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## An Analysis of the Philippine Business Process Outsourcing Industry

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## SERIES

# No. 93

An Analysis of the Philippine  
Business Process Outsourcing  
Industry

Nedelyn Magtibay-Ramos,  
Gemma Estrada, and Jesus Felipe

March 2007

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# AN ANALYSIS OF THE PHILIPPINE BUSINESS PROCESS OUTSOURCING INDUSTRY

NEDELYN MAGTIBAY-RAMOS, GEMMA ESTRADA, AND JESUS FELIPE

MARCH 2007

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## **FOREWORD**

The ERD Working Paper Series is a forum for ongoing and recently completed research and policy studies undertaken in the Asian Development Bank or on its behalf. The Series is a quick-disseminating, informal publication meant to stimulate discussion and elicit feedback. Papers published under this Series could subsequently be revised for publication as articles in professional journals



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## **ABSTRACT**

This paper provides a profile of the Philippine business process outsourcing (BPO) sector; makes country comparisons with India and other BPO providers; and summarizes the results of an input-output analysis of the Philippine BPO industry's intersectoral linkages and its potential impact on compensation and employment. The Philippine BPO sector's growth is largely driven by the contact center subsector due to its large share in total BPO employment and revenues, as well as by government support. The input-output linkage analysis shows that the BPO industry is not a key sector in terms of stimulating production in other sectors of the Philippine economy. However, growth in the sector's revenues can have a significant impact on compensation and employment. An increase in the sector's revenues will generate a considerable increase in the sector's total wage bill and in that of the other sectors. If appropriate policies are enacted and with improvements in human capital, it is estimated that the Philippine BPO sector may become an important employment-generating sector. The sector can provide 7–11% of the new jobs for the labor force entrants between 2007 and 2010. It is also estimated that the BPO total workforce size will reach 500,000 to 600,000 in 2010, which is considerable for a single economic activity.



## I. INTRODUCTION

For the past 25 years, the Philippines has witnessed high unemployment amidst low to moderate growth. Unemployment stood at 4.5% in the 1970s, but increased significantly after the economic crisis of the early 1980s, and peaked during the mid-1980s (see Felipe and Lanzona 2006). While economic recovery in the latter half of the 1980s led to a decline in unemployment, the economy's poor performance 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%. The Philippines's weak capacity to create enough jobs for its growing labor force, despite some periods of moderate growth, has led to the lingering unemployment problem.

Over the past two decades, much of the increase in the labor force has been absorbed by an expanding services sector. The share in employment of the services sector increased from 38.9% in 1990 to 48.1% in 2005. In contrast, industry's share in employment remained virtually unchanged, at around 15–16% during the same period. Analysts have pinpointed the blame on past economic policies that were carried out to pursue industrialization and growth. For several decades, the industrial sector was accorded heavy protection that inhibited backward integration, export expansion, and labor absorption (Balisacan and Hill 2003, Bautista 1983).

In the Medium-Term Philippine Development Plan (MTPDP 2004–2010), the Philippine government has openly acknowledged the need to address the country's unemployment problem and, thus, has set a target of creating about 1.5 million jobs a year between 2004 and 2010, or a total of 10 million jobs by 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 additional jobs were created. Although this led to a drop in the unemployed by 100,000, still total unemployment rate remained high at 11.4%.<sup>1</sup> Such inability to create enough jobs implies that the government's policy appeared to lack a cohesive strategy of addressing the unemployment issue. Recently, however, the government has ushered its support for sectors it considers as important for employment generation.

In the 2006 Workforce Development Summit, the government identified nine key employment-generating sectors to enable the matching of the country's skilled human resources with emerging industries in the local and global markets. These 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 would work with schools and training institutions to provide the type of education that is suited for today's workplace. While this appears to be a step in the right

<sup>1</sup> The unemployment rate is based on the old definition, which states that the total unemployed are "those who did not work and were reported wanting and looking for work during the reference week." A new definition was introduced in April 2005, which defined the unemployed as those who possess all three criteria: (i) without work; (ii) currently available for work; and (iii) seeking work, or not seeking work due to being discouraged for lack of available work, awaiting results of job application, temporary illness/disability, etc.

direction, its success in substantially bringing down unemployment depends not only on the specific 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 labor 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 overall output in terms of total revenues, which consists entirely of exports.<sup>2</sup> The BPO sector is estimated to account for only 0.075% of the economy’s gross domestic product (GDP) in 2000 but this increased to 2.4% in 2005. It has been hailed by the government as having huge potential for generating employment in the next five years. As of end-2005, the BPO sector employed 163,000 workers. The government and the Business Processing Association Philippines (BPA/P) have jointly forecast employment in this sector to rise by 38% annually between 2005 and 2010, employing one million workers by 2010. This forecast implies that around 27% of all new jobs in the country in 2010 would be generated by the BPO industry, which is not quite plausible for a single activity to achieve.

While the Philippines is already part of a large global outsourcing industry (where worldwide revenues amounted to \$67 billion in 2005), 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 some emerging BPO providers such as People’s Republic of China, Malaysia, Mexico, and Russia.

It is worth noting that nearly 70% of the BPO workers in the Philippines are in the contact center subsector. Since the minimum qualifications for employment in the contact center are a college degree, good English proficiency, and computer literacy, any college graduate can apply regardless of educational background. As a result, the contact center industry may have attracted a number of college graduates whose training is directed toward other highly skilled professions, thus creating an employment–education mismatch.

This paper aims to explore the status and trends in the BPO industry in the Philippines, as well as to examine how the country fares vis-à-vis India and other leading BPO providers. It performs a quantitative analysis of the potential impact of the BPO industry on compensation, employment, and output using the input–output (I-O) framework.

The rest of the paper is structured as follows. Section II briefly discusses the profile of the Philippine BPO sector, including the types of services, revenues, employment, investments, and government support to the sector. Section III provides an overview of the Indian BPO sector, to provide a benchmark for the Philippines and other countries aiming to acquire a substantial share in the rapidly expanding global BPO market. This is followed by cross-country comparisons on some key elements affecting BPO growth potential in Section IV. Section V investigates the prospects of the BPO sector by performing an I-O analysis on the sector’s intersectoral linkages, and an impact analysis on compensation and employment given the sector’s expected revenue growth based on government and industry projections. Section VI explores the employment dynamics in the BPO sector with reference to the attrition rate and training requirements in order to examine if there will be a sufficient number of people to occupy the predicted number of BPO jobs. The industry’s

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<sup>2</sup> As indicated by the Business Processing Association Philippines through communications with its Executive Director.

contribution to the labor force is also determined. Finally, Section VII offers some conclusions. The technical appendix provides a brief summary of I-O analysis.

The analysis leads to the following main conclusions: (i) by its very low intersectoral 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) in 2010, with a workforce of around 500,000 to 600,000, the sector will provide around 11% of the jobs for new labor force entrants.

## II. INDUSTRY STATUS

Business process outsourcing is defined by the Philippine Department of Trade and Industry (DTI 2003) as the “delegation of service-type business processes to a third-party service provider.” It covers services related to information technology, business administration, sales, marketing, and customer care.

As of the first quarter of 2006, at least 600 firms were considered part of the BPO industry in the Philippines. BPO services in the country are generally classified into seven subsectors (see Box 1). Of these, the biggest is the contact center subsector (also known as call centers), worth US\$1.8 billion in revenues in 2005, equivalent to 75% of the total revenues generated by the BPO industry during the year. From about four contact centers in 2000, the number of contact centers has increased to 114 as of first quarter 2006 (Tables 1 and 2). In 2005, contact centers employed 112,000 workers, equivalent to nearly 70% of total employment in the BPO sector. Employment in call centers is projected to reach around 506,500 by 2010 according to the BPA/P and government forecasts.

### Box 1 TYPES OF BPO SERVICES

- **Contact Center.** Consists of in-bound and outbound voice operation services for the purposes of sales, customer service, technical support, and others.
- **Back Office.** Services related to finance and accounting (e.g., bookkeeping, accounts maintenance, claims processing, asset management) and human resource administration (e.g., payroll processing, benefits administration, human resources data management).
- **Data Transcription.** Provision of transcription services for interpreting oral dictation of health professionals, dictations during legal proceedings, and other data encoding services.
- **Animation.** Process of giving the illusion of movement to cinematographic drawings, models, or inanimate objects through 2D, 3D, etc.
- **Software Development.** Analysis and design, prototyping, programming and testing, customization, reengineering and conversion, installation and maintenance, education and training of systems software, middleware and application software.
- **Engineering Development.** Includes engineering design for civil works, building and building components, ship building, and electronics.
- **Digital Content.** Creation of products that are available in digital form, such as music, information, and images that are available for download or distribution on electronic media.

Sources: DTI (2006), Locsin (2006), The Computer Language Company Inc. (2006).

After contact centers, the next biggest BPO subsectors in terms of total revenues and employment generated in 2005 are software development and back-office operations. Software development generated \$204 million and provided direct employment to 12,000 workers. While the country has been active in software development since the 1990s, only in recent years has it been vigorously involved in back-office operations, which cover numerous services related to finance, accounting, and human resource administration. Back-office operations were also the second biggest employer in the industry in 2005, accounting for 14% of total BPO employment.

Data from the Philippines Board of Investments (BOI) indicate that data transcription companies have been with the Philippines as far back as the mid-1990s, even earlier than the contact center companies, although expansion in the data transcription subsector has not been as robust as that of the contact center industry. In the last two years, however, data transcription experienced a substantial expansion in employment from 6,300 in 2004 to 8,950 in 2005, marking a 42% uptake.

**TABLE 1**  
**BPO INDUSTRY IN THE PHILIPPINES, 2005/2006**

	NO. OF SERVICE PROVIDERS <sup>a</sup>	REVENUES IN US\$ MILLIONS <sup>b</sup>	PERCENT SHARE	EMPLOYMENT <sup>b</sup>	PERCENT OF TOTAL EMPLOYMENT
Contact center	114	1,792	75.1	112,000	68.6
Back office	62	180	7.5	22,500	13.8
Medical transcription	64	70	2.9	5,500	3.4
Legal transcription	9	6	0.3	450	0.3
Other data transcription		39	1.6	3,000	1.8
Software development	300	204	8.5	12,000	7.4
Animation	42	40	1.7	4,500	2.8
Engineering design	14	48	2.0	2,800	1.7
Digital content	11	7	0.3	500	0.3
Total	616	2,386	100.0	163,250	100.0

<sup>a</sup> As of 1st quarter 2006.

<sup>b</sup> 2005.

Sources: Board of Investments–Commission on Information and Communications Technology–Business Processing Association Philippines, as cited in Locsin (2006); PEZA (2006).

**TABLE 2**  
**CONTACT CENTER SUBSECTOR**

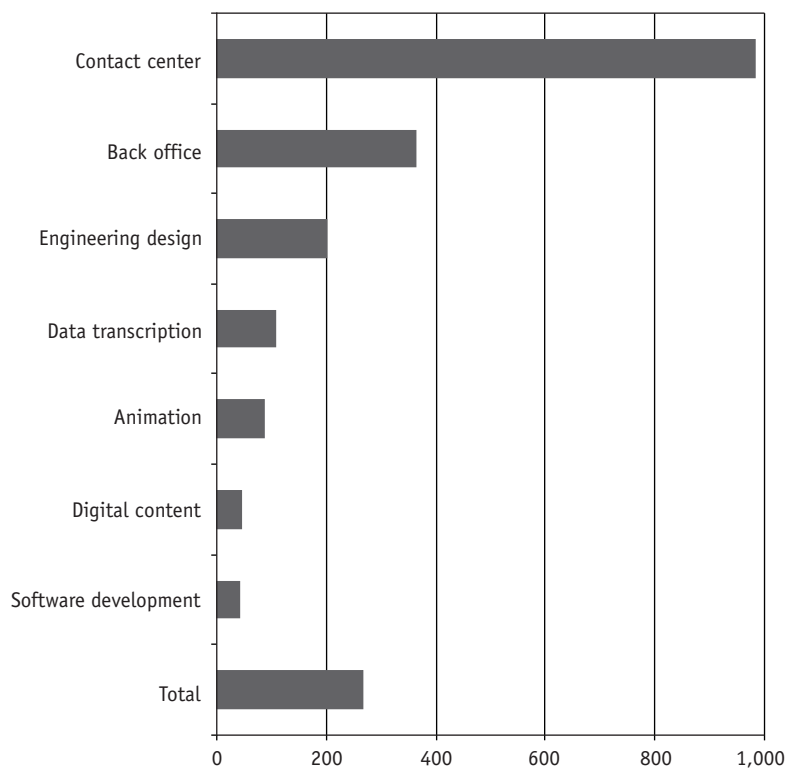
YEAR	NUMBER OF CONTACT CENTERS	ESTIMATED NUMBER OF SEATS	ESTIMATED NUMBER OF EMPLOYEES	ESTIMATED REVENUE (US\$ MILLIONS)
2000	4	1,500	2,400	24
2001	13	3,500	5,600	56
2002	31	7,500	12,000	120
2003	60	20,000	32,000	320
2004	72	45,000	67,000	800
2005	108	75,000	112,000	1,800

Source: Locsin (2006).

Other subsectors comprising the BPO industry are those involved in animation, engineering design, and digital content. On the aggregate, these subsectors earned revenues amounting to \$129 million in 2005, representing around 5% of the total revenues of the industry.

In terms of employment size, the largest companies within the industry are the contact centers, with each firm employing 1,000 workers on the average, about four times the size of an average Philippine BPO firm (Figure 1). After contact centers, the next biggest firms are those involved in back-office operations, employing 360 workers on average. Except for engineering design, which has about 200 workers per company, other BPO subsectors operate on a small scale, employing at most 100 workers.

**FIGURE 1**  
**AVERAGE NUMBER OF WORKERS PER BPO FIRM**



Source: Locsin (2006).

Various markets are currently being served by the Philippine BPO sector. For the contact center subsector, the existing markets are companies in the United Kingdom (UK) and the United States (US). Contact centers in the Philippines offer a number of inbound and outbound services, which include telemarketing, sales verification, credit and collection, reactivation/ reinstatement, technical help desk, complaints, sales, billing, etc. (BPA/P 2006). The clients of contact centers with operations in the Philippines also vary. Some of their clients include firms in the telecommunications sector, financial sector, tourism, health care, and transportation (Table 3).



While clients of contact centers are primarily based in the UK and the US, BPO firms in the other subsectors serve other developed countries and some Asian countries. For example, the existing market of the animation subsector includes not only the US, but also developed countries such as Australia, Canada, and France; and Asian countries such as People’s Republic of China (PRC), Republic of Korea, Malaysia, and Thailand. Further, among the clients of software development companies are firms in India and Singapore (DTI 2006).

**TABLE 3**  
**TYPE OF CLIENTS: SAMPLE CONTACT CENTERS WITH PHILIPPINE OFFICES**

BPO FIRM	CLIENTS
PeopleSupport	Travel and hospitality, technology, telecommunications, financial services, consumer products, retail and additional industries
Sykes	Communications, technology/consumer, financial services, health care and transportation, leisure industries
Teletech	Automotive, communications, financial services, government, health care, retail, travel and leisure, utilities

Note: The list may not be exhaustive.

Sources: Teletech (2006), PeopleSupport (2006), and Sykes (2006).

## A. BPO Investments

While BPO around the world began as early as the 1990s, it was only in the early part of the new millennium that outsourcing opportunities gained ground in the Philippines. From P2 billion in 2000, investment in the BPO industry rose to P11 billion in 2001, then settled to about P5–7 billion annually in the next 4 years.

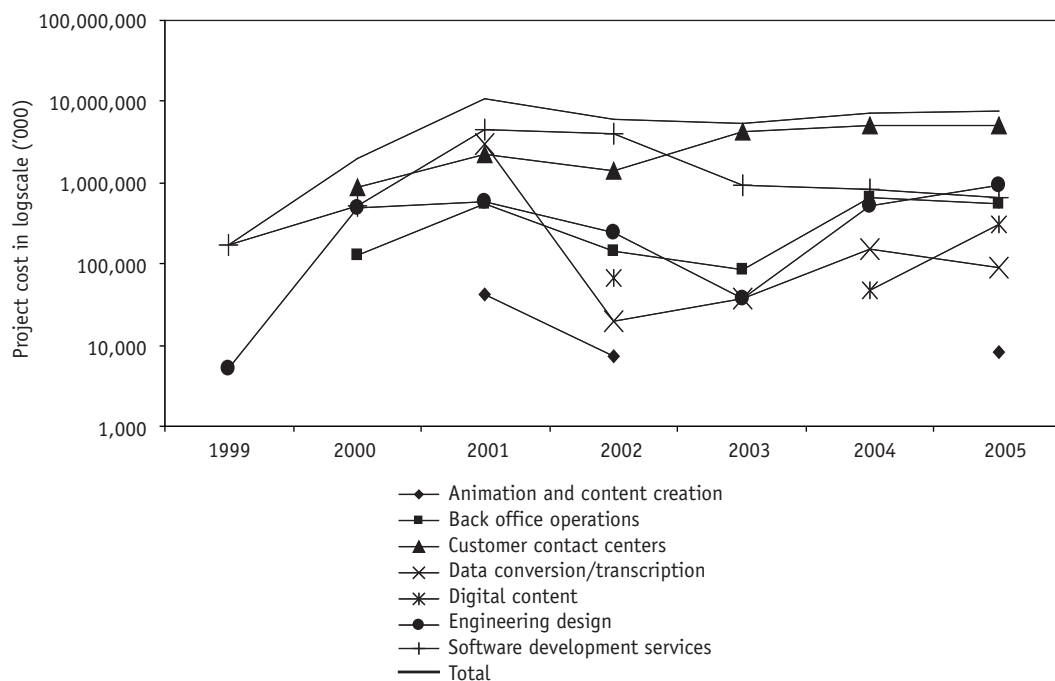
The cumulative amount of investment projects registered under the BOI and the Philippine Economic Zone Authority (PEZA) between 2000 and the first half of 2006 was about P43.2 billion, corresponding to a total of 420 investment projects. Of this total number, 34% were investments in contact centers while 35% were investments in software development projects. In terms of amount, however, contact centers accounted for a large share, 52% of the total, nearly twice the amount of investments in the software industry. Investments in contact centers in 2003–2005 amounted to nearly P5 billion annually. Between January and August 2006, contact center investments already amounted to around P3 billion. Meanwhile, the influx of investments in software development eased from about P4.3 billion annually in 2001–2002 to P800 million during 2003–2005 (Figures 2 and 3).

In contrast, for the other sectors the pattern was a surge in 2001, followed by a slowdown in 2002–2003, and then an increase again in the succeeding two years. In particular, investments in back-office operations amounted to P563.6 million in 2001, but dropped to P139.7 million in 2002 and P83.5 million in 2003; and then rose again to over P500 million annually in 2004–2005. In the same vein, investments in data transcription and engineering design slowed in 2002–2003, but managed to rise again in the succeeding years. Investment for data transcription has been particularly robust in recent years. Specifically, the cumulative amount of BOI-registered projects under data

transcription amounted to P3.3 billion in 2000–2005. Similar to data transcription, investments in engineering design also surged in the new millennium. In 2000–2005, a cumulative total of P2.9 billion in investments in engineering design were registered under the BOI and PEZA.

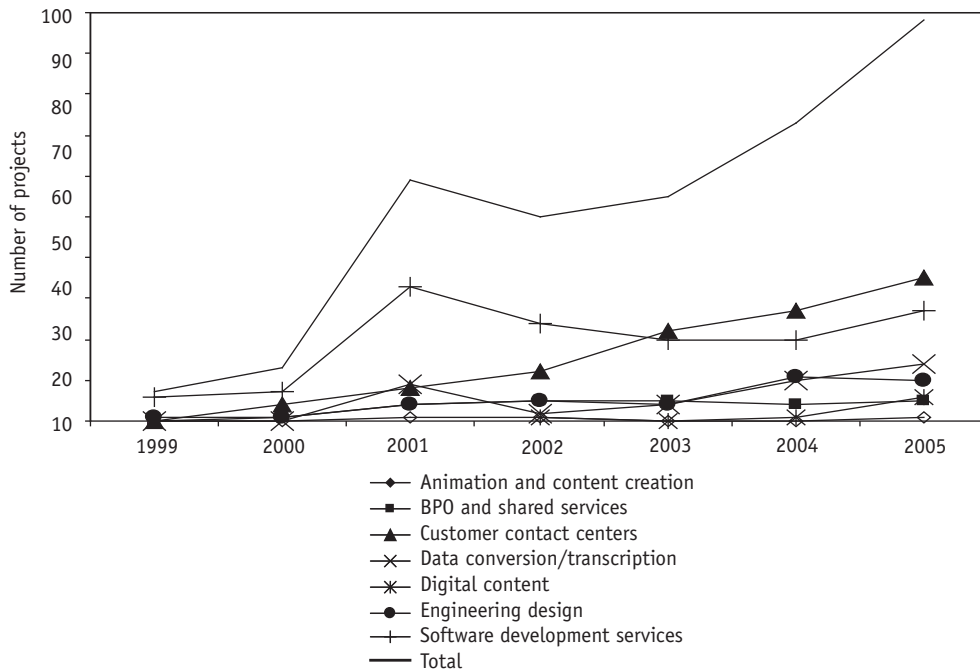
In terms of investment size per project, those in contact centers are again the largest with an average project cost of P159 million in 2000–2005. Considering that setting up contact centers involves heavy investments capable of generating 1,000 jobs per project, it is no surprise that the Philippine government has called on investors to bring more contact center investments to the Philippines. Given the current trends on contact center investments and the strong government support for the sector, it appears that contact centers will continue to dominate the BPO industry during the next few years.

**FIGURE 2**  
**INVESTMENT PROJECT COSTS**



Sources: Unpublished data from BOI and PEZA.

**FIGURE 3**  
**NUMBER OF BPO INVESTMENT PROJECTS**



Sources: Unpublished data from BOI and PEZA.

## B. Government Support to the BPO Industry

Government support for the BPO industry is quite evident. Coinciding with the surge of the BPO industry, in 2001 the government formed the Information Technology and E-Commerce Council (ITTEC) to serve as the highest policy-making body. It provides policy directions on information and communications technology. One of ITTEC's main objectives is to develop the country as an E-services hub.

In 2005, the government launched the Philippine Cyberservices Corridor, an "ICT belt stretching over 600 miles from Baguio City to Zamboanga", which is said to be capable of providing a variety of BPO services. It covers at least three primary urban centers in Luzon, Visayas, and Mindanao, and 15 other provinces across the country. These urban centers are Metro Manila, Cebu, and Davao. The government is allocating P26 billion for cyber corridor projects (ComputerWorld Philippines 2006). The completion of this corridor is expected to accelerate growth of the BPO sector.

In May 2006, the government announced that it had earmarked about half of the P500 million "Training for Work Scholarship Program" for the IT industry to provide educational grants for the training of BPO applicants. The program issues training certificates to "near-hires" or applicants whose qualifications fall just slightly below a hiring company's skill requirements. Out of the 65,100 training certificates that the BPO industry is receiving, 60,000 (92%) are intended for call centers; 2,000 (3%) for the data transcription sector; 3,000 (4.6%) for software development; and 100 (0.2%) for animation (Villafania 2006). The allocation scheme, with contact centers receiving a greater proportion of training certificates than its current share of BPO employment, indicates the government's strong bias toward this sector.

The BPA/P, a private sector organization composed of companies and organizations engaged in IT-enabled services and BPO, acknowledges that the Philippine government has been very supportive in marketing the country among BPO investors.<sup>3</sup> The government has worked in close coordination with the BPA/P on a number of programs that aim to showcase the country as a prime BPO destination among investors. The incentives that BPO investors can avail of through either BOI or PEZA include income tax holidays, tax and duty exemption on imported capital equipment, permanent resident status for foreign investors, employment of foreign nationals, and simplified export and import procedures, among others. The provision of these generous incentives, complemented by strong government support, augers well for the BPO sector.<sup>4</sup>

### III. INDIA'S EXPERIENCE: LESSONS FOR THE PHILIPPINES

Offshore outsourcing enables companies in developed countries to conduct business operations through a more cost-efficient means by tapping the stream of highly skilled workers in developing countries, commanding wages that are far lower than those in developed countries. Even factoring other costs such as business setup and infrastructure access, cost savings through outsourcing is estimated to be about 20–40%. Huge amounts of contracts have been forged between large companies and offshore suppliers in other, mostly developing, countries with the capacity to deliver low-cost outsourcing services in customer support, IT, and business processes. In 2000, the global outsourcing industry earned about \$44.9 billion in revenues. By 2005, the global BPO market was already worth \$67 billion (Clark 2006). Several developing countries led by India have benefited from the steady expansion of the global BPO industry.

India holds about 46% of the global market for BPO (Kaka et al. 2006). Its global dominance is mainly rooted on the reputation it has built throughout the years of delivering high-quality software services (Banerjee 2006). It has tremendously gained from being a pioneer in the industry, having been in the business of offshore-outsourcing services since the 1990s. In the early 1990s, India-based companies such as Wipro, Infosys, TCS, and HCL, with their pool of highly skilled technical staff, emerged to provide low-cost business solutions for US-based companies, which were then constrained by the IT resource shortage occurring during the early period of the internet boom (Schaaf 2005).

One strand of the literature attributes the success of India's BPO sector on the shift in economic policy and strong government support. 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 accelerator was the formation of the Software Technology Parks of India (STPI) in 1990, which aimed to (i) set up and manage IT-related infrastructure resources; (ii) provide single-window government services such as project approvals, import certification, software valuation, and certification for software exporters; (iii) promote development and export of software services; and (iv) train professionals and encourage development in the field of software technology and software engineering (STPI 2006). No limits on foreign ownership are imposed in the software technology parks. In addition,

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<sup>3</sup> Interview with Albert Mitchell Locsin, Executive Director of BPA/P (29 August 2006).

<sup>4</sup> Philippine BPO companies are collaborating toward increasing industry revenue to \$12 billion and boosting their share of the global outsourcing market from 3–4% in 2006 to 10% by 2010. BPA/P intends to carry out media campaigns and roadshows in Europe and the US to enhance the Philippine profile as an attractive outsourcing destination (Landingin 2007).

BPO companies are exempted from taxes on export profits until 2009 and are provided 100% income tax exemption for the first 5 years, and 50% for the succeeding 2 years (NeoIT 2004).

A recent 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 move cannot be regarded as a selective industrial policy that favored only the BPO. The surge of the BPO sector in India was due to the presence of well-educated English-speaking students and a group of enterprising local citizens who capitalized on the global shortage of programmers and the high demand for business solutions occurring in the 1990s. In addition, the Indian expatriate community in the US, especially the IT professionals in Silicon Valley, is providing a crucial role in the rapid development of the Indian BPO sector through their investments in the sector, their connections with large US software firms which they later on convinced to set up operations in India, and the mentoring they provide to local software firms in India.

At the extreme end of the spectrum is the view that past “policy errors” were instrumental in bringing about dramatic changes in the Indian economy (Banerjee 2006 and Kochar et al. 2006). The government’s heavy investment in tertiary education led some highly-skilled workers (e.g., engineers) to be employed in private or public firms which, more often than not, underutilized the capacities of their workforce. For lack of any challenging project to do, these workers took on contracts from new firms in the software industry. While initially working on a fixed price basis, Indian workers had gradually built a strong reputation in the software industry, which later on 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 dominance, a number of factors could dampen the sustained growth of its BPO sector. There is a 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 10–20% of graduates have the requisite training for international business. The industry also has a high level of turnover (15–30% per year), and employee compensation has been rising by 12–15% a year (Schaaf 2005).<sup>5</sup>

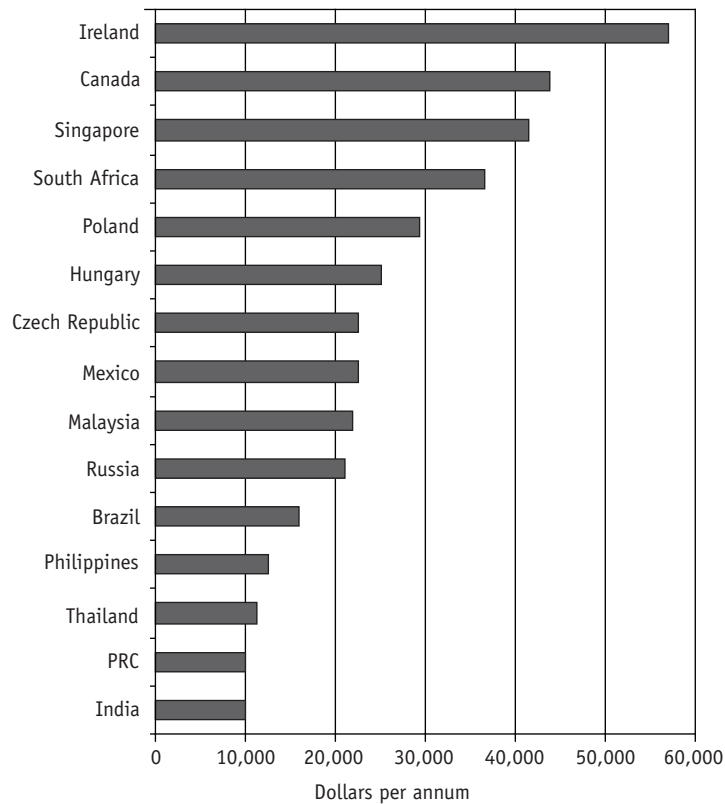
While India is recognized as the leading global outsourcing destination, in recent years it has faced looming competition from other providers, including the Philippines. However, it is unlikely that its leadership will be disputed in the next few years. Being the forerunner, India’s BPO industry has gained high 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 to be the most competitive: the average salary in the Indian IT outsourcing sector is the lowest among key offshore destinations (Figure 4).<sup>6</sup>

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<sup>5</sup> Such increase in compensation is not necessarily unfavorable if related to productivity gains.

<sup>6</sup> Considered as a well-established nearshore destination for firms from the UK, Ireland has the highest average salary on IT outsourcing.

**FIGURE 4**  
**AVERAGE SALARIES OF KEY OFFSHORE DESTINATIONS**



Source: NeoIT (2006b).

In a study conducted by NeoIT (2006a) on the competitiveness of 24 leading cities around the world that provide BPO services, the seven top ranking cities in terms of “generic” competitiveness are found in India.<sup>7</sup> Generic competitiveness includes measures related to human capital, costs, infrastructure, business and living environment, and risk factors. The best city according to this measure is the Delhi National Capital Region. Manila, the capital of the Philippines, is in the ninth spot, next to Ho Chi Minh City. Other cities in the Philippines included in the survey, namely, Cebu, Clark, and Davao, are in the 13th–15th ranking.

According to the NeoIT study, the advantage of cities in India is that India has acquired industry-specific capability. For example, Bangalore is known to specialize in high-tech services, while Mumbai ranks high on financial services. The same study also notes that Manila is ideal for voice-based activities and scores highly on back-office operations.

An important issue to examine is whether or not the Philippines could emulate India’s successful model. In 2005, revenues of Philippine BPO firms were only about 14% that of India (Table 4). While only 13% of the revenues of the Philippine BPO sector were from software and IT services, for India the corresponding percentage was 70%.

<sup>7</sup> These cities are Delhi, Bangalore, Hyderabad, Mumbai, Pune, Chennai, and Kolkata, respectively.

With the current status of the BPO industry, it may take some time before the Philippines could mature to a level similar to that of India for several reasons. One is that the growth of the local BPO is largely shaped by the expansion of contact centers. In the case of India, KPOs (particularly IT-related) currently capture 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 dramatic as that of contact centers. As noted earlier, recent government support also appears to be biased toward contact centers, given the disproportionate share that goes to contact centers in terms of funding for training. Proficiency in English, a key requirement for contact center work, has often been highlighted as the main skill demanded by the BPO industry. But for high-value KPOs to vigorously emerge, more specialized skills in areas such as IT, science, and engineering are needed. Thus, this gives the impression that the local BPO industry is merely waiting for a “natural process” to occur in which, at some point in time, the industry would eventually move up in the value chain ladder. It is still not clear, however, how such dynamics would come into play.

**TABLE 4**  
**PHILIPPINES VS. INDIA—BPO SECTOR COMPARISON**

INDICATORS	PHILIPPINES	INDIA
Total labor force, 2005	36 million	460 million
BPO employment, 2005	163,250	700,000
BPO employment in labor force (percent)	0.45	0.15
BPO revenues, 2005	\$2.4 billion	\$17.2 billion
Software and IT services <sup>a</sup> (percent)	13	70
Core competencies	Contact centers, transcriptions, animation, and back-office operations	Application maintenance and support, application development, contact centers, and financial processing services

<sup>a</sup> Includes development of software packages, applications development and maintenance, systems integration, etc.

Sources: Locsin (2006), Cu (2006), NeoIT (2004), Deutsche Bank Research and NASSCOM (2005) as cited in Schaaf (2005), NASSCOM and McKinsey (2005) as cited in Nandy (2006).

#### IV. CROSS-COUNTRY COMPARISONS

For BPO investors, the key factors that can greatly affect their location decision are costs, infrastructure, human capital, and governance. The expansion of the BPO industry will greatly depend on high-quality, reliable, and low-cost infrastructure services. In terms of electricity and telephone costs, the Philippines lies above the median among emerging BPO providers in developing Asia and other regions (Table 5). Telephone costs are lower in the Philippines than in the PRC, although higher than in Brazil and India. While it has an advantage over countries in South America and Eastern Europe in terms of electricity costs, the Philippines, however, fares worse compared to its Asian counterparts. This also holds true for internet costs, which are higher in the Philippines than in PRC; India; Republic of Korea; Singapore; and Taipei, China, but cheaper than the rates in Brazil, Eastern Europe, and Mexico. However, one clear advantage of the Philippines over other

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BPO-provider countries is its low office rental cost, which is just 32% and 40% of the rates in India and the PRC, respectively.<sup>8</sup>

The quality of human capital is a critical factor in the BPO sector. The Philippines enjoys a high literacy rate (97% in the National Capital Region; 89% in the country)<sup>9</sup> and is a popular destination among call center operators due to its people's English language capabilities and affinity with western cultures (NeoIT 2004). Compared to India, the Philippines also has a higher proportion of the population in the 25–34 age group with at least tertiary education. Average salaries in the Philippine BPO sector are also lower than those of many key offshore destinations (Figure 4).

Government fiscal policy and quality of governance are also important in influencing the entry of investments. In terms of corporate taxation, the rate in the Philippines of 32% is comparable to those of the PRC and Thailand, and lower than that of India (Table 6). However, the Philippines performs poorly in terms of governance. Out of 61 countries, the Philippines ranks only 51 in terms of transparency, and 59 or third-worst in both performance of custom's authorities and public service (Institute for Management Development 2006).

While the Philippines is comparable to or even fares better than other emerging BPO providers in areas such as quality and cost of labor 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. Industry analysts also 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 later achieve what India has gained so far, what are the implications of a huge BPO sector for the country? Can it indeed play a substantial role in employment generation as well as output expansion? This issue is explored using the input–output framework.

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<sup>8</sup> There are reports, however, that with the high demand for office space, vacancy rates in main urban centers in the Philippines have gone down to 4–5% and investors have to wait for several months before they could find a suitable office space (Galang et al. 2006).

<sup>9</sup> Based on functional literacy level 1, which pertains to population aged 10 to 64 years who can read and write (National Statistics Office 2003).



**TABLE 5**  
**INFRASTRUCTURES FOR BPO, CROSS-COUNTRY COMPARISONS**

	<b>ELECTRICITY COSTS FOR INDUSTRIAL CLIENTS, 2005 (US\$ PER KWH)</b>	<b>INTERNATIONAL FIXED TELEPHONE COSTS, 2004 (US\$ PER 3 MINUTES TO US IN PEAK HOURS)</b>	<b>INTERNET COSTS FOR 20 HOURS DIAL-UP PER MONTH, 2004 (US\$)</b>	<b>OFFICE RENT COSTS, 2005 (US\$/SQM PER YEAR)</b>
Philippines	0.081 <sup>a</sup>	0.90 <sup>a</sup>	15.70	145
<b>Asian Countries</b>				
PRC	—	2.93	10.13	366
India	—	0.41	9.68	447
Thailand	—	1.64	7.39	176
Malaysia	0.056	0.71	8.42	143
Singapore	0.073 <sup>b</sup>	0.70	11.74	363
Republic of Korea	0.059	0.84	10.49	665
Taipei, China	0.055 <sup>b</sup>	0.55	11.12	518
<b>Non-Asian Countries</b>				
Brazil	0.046 <sup>c</sup>	0.77	21.95	312
Canada	0.049	0.48	14.67	361
Czech Republic	0.081	0.50	28.90	404
Mexico	0.088	2.61	19.31	392
Hungary	0.096	0.99	34.90	459
Ireland	0.099	0.59	36.05	874
Poland	0.070	—	20.94	401
Russia	0.029 <sup>a</sup>	1.38	22.00	874
South Africa	0.023	0.70	58.36	149
Median	0.065	0.74	15.70	392

<sup>a</sup> Refers to 2003

<sup>b</sup> Refers to 2004

<sup>c</sup> Refers to 2001

<sup>d</sup> Refers to 2002

Source: Institute for Management Development (2006).

**TABLE 6**  
**EDUCATION AND GOVERNANCE, CROSS-COUNTRY COMPARISONS**

	EDUCATION	GOVERNANCE <sup>a</sup>				
	PERCENT OF POPULATION WITH TERTIARY EDUCATION FOR PERSONS AGED 25–34, 2003	CORPORATE TAX RATE ON PROFIT, 2005 <sup>b</sup>	EMPLOYER'S SOCIAL SECURITY CONTRIBUTION RATE, 2005 <sup>c</sup>	TRANSPARENCY, 2006 <sup>d</sup>	CUSTOMS AUTHORITIES, 2006 <sup>e</sup>	PUBLIC SERVICE <sup>f</sup>
Philippines	17	32.0	9.62	51	59	59
<b>Asian Countries</b>						
PRC	—	33.0	0.00	23	38	23
India	9.5	35.9	0.00	34	47	47
Korea, Rep. of	47	27.0	6.74	38	41	25
Thailand	18	30.0	6.12	52	44	41
Malaysia	18	28.0	0.35	15	26	15
Singapore	49	20.0	13.00	6	3	12
Taipei, China	43.2	25.0	9.21	50	36	26
<b>Non-Asian Countries</b>						
Brazil	7	25.0	37.29	58	58	54
Canada	53	41.1	7.07	5.95	25	7
Czech Republic	12	28.0	35.36	37	14	27
Mexico	19	32.0	20.25	26	50	32
Hungary	17	18.0	35.39	46	30	40
Ireland	37	12.5	10.75	6.43	5	11
Poland	20	19.0	19.83	59	48	60
Russia	31	24.0	30.15	55	60	49
South Africa	10.6	30.0	1.38	13	46	50
Median	18.5	28.0	9.62	37	41	32

<sup>a</sup> Survey ranking out of 61 countries for the following indicators: Transparency, Customs Authorities, Public Service (1 being the highest or most favorable)

<sup>b</sup> Maximum tax rate, calculated on profit before tax

<sup>c</sup> Compulsory contribution as a percentage of an income equal to GDP per capita

<sup>d</sup> Transparency of government policy is poor/satisfactory

<sup>e</sup> Do [not] facilitate the efficient transit of goods

<sup>f</sup> Public service is [not] independent from political interference

Source: Institute for Management Development (2006).

## V. INPUT-OUTPUT ANALYSIS OF THE BPO SECTOR

Previous sections described the performance and the current state of affairs of the Philippine BPO sector. It was also evaluated vis-à-vis BPO providers from other countries. In this section and the next, we analyze the interdependence of the sector with other sectors of the economy. We also investigate the prospects of 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 in order to determine if the supply of qualified individuals is sufficient.

Government and the BPO industry claim that the BPO sector is a key employment-generating sector. Particularly, they are predicting a huge increase in both the industry revenue and workforce, reaching almost US\$12.2 billion and around a million employees, respectively, by 2010.

Is there any economic tool that can provide evidence to validate this claim? What is the impact of such a considerable growth in the Philippine economy? How will growth in the BPO sector affect the rest of the economy? How does the BPO sector affect production in the other sectors of the economy? In this section, we propose to answer these questions using I-O analysis.

We use the Philippine I-O tables as a consistency framework and a tool to generate employment projections. The I-O framework is based on the assumptions of homogeneity and proportionality. Homogeneity involves three premises: (i) each sector produces a single output (i.e., 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.<sup>10</sup>

In this paper, the 2000 I-O accounts of the Philippines is used to examine the effect of the BPO sector on the Philippine economy.<sup>11</sup> The I-O accounts include the 240 by 240 transactions table, the technical coefficients matrix, and inverse matrix (see technical appendix for the precise definitions).

The transactions table shows the production flows within the economy during the year for each of the 240 sectors.<sup>12</sup> 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.

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<sup>10</sup> 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 intersectoral 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.

<sup>11</sup> This is the latest in the series produced by the National Statistical Coordination Board in collaboration with the National Statistics Office.

<sup>12</sup> This section draws heavily from the Technical Notes of the 2000 Input-Output Accounts of the Philippines (NSCB 2006).

Using the I-O framework, this study conducts two types of analysis (i) linkages of the BPO sector on the production of the other economic sectors, and (ii) impact of changes in BPO revenues on compensation and employment.

### A. Intersectoral Linkages

By looking at its linkages with the other sectors, the interrelationship of the BPO sector with the rest of the economy can be determined. The backward, forward, and total linkage indices are summaries that gauge the intersectoral dynamics of a sector with the other sectors as providers of input (i.e., backward linkage) and as a source of input to the other sectors (i.e., forward linkage).

Backward linkage measures the relative importance of a sector as a buyer of inputs from the other sectors. It is computed as the sum of the sector's column elements in the inverse matrix. On the other hand, forward linkage measures the relative importance of a sector as a supplier of inputs to the other sectors and is obtained as the sum of the sector's row elements. The linkage index of a sector is the ratio of its linkage, whether 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) proposes to multiply each element of the inverse matrix by the share in final demand. The resulting weighted inverse matrix is then used to calculate the linkages and the indices.

Sectors having both indices of backward and forward linkages greater than one are regarded as the key sectors of the economy. Key sectors are important in terms of investment because growth in these sectors will stimulate more production in other sectors of the economy.

In the Philippine BPO sector, the backward linkage is greater than the forward linkage (Table 7). 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. However, the BPO sector provides services to only three other sectors: tour and travel agencies, wholesale and retail trade, and banking.<sup>13</sup>

**TABLE 7**  
**LINKAGE INDICATORS OF THE PHILIPPINE BPO SECTOR**

	FORWARD	BACKWARD	TOTAL
Linkage	0.0006288	0.007065	
Index	0.0398655	0.447946	0.487812
Rank of the index out of 240 sectors	138th	178th	177th

Source: Authors' estimates.

The low indices of the BPO sector mean that this sector is not a very significant "supplier" of inputs to other sectors nor is it an important "buyer" of inputs from the other economic sectors. The low rank of the indices also indicates that the BPO sector is not a major stimulus in terms of economic interdependence.

<sup>13</sup> For instance, the Philippine BPO sector used Pesos 76 million worth of telecommunication services as input and provided Pesos 175 million worth of its services to the banking sector in 2000.

To know which sectors of the economy have a high degree of forward or backward linkages, one can refer to Table 8, which presents the ten top ranking sectors for each type of index. The wholesale and retail trade sector tops the list for all the 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 of the economy.

**TABLE 8**  
**TOP RANKING SECTORS WITH RESPECT TO THE LINKAGE INDEX**

RANK OF INDEX	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 semiconductor 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.

Given the low indices of backward and forward linkages of the BPO sector, it can therefore be argued that in terms of stimulating production in other sectors of the Philippine economy, the BPO industry is not a key sector. Note that 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% (while the share of total intermediate demand is only 8%). Also, the processes involved in the industry do not require inputs from a large number of other sectors. The share of total intermediate inputs is only 35% while the share of gross value-added is 65%. This is not to say that the BPO sector does not stimulate activities in the other sectors. But the level of inducement is not as big as that of some other sectors, for example that of the wholesale and retail trading sector. The higher than average compensation of BPO employees, as shown in the next section, may potentially increase personal consumption if this sector's workforce has a high propensity to consume.<sup>14</sup>

## **B. Impact Analysis**

To assess the impact of changes in the BPO sector's final demand, this paper estimates 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 that will be generated.

### **1. Output Multiplier**

In undertaking the impact analysis, an important concept used is that of the output 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 output multipliers for the different sectors shows where spending a particular amount of money would have a bigger 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 of additional output from all the sectors of the economy. Therefore, a \$10 million worth of new final demand for the BPO sector will generate \$16.3 million of additional output from the whole economy.

### **2. 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 on all the 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 multiplier measures the change in compensation in the whole economy brought about by the changes in final demand.

A key figure in this impact analysis is the compensation coefficient, which is 0.31 for the BPO sector. This means that compensation accounts for 31% of the BPO sector's total inputs. Since a significant portion of the sector's inputs goes to the wage bill, a substantial increase in revenue is expected to generate a considerable amount of additional compensation.

<sup>14</sup> 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. These represent personal consumption.

The year 2005 is taken as the baseline. Note that between 2004 and 2005, the BPO sector obtained an increase in revenues of \$945 million (Table 9). Using the compensation multiplier, we estimated that the BPO revenue increase of \$945 million in 2005 generated an increase in compensation of \$291 million for the BPO sector and \$87 million for the other sectors. Thus, in terms of compensation, the total impact on the economy in 2005 amounted to about \$378 million. This analysis was replicated for each of the forecast years (2006 to 2010) under three different scenarios based on different revenue forecasts.<sup>15</sup>

The Board of Investment–Commission on Information and Communications Technology–Business Processing Association/Philippines (BOI-CICT-BPA/P) workforce growth projections in Table 9 are based on the following factors: (i) previous years’ performance (2000–2005); (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, i.e., 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).<sup>16</sup>

**TABLE 9**  
**BOI-CICT-BPA/P FORECAST FOR THE BPO SECTOR, 2006 TO 2010**

	2004	2005	2006	2007	2008	2009	2010
Workforce	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, Scenario I (\$ millions)	1,474	2,419	3,627	4,992	6,769	9,130	12,199
Change in revenue, Scenario I (\$ millions)		945	1208	1365	1777	2361	3069

Source: Board of Investment—Commission on Information and Communications Technology—Business Processing Association/Philippines, as cited in Locsin (2006).

Note: Revenues are expressed in nominal dollars.

Scenario I is based on the BOI-CICT-BPA/P revenue forecast shown in Table 9. This is assumed to be the best possible scenario. In Scenario II, the BOI-CICT-BPA/P revenue forecast is reduced by 15%. In Scenario III, the BOI-CICT-BPA/P revenue forecast is reduced by 30%. The revenues under Scenarios II and III are indicated in Table 10. The results of the impact analysis are summarized in Table 11.

<sup>15</sup> It was recently reported (Domingo 2007) in an interview with the Trade and Industry Secretary that (i) BPO revenues in 2006 was \$3.63 billion and the 2010 forecast is \$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).

<sup>16</sup> This information was obtained through communications with BOI and BPA/P.

**TABLE 10**  
**REVENUE FORECAST UNDER DIFFERENT SCENARIOS**

REVENUES (\$ MILLIONS)	2006	2007	2008	2009	2010
Scenario II	3082.95	4243.2	5753.65	7760.5	10369.15
Scenario III	2538.9	3494.4	4738.3	6391	8539.3
<b>Change in revenue</b>					
Scenario II	663.95	1160.25	1510.45	2006.85	2608.65
Scenario III	119.9	955.5	1243.9	1652.7	2148.3

Source: Authors' estimates.

**TABLE 11**  
**ADDITIONAL COMPENSATION UNDER DIFFERENT SCENARIOS (\$ MILLIONS)**

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

Source: Authors' estimates.

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 (Scenario I), under the most optimistic assumptions the change in compensation for the sector ranges from \$372 million in 2006 to \$944 million in 2010. Under Scenario II, the additional compensation forecasts for the BPO sector are \$204 million and \$802 million for 2006 and 2010, respectively. The least optimistic scenario projects only \$37 million for 2006, but rises to \$661 million in 2010.

The impact on the rest of the economy (i.e., 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 \$11 million to \$111 million for 2006 and \$198 million to \$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.



### 3. 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.<sup>17</sup> 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 \$4,631 (equivalent to an average monthly compensation of \$386 or Pesos 21,227). In comparison, the 2005 average compensation for the Philippines was equal to \$165 or Pesos 9,065 per month.<sup>18</sup> Hence, the BPO sector's average compensation in 2005 is more than double that of the Philippine average.

In combination with the three scenarios previously described, two different assumptions regarding the average compensation are considered: (A) the average compensation remains at the 2005 level; and (B) the average compensation increases at an annual rate of 7%.<sup>19</sup> 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 12).

**TABLE 12**  
**NUMBER OF NEW BPO JOBS GENERATED**

SCENARIO	2006	2007	2008	2009	2010	TOTAL
I and A	80,214	90,639	117,997	156,775	203,788	649,413
II and A	44,088	77,043	100,297	133,259	173,220	527,907
III and A	7,962	63,447	82,598	109,743	142,652	406,401
I and B	74,966	79,168	96,320	119,603	145,298	515,355
II and B	41,203	67,292	81,872	101,663	123,503	415,534
III and B	7,441	55,417	67,424	83,722	101,709	315,713

Source: Authors' estimates.

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

With the 2005 total workforce of 163,250 as baseline, the forecast for the succeeding 5 years is given by the cumulative sum in Table 13. It is worthwhile to compare the results obtained here with the employment projection of the government and BPA/P shown in Table 9. It is apparent that the workforce forecasts obtained using the results of the I-O analysis are lower than those of the

<sup>17</sup> For a given year, average compensation of new employees = change in total compensation/change in workforce. Since the change in compensation has been obtained (Table 11), then, given the average compensation, the additional employment can easily be estimated as  $\Delta \text{workforce} = \Delta \text{compensation} / \text{average compensation}$ .

<sup>18</sup> Estimated using the most recent available Bureau of Labor and Employment Statistics data.

<sup>19</sup> The annual increase of 7% 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 Labor Statistics* (BLES 2005a).

BOI-CICT-BPA/P, even under the most optimistic assumptions of no increase in average compensation, and that revenues increase by as much as the government and the industry association's forecast. The difference is particularly substantial toward the later years (2008 to 2010).

**TABLE 13**  
**BPO WORKFORCE FORECAST**

SCENARIO	2006	2007	2008	2009	2010
I and A	243,464	334,103	452,099	608,875	812,663
II and A	207,338	284,381	384,678	517,937	691,157
III and A	171,212	234,659	317,256	426,999	569,651
I and B	238,216	317,384	413,704	533,307	678,605
II and B	204,453	271,746	353,618	455,281	578,784
III and B	170,691	226,108	293,532	377,255	478,963

Source: Authors' estimates.

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 12). 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 of the economy, the 2005 average monthly compensation for the Philippines of \$165 or Pesos 9,065 per month was used together with the changes in compensation for the 239 other sectors. The results for the six scenarios are given below (Table 14).

**TABLE 14**  
**NUMBER OF NEW JOBS GENERATED BY THE OTHER 239 SECTORS**

SCENARIO	2006	2007	2008	2009	2010	TOTAL
I and A	56,104	63,395	82,530	109,653	142,535	454,218
II and A	30,836	53,886	70,151	93,205	121,155	369,233
III and A	5,569	44,377	57,771	76,757	99,775	284,249
I and B	52,434	55,372	67,369	83,654	101,626	360,455
II and B	28,819	47,066	57,264	71,106	86,382	290,637
III and B	5,204	38,760	47,158	58,558	71,138	220,819

Source: Authors' estimates.

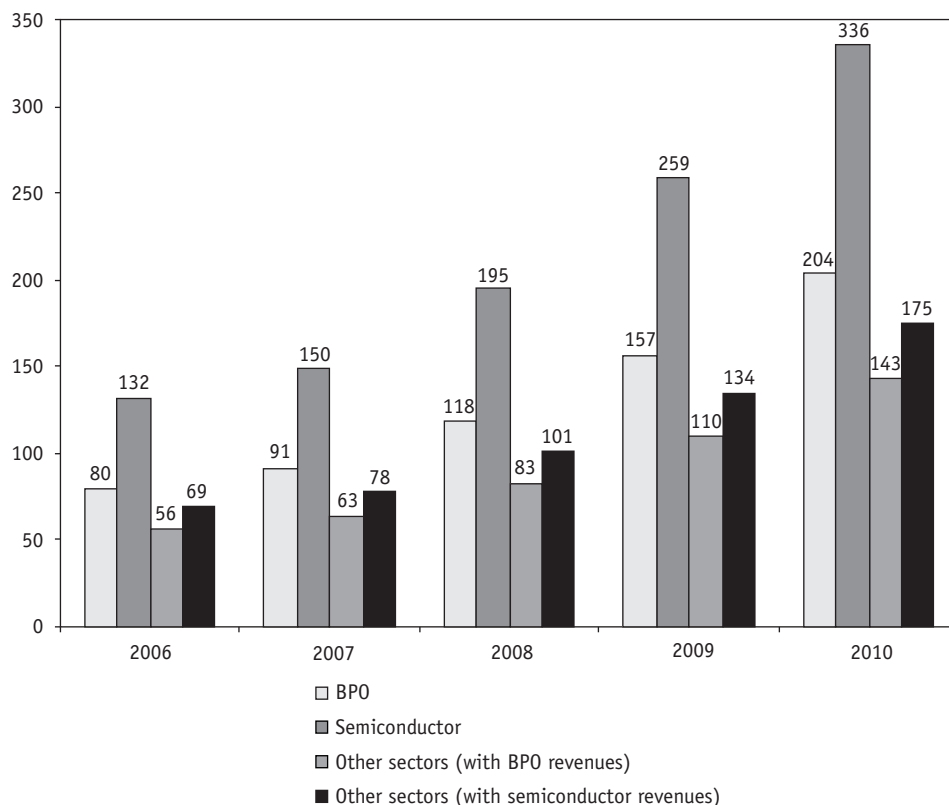
These results show that an increase in BPO revenues will also generate new jobs in the other sectors. For the best scenario, almost 143,000 additional jobs will be generated in the rest of the economy in 2010. The total number of new jobs generated by the other 239 sectors of the economy between 2006 and 2010 ranges from almost 221,000, under the most conservative assumptions (III

and B), to about 454,000 under the most optimistic assumptions (I and A). Between 2006 and 2010, the total number of new jobs in the whole economy that will be generated by the additional BPO revenues oscillates between 536,000 and 1.1 million.<sup>20</sup>

This indicates that while the BPO sector has the potential of being an important employment generator, its capacity is substantially smaller than what the sector and government have claimed.

If the same amount of additional revenue were received by another sector with high intersectoral linkages, what will be the impact on employment? For comparative purposes, simulations under Scenario I and A were carried out for another sector, the manufacture of semiconductor devices. This particular sector was chosen because, like the BPO sector, it is export-oriented. But unlike the BPO sector, the manufacturing of semiconductors has relatively high intersectoral linkages. Its total linkage index is 10.5, or 21 times that of the BPO sector. Further, in 2000 the share of semiconductor manufacturing in the gross total output of the economy was 3.28%, the fourth highest among the 240 sectors. However, its compensation coefficient is 0.17, about half that of the BPO sector. Simulation results are shown in Figure 5.

**FIGURE 5**  
**NUMBER OF NEW JOBS GENERATED UNDER SCENARIO I AND A (IN THOUSANDS)**



Sources: Authors' estimates.

<sup>20</sup> Computed as 220,819 (III & B in Table 14) + 315,713 (III & B in Table 12), and 454,218 (I & A in Table 14) + 649,413 (I & A in Table 12), respectively.

The results show that if the semiconductor subsector received the amount of additional revenues projected for the BPO sector, and compensation remained at the 2005 level (scenario I and A), it would generate 132,000 new jobs in 2006 and 336,000 in 2010, which is 65% more than the number of new BPO jobs (80,000 for 2006 and 204,000 for 2010; see Figure 5). This gives a total of 1.07 million new jobs for the semiconductor subsector between 2006 and 2010. For the other 239 sectors, the number of new jobs that can be generated is between 69,000 in 2006 and 175,000 in 2010, around 22% higher than those generated by additional BPO revenues (Figure 5), or a total of 557,000 new jobs between 2006 and 2010. Hence, a total (i.e., direct plus indirect) of around 1.6 million new jobs for the whole economy can potentially be created between 2006 and 2010, half a million more than our best forecast for the BPO sector.

Using the most recently available I-O tables, we have shown through simulations that the government and the BPO industry may have overestimated their projection for the future size of the BPO workforce. Based on their revenue projection and under a more realistic scenario, our estimate for the BPO sector's total number of employees by 2010 is 500,000–600,000, significantly less than their predicted 1.1 million workers. Also, we have demonstrated that if the same amount of revenue predicted for the BPO sector were generated by a sector in the manufacturing industry, say the semiconductor devices manufacturers, the impact on employment would be significantly greater.

With this predicted growth in employment in the BPO sector, are there enough qualified persons to fill the job positions? What is the current state of employment in the sector? How much is the potential contribution of this sector to the labor force? These issues will be explored in the next section.

## **VI. EMPLOYMENT DYNAMICS IN THE BPO SECTOR**

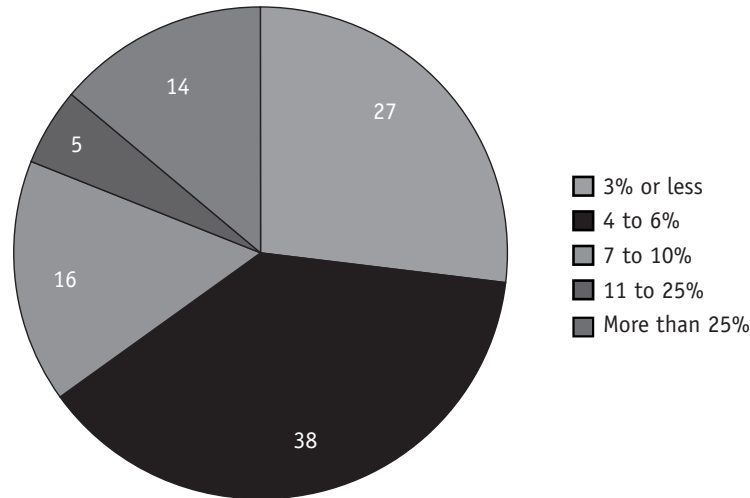
Since the number of available BPO jobs is expected to increase considerably in the next few years it is important to consider the factors that affect personnel recruitment in the industry in order to determine if the supply of qualified individuals is sufficient. Some of the elements that influence this are hiring and attrition rates, characteristics of applicants, salary, and job requirements. These issues will be explored in this section, and we will assess whether the supply matches the demand for BPO employment. Some of the results of the previous section will be used to determine the required number of BPO employees in the next few years and the possible contribution of the BPO sector in providing jobs for future labor entrants.

Among the factors that affect employment dynamics are hiring and attrition rates, both company-specific measures. 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 (e.g., quarter or year).

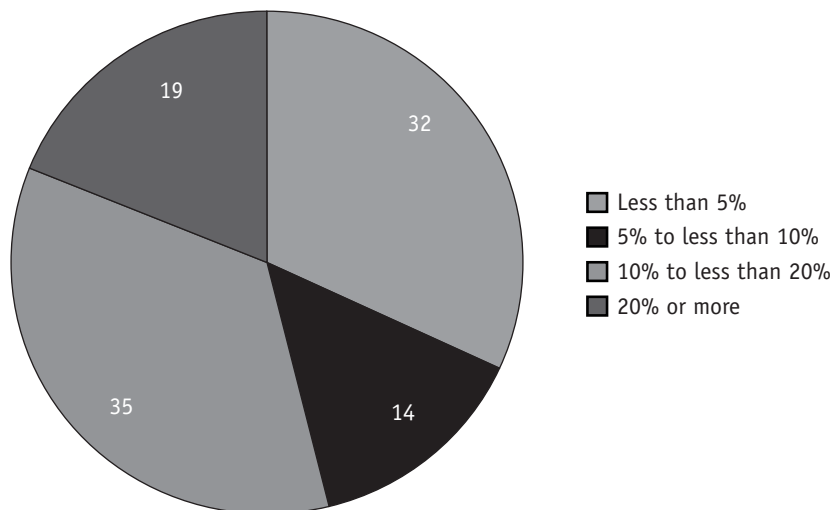
The results of a survey on hiring and attrition rates are summarized in Figures 6 and 7. The estimate of the median hiring rate is 5%. The majority of the respondents (76%) agreed that this dearth of eligible applicants may have a negative effect on their future growth as there might be BPO positions that may not be filled up immediately.

The attrition rate is provided in Figure 7. The median attrition rate is about 15%. Of the overall attrition rate, company-initiated attrition represents 15% of the total, and transfer to another firm within the industry accounts for 24%. Other major reasons include moving to another country, career shift, and pursuit of studies.

**FIGURE 6**  
**HIRING RATES, PHILIPPINE BPO SECTOR**  
 (PERCENT OF FIRMS)



**FIGURE 7**  
**ATTRITION RATES, PHILIPPINE BPO SECTOR**  
 (PERCENT OF FIRMS)



Sources: Outsource2Philippines and BPA/P (2005).

Attrition or loss of personnel creates positions that need to be filled up. Hence, the attrition rate affects staff requirements. Considering the median as the attrition rate for the industry, on the assumption that it remains at 15% until 2010, and that 24% of this 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 (Table 15). The resulting additional number of employees needed by the BPO industry (i.e., the number of new

jobs in Table 12, plus those vacated due to attrition in Table 15) is given in Table 16. The total number of new employees required by the BPO sector is somewhere between 156,000 and 296,000 for the year 2010.

**TABLE 15**  
**PROJECTED NUMBERS OF BPO EMPLOYEES LOST DUE TO ATTRITION**

SCENARIO	2006	2007	2008	2009	2010
I 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
III and A	19,518	26,751	36,167	48,678	64,940
I and B	27,157	36,182	47,162	60,797	77,361
II and B	23,308	30,979	40,312	51,902	65,981
III and B	19,459	25,776	33,463	43,007	54,602

Source: Authors' estimates.

**TABLE 16**  
**PROJECTED NUMBERS OF NEW EMPLOYEES IN THE BPO INDUSTRY**

SCENARIO	2006	2007	2008	2009	2010
I 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
III and A	27,480	90,198	118,765	158,421	207,592
I and B	102,123	115,349	143,483	180,400	222,659
II and B	64,511	98,271	122,185	153,565	189,485
III and B	26,900	81,194	100,887	126,729	156,310

Source: Authors' estimates.

Hence, because of attrition, the number of new employees needed by the sector is even larger than the number of new jobs. With college graduates in cyberservices-inclined disciplines<sup>21</sup> numbering at least 300,000 per year (Table 17), there are potential individuals to fill in these positions. However, considering that not all these tertiary graduates are 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 applicants is actually less than the demand. The absorption rate (proportion of graduates who are hired) is estimated at only 30% (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 sectors between 2006 and 2010.

<sup>21</sup> The following disciplinary groups (classified by the Commission on Higher Education) were identified as the cyberservices-inclined disciplines by Mapa (2006): Architectural and Town Planning, Business Administration and related courses, Engineering and Technology, Fine and Applied Arts, Humanities, Law and Jurisprudence, Mass Communication and Documentation, Mathematics and Computer Science, Information Technology, Medical and allied courses, Natural Science, Social and Behavioral Science.

**TABLE 17**  
**FORECAST NUMBER OF COLLEGE GRADUATES**

NUMBER OF TERTIARY GRADUATES	2006	2007	2008	2009	2010
Total cyberservices-inclined	302914	314817	326721	338626	350527
Other disciplines <sup>1</sup>	151904	157874	163843	169812	175783
Grand total	454818	472691	490564	508438	526310

<sup>1</sup> Other disciplines: Agriculture, Forestry, Fisheries and Veterinary Medicine; Education and Teacher Training; General; Home Economics; Religion and Theology; Service Trades; and Trade, Craft and Industrial.

Source: Commission on Higher Education (as cited by Mapa 2006).

Another significant finding of the 2006 Workforce Development Summit is that there is indeed a mismatch between labor supply and industry demand (Galang Reyes 2006). This “job and skills mismatch” is due to the fact that most applicants do not have the skills and competencies required by the available positions. 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. Table 18 documents the educational and training requirements. Except for entry-level jobs in animation, almost all the positions require a college education and additional training on specific areas. Thus, the educational requirement is quite high even for low knowledge-intensive jobs like customer service.

The average monthly wage rate for all nonagricultural industries skilled workers in the Philippines in 2005 is estimated to be around Pesos 11,500.<sup>22</sup> Table 18 gives the salary ranges for BPO employees. It indicates that the sector pays above-average salary. Salary ranges of contact center positions are generally wider with a higher maximum than in the other BPO subsectors. However, salaries in the BPO sector are not particularly high when compared to those of engineers, accountants, economists, or computer programmers in general, as Table 19 documents, which gives monthly wages in 2004.

The Philippine labor force for 2005 is estimated at 36 million and the forecast is about 41 million for 2010 (BLES 2006b). The labor force for 2006–2009 was estimated by interpolation. The average unemployment rate for 2005 was 8.3% and for 2006 about 8.2% (BLES 2006a). Assuming that the unemployment rate remains at 8%, the unemployment forecast is given in Table 20.

<sup>22</sup> Based on data from the *2005 Yearbook of Labor Statistics* (BLES 2005b).

**TABLE 18**  
**SALARY RANGE, EDUCATIONAL AND TRAINING REQUIREMENTS, 2006**

BPO SECTOR	POSITION	MONTHLY SALARY RANGE (PESOS '000)	EDUCATIONAL ATTAINMENT AND ADDITIONAL TRAINING
Contact center	Agent	10–25	Majority 2–4 years college education; for technical support: ICT-related courses; English proficiency/interview skills; soft skills; product training
	Team Leader/Supervisor	20–35	Majority 2–4 years college education; for technical support: ICT-related courses; training: same as agent plus leadership programs
	Middle Manager	50–100	Majority 2–4 years college education; for technical support: ICT-related courses; training: same as supervisor plus business management
Animation	Entry-level Animator	8–12	Preferably high school graduate; in-betweening, clean-up
	Key Animator	15–25	At least high school graduate; enhanced in-betweening
	TP/IB Checker	10–12	Preferably high school graduate
	Key/BG Checker	10–12	Preferably high school graduate
	Production Assistant	8–12	Preferably college graduate; in-house training on process
	Digital Ink-and-Paint	8–12	n/a; use of software tools
	Editor/Compositor	20–30	n/a; use of software editing tools
	Assistant Director	40–60	n/a; in-house on the job training with proficiency exam
	Director	60–100	n/a; in-house on the job training with proficiency exam
	Production Manager	50–80	Preferably college degree in engineering, mass communications, business management; industry seminars on management and supervision
Software development	Programmer	15–20	College degree in IT, math, or engineering, or equivalent business IT degree; internal training
Medical transcription	Transcriptionist	10–12	College degree; medical transcription course
	Facilitator	10–15	College degree; medical transcription course
	Editor	15–20	College degree (preference for allied health degrees); editing courses
	Lecturer	150–450 pesos/hour	College degree (medical degree required for medical subjects); medical transcription and editing courses
Back-office operations	Generic	12–15	Mostly college degree; internal training
	Human Resources Analyst	13–18	Human resources-related college degree and other degrees such as industrial engineering; training on industry practices
	Financial Analyst	13–18	Business-related degree, accounting, political science, economics; internal training on specific business processes
	Engineering	18–25	Engineering-related college degree and also business degree; internal training on specific business processes
	ICT Operations	13–18	Mostly ICT-related college degree and also engineering degree; specific technical operations

n/a means not applicable.  
Source: Mapa (2006).



**TABLE 19**  
**MONTHLY SALARY, JUNE 2004 (PESOS)**

SELECTED OCCUPATIONS	MINIMUM	INDUSTRY	MAXIMUM	INDUSTRY
Engineers (mechanical, electronics and communications, electrical, civil, and computer engineers)	12,117	Manufacture of wood and wood products	26,811	Postal and telecommunication services
Accounting and bookkeeping clerks	7,064	Manufacture of plastic products	20,780	Postal and telecommunication services
Accountants and auditors	12,770	Retail trade	72,803	Accounting, bookkeeping and auditing activities; tax consultancy
Statisticians	10,104	Nonbank financial intermediation	21,341	Banking institutions
Economists	13,609	Nonbank financial intermediation	21,518	Banking institutions
Computer programmers	22,038	Insurance and pension funding	23,575	Computer and related activities
Data entry operators	6,175	Computer and related activities	15,014	Accounting, bookkeeping and auditing activities; tax consultancy

Source: BLES (2007).

**TABLE 20**  
**LABOR FORCE PROJECTION (IN THOUSANDS)**

	2005	2006	2007	2008	2009	2010
Labor force projection	35,776	36,746	37,742	38,765	39,816	40,895
New labor force entrants		970	996	1,023	1,051	1,079
Unemployed	2,862	2,940	3,019	3,101	3,185	3,272
BPO workforce in labor force (percent) <sup>a</sup>	0.5	0.5–0.7	0.6–0.9	0.8–1.2	0.9–1.5	1.2–2
New BPO jobs (Scenario II and B)		41	67	82	102	124
New BPO jobs for new labor force entrants (percent) <sup>b</sup> (Scenario II and B)		4.2	6.8	8.0	9.7	11.4
New BPO jobs (according to BOI-CICT-BPA/P)	63	103	137	165	226	288
New BPO jobs for new labor force entrants (percent) (according to BOI-CICT-BPA/P)		10.6	13.8	16.1	21.5	26.7

<sup>a</sup> Calculated using the results of the six combinations of scenarios (Table 13)

<sup>b</sup> Computed under Scenario II (the BOI-CICT-BPA/P revenue forecast is reduced by 15%) and B (7% increase in the average compensation). The latter condition is deemed as a more realistic scenario than having no wage increase, and the former is the middle ground between the government/industry forecast and the more conservative condition that their forecast is reduced by 30%.

Sources: BLES (2006b), authors' estimates, and BOI-CICT-BPA/P.

By 2010, the Philippine labor force will be around 41 million and the total workforce in the BPO industry will be between 478,963 and 812,663. Therefore, the share of the industry in the labor force will increase from 0.5% in 2005 to 1–2% in 2010.

The proportion of new BPO jobs over the number of new labor force entrants is also shown in Table 20. With the government and industry revenue forecast, this percentage ranges from around 11% in 2006 to about 27% in 2010. These values are extremely high. It is not very likely that a single activity will be able to provide almost a third of the jobs for new labor force entrants. Under the more realistic conditions of a 7% annual increase in the average compensation and a reduction of the government/industry revenue forecast by 15% (Scenario II and B), the BPO sector will provide around 7% of the jobs for new labor force entrants in 2007 and 11% in 2010. These proportions are more reasonable than those using the industry forecast and still represent a significant share for a single economic activity.

## VII. CONCLUSIONS

One 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 critical sector that could employ as many as 1 million employees by 2010. The sector is therefore expected to contribute 10% of the 10 million jobs that the government has committed to generate in the 2004–2010 MTPDP. The Philippine BPO sector is expected to experience high growth because it has been marked by a steady flow of investments, especially in the contact centers. The growth of the BPO sector will be largely influenced by the contact centers because (i) they capture 70% of total BPO employment and 75% of total BPO revenues; (ii) they have accounted for about one half of total cumulative investments in the BPO sector since 2000; and (iii) government support appears biased toward contact centers.

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 in the future. However, even under the most favorable assumptions, the total number of workers in the sector falls short of the industry’s forecast. Perhaps a more reliable figure is about 500,000–600,000 workers in 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% of the sector’s output and intermediate demand is only 8%. 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 intersectoral linkages, the BPO sector has the potential of generating a significant increase in the total wage bill for the economy. The I-O analysis showed 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%.

Although lower than the government's forecast, the estimate here represents a substantial portion of the number of jobs that the country needs to generate for future labor entrants. The sector can provide 7–11% of the jobs for new labor force entrants between 2007 and 2010, which is a high contribution for a single economic activity.

What challenges will the sector face in the future? The first one is whether the Philippines is going to continue attracting investments in the BPO sector, given the competition from other locations. Although the advantages of locating in the Philippines should be emphasized, constraints like low hiring rates, high attrition rates, high cost of electricity, and weak governance must be addressed without delay.

Second, how is the sector going to move up the knowledge intensity ladder? There are government and industry pronouncements of the desire to advance toward higher-end knowledge process outsourcing 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 are already mobilized to encourage the development of the sector. What other type of assistance can be made available to facilitate the growth of the sector? If the government is seriously bent on moving toward knowledge process outsourcing, then it is important to identify strategies to entice more investors that are involved in knowledge process outsourcing, as well as to encourage BPO firms to move into higher-value added activities. The latter is linked to a proper understanding of the needs of the industry in order to grow. Surely, the industry needs a greater pool of workers with specialized skills beyond high English proficiency.

Fourth and final, since the existence of a pool of educated 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. The following two questions, in particular, must be answered: (i) is it the right policy, for a country like 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 take degrees in disciplines such as engineering, statistics, economics, etc. to be blamed for their lack of appropriate skills to be employed in the BPO sector?

## TECHNICAL APPENDIX

### Input–Output Analysis<sup>1</sup>

The input–output (I-O) model is used to examine the interdependence of the different sectors in an economy.

An I-O model is created from actual data for a specific economic zone (e.g., a country, region, province, etc). The data consists of flows of products from each sector or activity, considered as a producer, to each of the sectors considered as consumers. These flows, usually in monetary terms, are calculated over a certain time period (e.g., annually) and are arranged in a transactions table. The rows of this table give the allocation of a sector's output over the economy and the columns indicate the allotment of inputs required by a particular sector to produce its output.

Also, there are consumers who are external to the sectors that comprise the producers in the economy (e.g., governments, households, and foreign trade). The demands of these exogenous consumers are referred to as final demand. These are included in the transactions table as columns to the right of the endogenous sectors. Furthermore, a sector pays for other items, like labor and capital, and uses other inputs such as inventoried items. These are called value added in sector  $i$  and are incorporated as additional rows in the transactions table.

An I-O system then consists of a set of  $n$  linear equations with  $n$  unknowns. Let  $z_{ij}$  be the value of the flow from sector  $i$  to sector  $j$ ,  $x_i$  the total output of sector  $i$ , and  $y_j$  the total final demand for sector  $j$ 's product. Then

$$X_i = z_{i1} + z_{i2} + \dots + z_{ij} + \dots + z_{in} + Y_i \text{ for } i = 1, \dots, n.$$

The ratio of input to output is called the technical coefficient, denoted by,  $a_{ij}$  and is defined as

$$a_{ij} = \frac{z_{ij}}{X_j}.$$

These coefficients are assumed to be fixed.

In matrix notation, the basic I-O relation can be presented as:

$$X = AX + Y$$

where  $X = (x_1, \dots, x_n)'$  is the vector of gross output,

$A = (a_{ij})$  is the matrix of technical coefficients, and

$Y = (y_1, \dots, y_n)'$  is the vector of final demand.

$AX$  is the intermediate demand. Hence, the gross output is the sum of the intermediate demand and the final demand.

From the above equation,

$$X = (I - A)^{-1}Y$$

where  $I - A$ , called the Leontief matrix, is nonsingular and  $I$  is the identity matrix.

<sup>1</sup> This makes heavy reference to Miller and Blair (1985).

The matrix  $(I - A)^{-1}$  is called the **Leontief inverse** and gives the direct and indirect sectoral output requirements to support one unit of final demand in each sector. Let  $\alpha_{ij}$  represent the elements of the Leontief inverse.

## Impact Analysis

The I-0 model is utilized to evaluate the effect of changes in exogenous elements on an economy. The assessment is often called *impact analysis* if the changes arise due to only one exogenous element or a few such elements, and if the changes are projected to happen in the short run (say, in a year).

There are several measures, called I-0 multipliers, which are frequently used in impact analysis. These multipliers utilize the Leontief inverse  $(I - A)^{-1}$ .

### Output Multipliers

An output multiplier for sector  $j$  is the total value of production in all sectors that is needed for a unit's worth of final demand for the output of sector  $j$ .

Let the changes in final demand and gross outputs be denoted by  $\Delta Y$  and  $\Delta X$ , respectively. Then,

$$\Delta X = (I - A)^{-1} \Delta Y .$$

The elements of  $\Delta X$  are the values of the required additional output from each of the sectors in the economy. These can be considered as determinants of the impact on the economy of the new final demand.

For a change in sector  $j$  only,

$$\Delta X(j) = (I - A)^{-1} \Delta Y(j)$$

where  $\Delta Y(j)$  is a vector consisting of zeros except for the  $j$ th element that gives the change in final demand for sector  $j$ .

Each element of vector  $\Delta X(j)$ , say  $\Delta X_i$ , gives the additional output from each sector  $i$  that is necessary for the new final demand for the output of sector  $j$ .

The **output multiplier** for sector  $j$  is the sum of the elements of the vector  $\Delta X(j)$ .

If  $\Delta Y(j)$  is such that its  $j$ th element is 1, then  $\Delta X(j)$  is just the  $j$ th column of the Leontief inverse and it gives the additional output of each sector, say in dollars worth, needed for a unit (a dollar) of new final demand for sector  $j$ 's output. Hence, the **simple output multiplier** for sector  $j$  is given by  $\sum_{i=1}^n \alpha_{ij}$  which is the sum of the  $j$ th column of the Leontief inverse.

### Compensation Multiplier

The ratio of compensation over total output can be considered as a compensation coefficient that gives the output requirement in terms of amount of compensation (say in dollars) per unit (dollar) of the sector's output.

Denote the compensation coefficients as  $c_1, c_2, \dots, c_n$ . Let  $C$  be the diagonal matrix whose diagonal elements are the compensation coefficients  $c_1, c_2, \dots, c_n$  and  $\mathcal{C}$  be the vector of compensation for the sectors. The change in compensation in each sector arising from changes in the exogenous final demand is given by

$$\Delta \mathcal{C} = C \Delta X = C(I - A)^{-1} \Delta Y .$$

The sum of the elements of  $\Delta \mathcal{C}$  is the **compensation multiplier** that measures the change in compensation in all the economic sectors brought about by the changes in final demand.

## Intersectoral Linkages<sup>2</sup>

The most commonly used measures of intersectoral dependence are the **backward, forward, and total linkage indices**. Backward linkage of a sector determines the amount of inducement on production in all sectors of inputs needed by the sector. Forward linkage of a sector reflects the extent to which the sector's output is used by other sectors as input.

The sum of the elements in the  $i$ th row of the Leontief inverse is usually taken as the measure of forward linkage. This assumes an identical increase in demand by one unit for all the sectors that is not likely to occur in reality. To resolve this, the Leontief matrix is weighted by the share in final demand. Hence, each element of the Leontief matrix, say  $\alpha_{ij}$ , is weighted to calculate

$$\alpha_{ij}^w = \alpha_{ij} f_j / \sum_{j=1}^n f_j$$

which is the element of the **final demand weighted Leontief inverse**.

The **forward linkage** is then  $\alpha_i^w = \sum_{j=1}^n \alpha_{ij}^w$ , the sum of the elements in the  $i$ th row of the final demand weighted Leontief inverse. This gives the increase in output of the  $i$ th sector used as inputs for producing an additional unit of final demand output, given each sector's share in total final demand.

The intersector comparison of forward linkages can be made by constructing an **index of forward linkage** defined as

$$U_i^w = \frac{\alpha_i^w / n}{\sum_{i=1}^N \alpha_i^w / n^2}$$

Accordingly, an **index of the backward linkage** is given by

$$U_{.j}^w = \frac{\alpha_{.j}^w / n}{\sum_{j=1}^N \alpha_{.j}^w / n^2}$$

where the **backward linkage** is defined by  $\alpha_{.j}^w = \sum_{i=1}^n \alpha_{ij}^w$ , the sum of the elements in the  $j$ th column that gives the input requirements for a unit increase in the final demand for output of the  $j$ th sector given each sector's share in total final demand. The sum of the backward and forward linkage indices is the **total linkage index**.

<sup>2</sup> This section draws heavily from Hansda (2003).

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Nedelyn Magtibay-Ramos, Gemma Estrada, and Jesus Felipe provide an analysis of the business process outsourcing (BPO) industry in the Philippines. The paper provides a profile of the BPO sector; makes comparisons with other large BPO providers; and uses input–output tables to estimate intersectoral linkages and the potential impact of the sector on employment. Constraints on the sector’s growth are discussed.

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