wholesale and retail trade (158.2)	Wholesale and retail trade (166.3)
2	Public administration and defense (5.1)	Electricity (13.0)	Electricity (14.1)
3	Manufacture of parts and supplies for radio, TV and communication (4.8)	Banking (9.4)	Construction (12.8)
4	Manufacture of semi-conductor devices (4.7)	Construction (8.1)	Banking (10.8)
5	Construction (4.7)	Petroleum refineries including liquefied petroleum gas (7.1)	Manufacture of semiconductor devices (10.5)
6	Manufacture, assembly and repair of office, computing and accounting machines (4.6)	Rice and corn milling (6.0)	Public administration and defense (9.8)
7	Manufacture, assembly, rebuilding and major alteration of railroad equipment, aircraft, and animal and hand-drawn vehicle (4.1)	Manufacture of semiconductor devices (5.8)	Rice and corn milling (8.4)
8	Ownership of dwellings (3.7)	Public administration and defense (4.7)	Manufacture of parts and supplies for radio, TV and communication (8.0)
9	Manufacture of photographic and optical instruments (3.5)	Slaughtering and meat packing (4.5)	Manufacture, assembly and repair of office, computing and accounting machines (7.5)
10	Manufacture of communication and detection equipment (3.5)	Restaurants, bars, canteens and other eating and drinking places (3.8)	Ownership of dwellings (7.4)

Source: Authors' estimates.

multiplier. A sector's output multiplier is the total value of production in all sectors needed for a unit's worth of final demand for the sector's output. Comparison of sectoral output multipliers shows where spending a particular amount of money would have the largest effect, considering the total output value brought about in the economy (Miller and Blair 1985).

The simple output multiplier is the sum of the sector's column elements in the inverse matrix. The simple output multiplier of the Philippine BPO sector is 1.63. This indicates that every dollar's worth of new final demand for the BPO sector induces a total of 1.63 dollars of additional output from all sectors of the economy.

Impact on compensation. Analysis of the impact on compensation primarily involves measuring the change in total compensation for the BPO sector and the rest of the economy given additional revenue in the BPO sector. Thus, the analysis not only covers the change in compensation for the BPO sector but also for all other sectors. The change in compensation for each sector is obtained using the compensation coefficients from the I-O technical coefficient table, the inverse matrix, and the change in BPO revenue. The change in BPO revenue is taken as the change in final demand. Computed as the sum of the sectoral changes in compensation, the compensation

Table 2
2006 to 2010 forecasts for the BPO sector under different scenarios

	2004	2005	2006	2007	2008	2009	2010
Workforce ^a	100,500	163,250	266,000	403,400	568,800	794,800	1,082,800
New jobs		62,750	102,750	137,400	165,400	226,000	288,000
Revenues (US\$ million)							
Baseline ^a	1,474	2,419	3,627	4,992	6,769	9,130	12,199
Scenario I	n.a.	n.a.	3,083	4,243	5,754	7,761	10,369
Scenario II	n.a.	n.a.	2,539	3,494	4,738	6,391	8,539
Change in revenue (US\$ million)							
Baseline	n.a.	945	1,208	1,365	1,777	2,361	3,069
Scenario I	n.a.	n.a.	664	1,160	1,510	2,007	2,609
Scenario II	n.a.	n.a.	120	956	1,244	1,653	2,148

^a Board of Investment-Commission on Information and Communications Technology-Business Processing Association/Philippines (BOI-CICT-BPA/P) 2006 to 2010 forecasts.

Note: Revenues are expressed in nominal dollars.

Sources: BOI-CICT-BPA/P as cited in Locsin (2006) and Authors' estimates.

multiplier measures the change in compensation in the whole economy brought about by the changes in final demand.

A key parameter in impact analysis is the compensation coefficient, which is 0.31 for the BPO sector. This means that compensation accounts for 31 per cent of the BPO sector's total inputs. Since a significant portion of the sector's inputs goes to wages, a substantial increase in revenue can be expected to generate a considerable amount of additional compensation.

The year 2005 is taken as the baseline. Note that, between 2004 and 2005, the BPO sector increased revenues by US\$945 million (Table 2). Using the compensation multiplier, we estimated that such a revenue increase in that period generated an increase in compensation of US\$291 million for the BPO sector and US\$87 million for the other sectors. Thus, in terms of compensation, the total impact on the economy in 2005 amounted to about US\$378 million. This analysis was replicated for each

of the forecast years (2006 to 2010) under three different scenarios based on different revenue forecasts.¹²

The workforce growth projections of the Board of Investment Commission on Information and Communications Technology-Business Processing Association/Philippines (BOI-CICT-BPA/P) (in Table 2) are based on the following factors: (i) previous years' performance (2000–05); (ii) investment leads in terms of companies that are likely to set up operations and their workforce requirements (based on investment missions); and (iii) industry performance (that is, which subsectors are likely to experience growth, based on trends in the world market). The revenue projections were calculated using the workforce forecasts and the prevailing rates of revenue per agent, per sector, and per year (based on surveys).¹³

The baseline is the BOI-CICT-BPA/P revenue forecast, which is assumed to be the best possible scenario. In Scenario I, the BOI-CICT-BPA/P revenue forecast is reduced by 15 per

12 It has been recently reported (Domingo 2007) in an interview with the Trade and Industry Secretary that (i) BPO revenues in 2006 were US\$3.63 billion and the 2010 forecast is US\$12.4 billion; (ii) workforce in 2010 is projected to be 920,764 (162,036 less than the BOI-CICT-BPA/P forecast in August 2006); and (iii) the number of employees in 2006 is 244,675 (21,325 less than the BOI-CICT-BPA/P forecast in August 2006).

13 This information was obtained through communications with BOI and BPA/P.

Table 3
Additional compensation under different scenarios (US\$ million)

	2006	2007	2008	2009	2010
Impact on BPO sector					
Baseline	372	420	546	726	944
Scenario I	204	357	465	617	802
Scenario II	37	294	383	508	661
Total impact on the other sectors of the economy					
Baseline	111	126	163	217	282
Scenario I	61	107	139	185	240
Scenario II	11	88	114	152	198

Source: Authors' estimates.

cent. In Scenario II, the BOI-CICT-BPA/P revenue forecast is reduced by 30 per cent. The results of the impact analysis are summarised in Table 3.

These forecasts show that the BPO sector's additional revenue may be able to generate a significant increase in the total wage bill for the industry. Since we assumed the best scenario to be the BOI-CICT-BPA/P revenue forecast (Baseline), under the most optimistic assumptions the change in compensation for the sector ranges from US\$372 million in 2006 to US\$944 million in 2010. Under Scenario I, the additional compensation forecasts for the BPO sector are US\$204 million and US\$802 million for 2006 and 2010, respectively. The least optimistic scenario projects only US\$37 million for 2006, but rises to US\$661 million in 2010.

The impact on the rest of the economy (that is, the other 239 sectors) is also considerable, albeit smaller than the wage bill increase in the BPO sector. For the three different scenarios, the change in compensation ranges from US\$11 million to US\$111 million for 2006, and

from US\$198 million to US\$282 million for 2010. The changes in compensation obtained in this exercise are used as inputs in the analysis of the impact on employment in the next subsection.

Impact on employment. The impact of the increase in BPO revenues on employment is estimated as the ratio of the change in the sector's compensation to the average wage rate.¹⁴ In 2005, the average wage or compensation for the additional BPO employees is computed by dividing the additional compensation by the number of new jobs. With 62,750 employees added to the workforce, the average yearly compensation per new employee in 2005 was US\$4,631 (equivalent to average monthly compensation of US\$386 or Pesos 21,227). By comparison, the 2005 average compensation for the Philippines was US\$165 or Pesos 9,065 per month (BLES 2006b).¹⁵

In combination with the three scenarios previously described, two different assumptions regarding average compensation were considered: (A) average compensation remains at the 2005 level; and (B) average compensation increases at an annual rate of 7 per cent.¹⁶ The additional BPO employment brought about by the increase in compensation was computed for each of the six possible scenario combinations (results are shown in Table 4).

Since under Scenario B the average compensation is assumed to increase for each revenue forecast scenario (Baseline, I or II), the resulting number of new jobs is always smaller than under Scenario A. Under the latter, the BPO sector can generate a total number of new jobs between 406,401 and 649,413 during the period 2006 to 2010. However, this assumes no increase in the average compensation in the sector. Under the more realistic Scenario B, new total jobs between 315,713 and 515,355 can be created in the same period.

14 For a given year, average compensation of new employees = ratio of change in total compensation to change in workforce. Since the change in compensation has been obtained (Table 3), then, given the average compensation, the additional employment can easily be estimated as $\Delta \text{workforce} = \Delta \text{compensation} / \text{average compensation}$.

15 This is an estimation using data from the Occupational Wages Survey of the Bureau of Labour and Employment Statistics, June 2006, Manila, Philippines. Available at <<http://www.bles.dole.gov.ph>>.

16 The annual increase of 7 per cent was calculated from the most recent values of the average monthly compensation for computer and other related activities as given in the 2005 *Philippine Industry Yearbook of Labour Statistics* (BLES 2005a).

Table 4
Results of Simulations

Number of new BPO jobs generated (Scenario)	2006	2007	2008	2009	2010	Total
Baseline and A	80,214	90,639	117,997	156,775	203,788	649,413
I and A	44,088	77,043	100,297	133,259	173,220	527,907
II and A	7,962	63,447	82,598	109,743	142,652	406,401
Baseline and B	74,966	79,168	96,320	119,603	145,298	515,355
I and B	41,203	67,292	81,872	101,663	123,503	415,534
II and B	7,441	55,417	67,424	83,722	101,709	315,713
BPO workforce forecast	2006	2007	2008	2009	2010	
Baseline and A	243,464	334,103	452,099	608,875	812,663	n.a.
I and A	207,338	284,381	384,678	517,937	691,157	n.a.
II and A	171,212	234,659	317,256	426,999	569,651	n.a.
Baseline and B	238,216	317,384	413,704	533,307	678,605	n.a.
I and B	204,453	271,746	353,618	455,281	578,784	n.a.
II and B	170,691	226,108	293,532	377,255	478,963	n.a.
Number of new jobs generated by the other 239 sectors	2006	2007	2008	2009	2010	Total
Baseline and A	56,104	63,395	82,530	109,653	142,535	454,218
I and A	30,836	53,886	70,151	93,205	121,155	369,233
II and A	5,569	44,377	57,771	76,757	99,775	284,249
Baseline and B	52,434	55,372	67,369	83,654	101,626	360,455
I and B	28,819	47,066	57,264	71,106	86,382	290,637
II and B	5,204	38,760	47,158	58,558	71,138	220,819

Source: Authors' estimates.

With the 2005 total workforce of 163,250 taken as the baseline, the forecast for the succeeding five years is given by the cumulative sum in Table 4. The workforce forecasts obtained using the results of the I-O analysis are lower than those of the BOI-CICT-BPA/P (see Table 2), even under the most optimistic assumptions of (i) no increase in average compensation and that (ii) revenues increase by as much as the government and the industry forecast. The difference is particularly substantial toward the final years (2008 to 2010).

Under the BOI-CICT-BPA/P revenue forecasts and the assumption that the average compensation remains at the 2005 level, the I-

O analysis predicts an increase in employment between 80,214 for 2006 and 203,788 for 2010 (Table 4). This results in a BPO workforce of 243,464 in 2006 and 812,663 in 2010, significantly below the BOI-CICT-BPA/P forecast. Under the more realistic assumption that wage rates grow, total employment in the sector by 2010 can be as high as 678,605; that is, about half of what the BOI-CICT-BPA/P forecasts.

To examine the impact of changes in BPO revenues on the employment level of the other sectors, the 2005 average monthly compensation for the Philippines of US\$165 per month was used, together with the changes in compensation for the 239 other sectors. The results for the six scenarios are given in Table 4.

These results show that an increase in BPO revenues will generate new jobs in the other sectors. For the best scenario, almost 143,000 additional jobs will be generated in the rest of the economy in 2010. The total number of new jobs generated by the other 239 sectors of the economy during the period 2006 to 2010 ranges from almost 221,000 under the most conservative assumptions (II and B) to 454,000 under the most optimistic assumptions (Baseline and A). During this period, the total number of new jobs in the whole economy that will be generated by the additional BPO revenues ranges between 536,000 and 1.1 million.¹⁷

These results indicate that while the BPO sector has the potential to be an important employment generator, its capacity to do so is substantially smaller than what the sector and the government have claimed.

With this predicted growth in employment in the BPO sector, will there be sufficient qualified persons to fill the jobs? How much is the potential contribution of this sector to the total work force? These issues are explored in the next section.

Employment dynamics in the BPO sector

Since the number of available BPO jobs is expected to increase substantially in the next few years, it is important to consider the factors that affect personnel recruitment in the industry to determine if the supply of qualified individuals will be sufficient. Some of the influential elements are hiring and attrition rates, characteristics of applicants, salary, and job requirements. The hiring rate is the ratio of the number of individuals who qualify for the job and are employed by a company to the total number of applicants in a particular time interval. The attrition rate is the proportion of employees who leave the company in a given period (for example, quarter or year).

The results of a survey on hiring and attrition rates (Outsource2Philippines and BPA/P

2005) give an estimate of the median hiring rate as 5 per cent. The majority of the respondents (76 per cent) agreed that this dearth of eligible applicants may have a negative effect on their future growth as there might be BPO positions that may not be filled immediately.

The median attrition rate is estimated at about 15 per cent. Of the overall attrition rate, company-initiated attrition represents 15 per cent of the total; and transfers to another firm within the industry account for 24 per cent. Other major reasons include moving to another country, a career shift, and pursuit of studies.

Attrition or loss of personnel creates positions that need to be filled. Hence, the attrition rate affects staff requirements. Considering the median as the attrition rate for the industry—on the assumptions that it remains at 15 per cent until 2010 and that 24 per cent of the overall attrition are transfers within the industry—the number of employees that leave the industry per year is computed using the forecast values under the different scenarios given in the previous section. Results are shown in Table 5. The resulting additional number of employees needed by the BPO industry (that is, the number of new jobs in Table 4 plus those vacated due to attrition in Table 5) is given in Table 6. The total number of new employees required by the BPO sector is somewhere between 156,000 and 296,000 for the year 2010.

Because of attrition, the number of new employees needed by the sector is larger than the number of new jobs. The forecast of the Commission on Higher Education for the number of college graduates in cyberservices-inclined disciplines is 302,914 in 2006 and increases to 350,527 in 2010 (Mapa 2006). With college graduates in cyberservice-inclined disciplines numbering at least 300,000 per year, there should be sufficient graduates to fill the BPO positions. However, considering that not all these tertiary graduates will be interested in a BPO job and that the current hiring rate is quite low due to the large proportion of unqualified applicants, the supply of qualified

¹⁷ Computed as 220,819 (II & B in third part of Table 4) + 315,713 (II & B in first part of Table 4), and 454,218 (Baseline & A in third part of Table 4) + 649,413 (Baseline & A in first part of Table 4), respectively.

Table 5
Projected numbers of BPO employees lost due to attrition

Scenario	2006	2007	2008	2009	2010
Baseline and A	27,755	38,088	51,539	69,412	92,644
I and A	23,636	32,419	43,853	59,045	78,792
II and A	19,518	26,751	36,167	48,678	64,940
Baseline and B	27,157	36,182	47,162	60,797	77,361
I and B	23,308	30,979	40,312	51,902	65,981
II and B	19,459	25,776	33,463	43,007	54,602

Source: Authors' estimates.

Table 6
Projections of new employees in the BPO industry

Scenario	2006	2007	2008	2009	2010
Baseline and A	107,969	128,727	169,536	226,187	296,432
I and A	67,724	109,462	144,150	192,304	252,012
II and A	27,480	90,198	118,765	158,421	207,592
Baseline and B	102,123	115,349	143,483	180,400	222,659
I and B	64,511	98,271	122,185	153,565	189,485
II and B	26,900	81,194	100,887	126,729	156,310

Source: Authors' estimates.

applicants is likely to be less than the demand. The absorption rate (proportion of graduates who are hired) is estimated at only 30 per cent (Mapa 2006). In fact, the analysis of the BPO sector in the 2006 Workforce Development Summit predicts a shortfall in employees for all the BPO subsectors during the period 2006 to 2010.

Another significant finding of the 2006 Workforce Development Summit is that there is a mismatch between labour supply and industry demand (Reyes 2006). Among the qualifications that most job seekers lack are good communication and analytical skills. Particularly for the BPO industry, high proficiency in English and computer literacy are requisites for most positions. Except for entry-level jobs in animation, almost all the positions require a college education and additional training in specific areas.

The average monthly wage rate for skilled workers in all non-agricultural industries in the Philippines in 2005 was estimated to be around US\$ 209 (Pesos 11,500).¹⁸ The BPO sector pays above-average salaries, with contact-centre positions generally paying a higher maximum than other BPO subsectors. Salaries in the BPO sector, however, are not particularly high when compared to those of engineers, accountants, economists or computer programmers.

The 2005 Philippine labour force was estimated at 36 million, and the forecast for 2010 is about 41 million (BLES 2006b). The BPO total workforce is 163,250 in 2005 and is projected to be between 479,000 and 812,700 in 2010. The share of the BPO industry in the labour force, therefore, will increase from 0.5 per cent in 2005 to 1 to 2 per cent in 2010. The number of new labour force entrants in 2006 is around

18 Based on data from the 2005 Yearbook of Labour Statistics (BLES 2005b).

970,000 and will increase to 1,079,000 in 2010, based on government forecasts. Given the government and industry revenue forecasts, new BPO jobs as a percentage of the number of new labour force entrants range from around 11 per cent in 2006 to about 27 per cent in 2010. These values are extremely high. It is not likely that a single activity will be able to provide almost one-third of the jobs for new labour force entrants. Under the more realistic assumptions of a 7 per cent annual increase in average compensation and a reduction in the government/industry revenue forecast by 15 per cent (Scenario I and B), it is estimated that around 4 per cent of the jobs for new labour force entrants in 2006 will be provided by the BPO sector; 7 per cent in 2007; 8 per cent in 2008; 10 per cent in 2009; and 11 per cent in 2010 (Magtibay-Ramos et al. 2007). These proportions are more reasonable than those using the industry forecast and still represent a significant share for a single economic activity.

Conclusions

An important measure to address the lingering unemployment problem of the Philippines is to attract more investments in key employment-generating sectors. The government has identified the BPO sector as a sector that could employ as many as one million workers by 2010. The Philippine BPO sector is expected to experience high growth due to a steady flow of investment, especially in contact centres. The growth of the BPO sector will be largely influenced by the contact centres because (i) they account for 70 per cent of total BPO employment and 75 per cent of total BPO revenues; (ii) they have accounted for about one-half of total investment in the BPO sector since 2000; and (iii) government support appears to be biased toward contact centres.

The implications of BPO revenue growth on output and employment expansion have been examined here through the input-output framework. Given improvements in human capital and the right policy environment, the Philippine BPO sector may indeed become an important employment-generating sector.

However, even under the most favourable assumptions, the total number of workers in the sector will fall well short of the industry's forecast. Perhaps a more reasonable figure is 500,000 to 600,000 workers by 2010.

As shown by the linkage analysis, the BPO sector has very little interaction with the rest of the economy. Hence, an increase in the Philippine BPO industry's output may not necessarily increase production in most of the other sectors. This is because exports account for 92 per cent of the sector's output and intermediate demand only 8 per cent. Also, the BPO sector requires direct inputs from relatively few other sectors. Hence it is not a major stimulus of economic interdependence.

Notwithstanding its low inter-sectoral linkages, the BPO sector has the potential to generate a significant increase in the total wage bill of the economy. The I-O analysis shows that growth in the BPO sector's revenues has a non-negligible impact on compensation and employment. A substantial increase in the sector's revenue will result in a significant increase in the sector's total compensation and in that of the other sectors. The reasons for this big impact on compensation are: (i) the revenue forecast, based on the industry's forecast, is a very high base; and (ii) a key figure in the simulations is the compensation coefficient—a very high 31 per cent.

Although lower than the government's forecast, the estimates made here represent a substantial share of the jobs that the country needs to generate for future labour entrants. The sector can be expected to provide 7 to 11 per cent of the jobs for new labour force entrants during the period 2007 to 2010, which is a high contribution for a single economic activity.

What challenges will the BPO sector face? The first is whether the Philippines will continue to attract investment to the sector given the competition from other locations. Although the advantages of locating in the Philippines should be emphasised, constraints such as low hiring rates, high attrition rates, high cost of electricity, and weak governance must be addressed without delay.

The second is the question of how fast the sector could move up the knowledge-intensity

ladder. There are government and industry pronouncements emphasising the desire to advance toward higher-end KPO, but no specific strategy to achieve this goal has been laid out. A third and related issue is whether the sector will continue to require government support. Various government agencies have already been mobilised to encourage the development of the sector. What other types of assistance can be made available to facilitate the growth of the sector? If the government is seriously bent on moving toward KPO, it is important to identify strategies to entice investors who are involved in it, as well as encourage BPO firms to move into higher-value added activities.

Finally, since the existence of a pool of workers with tertiary education is seen as a key to the development of the sector, an analysis of the state of tertiary education in the Philippines is required. In particular, the following two questions must be answered: (i) is it optimal for the Philippines to continue investing in tertiary education to satisfy the needs of the BPO sector? and (ii) are students (or the educational system in general) who undertake degrees in disciplines such as engineering, statistics, and economics to be blamed for their lack of appropriate skills (for example, communication skills) for employment in the BPO sector?

References

- Balisacan, A.M. and Hill, H. (eds), 2003. *The Philippine Economy: development, policies and challenges*, Oxford University Press, New York.
- Banerjee, A.V., 2006. 'The paradox of Indian growth: a comment on Kochhar et al.', *Journal of Monetary Economics*, 53(5):1021–26.
- Bautista, R.M., 1983. *Industrial policy and development in the ASEAN countries*, Monograph Series 2, Philippines Institute for Development Studies, Makati City.
- BLES, 2005a. *2005 Philippine Industry Yearbook of Labor Statistics*, Bureau of Labor and Employment Statistics, Manila.
- , 2005b. *2005 Yearbook of Labor Statistics*, Bureau of Labor and Employment Statistics, Manila.
- , 2006a. 'The Changing Demographics of the Philippine Workforce', *LabStat Updates* 10(16):1–7, Bureau of Labour and Employment Statistics, Department of Labour and Employment, Manila.
- , 2006b. Occupational Wages Survey, tabular results of survey, Bureau of Labour and Employment Statistics, Department of Labour and Employment, Manila. Available online at <<http://www.bles.dole.gov.ph/HTML%20FILES/ows06.html>>, accessed on 10 January 2007.
- BPA/P., 2006. Call center, Business Processing Association Philippines, Makati City. Available online at <<http://www.bpap.org/itesict/callcenter.asp>>, accessed on 15 September 2006.
- Catiang, P., 2006. DOLE holds 2006 National Manpower Summit, John Clements Consultants, Inc, Makati City. Available online at <<http://www.johnclements.com/articles/DoLEHolds2006NatManpwr-Summit.htm>>, accessed on 13 September 2006.
- Clark, G., 2006. *The TPI index—an informed view of the state of the global commercial outsourcing market*, Paper Presented at the ICT Leaders' Forum, Makati City, 16 May 2006.
- DTI, 2006. IT and IT-enabled services, Department of Trade and Industry, Makati City. Available online at <<http://www.dti.gov.ph/contentment/9/16/119/422.jsp>>, accessed on 16 September 2006.
- Domingo, R., 2007. 'Outsourcing business seen to earn \$12 B by 2010', *Philippine Daily Inquirer*, online article first posted January 20, 2007, available at <http://archive.inquirer.net/view.php?db=1&story_id=44540>, accessed on 26 January 2007.
- Felipe, J. and Lanzona, L. Jr., 2006. 'Unemployment, labor laws, and economic policies in the Philippines', in J. Felipe and R. Hasan (eds), *Labor Markets in Asia: issues and perspectives*, Palgrave Macmillan for the Asian Development Bank, New York:367–502.
- Hansda, S.K., 2003. Sustainability of Services-Led Growth: an input output exploration of the Indian economy, Reserve Bank of India, New Delhi. Available online at <http://www.rbi.org.in/scripts/publicationsView.aspx?Id=5707>, accessed on 4 September 2006.
- International Institute for Management Development, 2006. *IMD World Competitiveness Yearbook 2006*, International Institute for Management Development, Lausanne.
- Kaka, N.F.; Kekre, S.S. and Sarangan, S., 2006. Benchmarking India's business process outsourcers, *The McKinsey Quarterly*, July 2006. Available

- online at http://www.mckinseyquarterly.com/article_page.aspx?ar=1788, accessed on 18 September 2006.
- Kochar, K.; Kumar, U.; Rajan, R.; Subramanian, A. and Tokatlidis, I., 2006. *India's pattern of development: what happened, what follows?*, Working Paper WP/6/22, International Monetary Fund, Washington, DC.
- Locsin, A.M., 2006. *Services at its best: the Philippine ITES-BPO industry*, Paper Presented at the Aspect Customer Experience Conference, 23 August 2006, Queensland.
- Magtibay-Ramos, N.; Estrada, G. and Felipe, J., 2007. *An analysis of the Philippine business process outsourcing industry*, ERD Working Paper Series No. 93, Asian Development Bank, Manila.
- Mapa, D., 2006. Cyberservices—the sectoral picture, a presentation at the DOLE Workforce Development Summit, March 2006, Manila. Available online at http://www.bpap.org/bpap/research/Cyberservices_Sector-DOLE_2006_Summit.pdf, accessed on 25 September 2006.
- Miller, R.E. and Blair, P.D., 1985. *Input–Output Analysis Foundation and Extension*, Prentice-Hall, New Jersey.
- National Statistical Coordination Board, 2006. *The 2000 Input–Output Accounts of the Philippines*, a data set in CD from National Statistical Coordination Board, Makati City.
- National Statistics Office, 2003. *Functional Literacy, Education and Mass Media Survey*, tabular results of a survey, National Statistics Office, Manila. Available online at <http://www.census.gov.ph/data/sectordata/dataadlit.html>, accessed on 18 September 2006.
- NeoIT, 2004. *Research summary: mapping offshore markets update 2004*, Offshore Insights White Paper Series No. 2(6), NeoIT, California. Available online at <http://www.bpap.org/bpap/research/090605b.pdf>, accessed on 18 September 2006.
- , 2006. *Research Summary: offshore and nearshore ITO and BPO salary report*, Offshore Insights Market Report Series 4(4, June):1–34, NeoIT, California. Available online at http://costkiller.net/tribune/Tribu-PDF/OIv4i04_0506_ITO_and_BPO_Salary_Report_2006.pdf, accessed on 17 September 2006.
- Oliva, E., 2008. BPAP, TESDA to sign deal related to Arroyo scholarship, Inquirer.net. Available online at <http://newsinfo.inquirer.net/breakingnews/infotech/view/20080205-116938/BPAP-Tesda-sign-deal-on-Arroyo-training-scholarship>, accessed on 5 February 2008.
- Outsource2Philippines and Business Processing Association Philippines, 2005. *O2P and BPA/P Periodic Survey #1, Summary of Results*. Research Summary Report. Business Processing Association Philippines. Available online at <http://www.bpap.org/bpap/research/survey1.pdf>, accessed on 18 September 2006.
- Pack, H. and Saggi, K., 2006. *The case for industrial policy: a critical survey*, Policy Research Working Paper No. 3839, World Bank, Washington, DC.
- Reyes, R.G., 2006. Both Academe and Industry must Address Competency Mismatch, JobMarket Online. Available online at <http://jobmarket.inquirer.net/people/people.php?artdate=2006-06-26&artnum=4>, accessed on 13 September 2006.
- Rodolfo, C.S., 2005. *Sustaining Philippine advantage in business process outsourcing*, Paper Presented to the Philippine Institute for Development Studies, September 2005, Makati City.
- Schaaf, J., 2005. *Outsourcing to India: Crouching Tiger set to pounce*, Deutsche Bank Research, Frankfurt. Available online at http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000192125.pdf, accessed on 18 September 2006.
- Software Technology Parks of India., 2006. STPI: the beginning. Software Technology Parks of India, Bangalore. Available online at http://www.blr.stpi.in/about_background.htm, accessed on 19 October 2006.
- Villafania, A., 2006. 'IT Industry Gets Bigger Share of the P500M Scholarship Program', *Philippine Daily Inquirer*, 12 May 2006.