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Requirements For Upgrading and Workforce Development in the ICT Sector



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Acronyms

BPS	Business Process Services
BPAP	Business Process Association – Philippines
CCC	Call Center Commission
CFA	Chartered Financial Analyst
CGGC	Center on Globalization, Governance & Competitiveness – Duke University
CMMI	Capability Maturity Model Integration
CORFO	Chilean Agency for Economic Development
CRM	Customer Relationship Management
ERM	Enterprise Resource Management
eSCM	eSourcing Capability Model
ESL	English as a Second Language
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GSD	Global Service Delivery
GVC	Global Value Chain
HR	Human Resources
HRD	Human Resources Division- Government of India
HRM	Human Resource Management
ICT	Information and Communication Technologies
INSPIRE	Innovation in Science Pursuit for Inspired Research
IT	Information and Technology
ITS	Information Technology Services
KPS	Knowledge Process Services
LPS	Legal Process Services
MBA	Master's in Business Administration
MNCs	Multinational Corporations
NASSCOM	The National Association of Software and Services Companies – India
NGO	Nongovernmental Organization
OECD	Organization for Economic Co-operation and Development
R&D	Research and Development
SENCE	Servicio Nacional de Capacitación y Empleo
SLA	Service Level Agreement
TCS	Tata Consultancy Services
TESDA	Technical Education and Skills Development Authority – Philippines
UK	United Kingdom
U.S.	United States
Y2K	Year 2000 Problem

I. Executive Summary

This supplemental report highlights the industrial upgrading and workforce development requirements for the Information and Communication Technology (ICT) services sector. It is meant to serve as a complement to the ICT Taxonomy and Subsector Selection Report that was delivered to the Jordan Competitiveness Program (JCP) on February 15, 2014. We focus on IT and ICT-enabled services, following CGGC's ICT sub-sector selection process, which prioritized sub-sectors in the services portions of the ICT industry (rather than hardware). ICT and software services include the focus ICT subsectors recommended for JCP the ICT Taxonomy and Subsector Selection Report: software services, web services, business process services (BPS),¹ and knowledge process services (KPS), including industry-specific BPS and KPS for vertical markets.

The report uses the global value chain (GVC) perspective to outline the principal stages of upgrading for the ICT industry, based on a comparative analysis of three developing economies in the rapidly expanding ICT services sector: India, the Philippines, and Chile. We describe the institutional context and enabling environment most appropriate for each upgrading stage in the ICT services sector, with an emphasis on workforce development issues, international standards and certifications, and the role of government policy.

The report's focus is on workforce development, and the institutions needed to strengthen skills and meet global standards in ICT services. Hardware provides an essential platform for ICT services, but capital requirements are relatively uniform (if high and dynamic) across the world, leaving skilled labor as the key differentiator in a global industry that commonly pits various geographic clusters against one another in bids for new contacts and investment. In a small country such as Jordan, with limited market and population sizes, workforce upgrading in ICT-services offers the most promising path to success. Far from a race to the bottom, involvement in the ICT services industry has provided developing country workers, firms, and governments with an attractive opportunity to build the skill-based competencies required to meet the demands of global service markets. Jordan is well positioned to continue to gain from its efforts to move up in the ICT services GVC.

A GVC approach is particularly useful in exploring the dynamic workforce skill issues in the ICT services industry for several reasons. First, ICT services are increasingly global: the geographic span of the industry encompasses the home market—usually in a developed country—as well as one or more developing country markets, which provide business services at a level of value added that is, again, significantly determined by the quality of the available workforce.

¹ In the ICT Taxonomy and Subsector Selection Report, BPS was characterized as an entry point for eventual upgrading to KPS.

Second, the upgrading in the industry has been catalyzed by three key groups of lead firms: (1) multinational firms that establish subsidiaries in developing countries to provide services for internal use; (2) large global service providers from developed countries that have set up subsidiaries in emerging markets to provide services both to and from the developed world; and (3) a group of strong Indian firms that have grown rapidly as the industry has developed and are now established as a significant presence in both developing (operations) and developed (client and sales teams) countries. All three groups of firms have driven the market by seeking cost advantages through the geographic separation of activities, often sourcing from low-cost locations that are capable of providing services at acceptable standards. The ICT sector provides a clear illustration of how GVCs provide opportunities for both employment and business formation in developing countries, with the requirement that appropriate skills are present.

Third, developing countries can upgrade in the ICT services along several trajectories. They can provide better services (process upgrading), expand the number of services (product upgrading), and/or offering higher value added services (functional upgrading). However, a GVC perspective clearly shows that all of these upgrading paths require significant investments in workforce training and managerial capabilities. In addition, these efforts need to be supported by a diverse range of public, private, and multi-sector initiatives. Accordingly, this report examines the role of workforce development initiatives meant to help developing countries enter and upgrade within the ICT services value chain. Several key findings with respect to workforce development and upgrading in the ICT sector are highlighted below.

Upgrading

There are five principal upgrading trajectories for the ICT services industry: 1) entry into the value chain; 2) upgrading within the BPS segment; 3) offering full package services; 4) the expansion of ITS and BPS into KPS; and 5) the specialization of BPS and KPS firms in services for vertical industries. In each segment of the ICT services value chain (ITS, BPS and KPS), process, product, and functional upgrading may occur, and multiple upgrading (shifts) processes can happen simultaneously in a given country. A highly developed, low-cost network communications infrastructure with high-bandwidth international linkages is basic requirement for all five upgrading trajectories.

- Entry into the lowest segments of the value chain requires a large supply of low-cost labor with high quality basic education, as in the Philippines where wages in the call center industry are amongst the lowest in the world.
- Highly qualified labor is key for upgrading into higher segments of the value chain. This is especially relevant for Jordan, where large scale, low wage services employment is not practical. Entry into high- value engineering services for mining by Chile, for example, was facilitated by the availability of a large number of well-educated engineers.

Workforce Development

While national education systems have provided the basic skills necessary in all countries, the majority of workers in the ICT services industry require additional training to fill the knowledge gap between local education systems and high-quality standards required to serve the global market.

- English-language skills training has been central to workforce development initiatives in all countries. In particular, English is critical to upgrading the workforce, as many of the third-party providers operating in developing countries offer online training and development resources in English only. English training is also necessary for upgrading into higher value services, which include significant collaborative interactions with global communities, of which English is the main language.
- Job-specific or demand-driven training where the private sector trains staff for specific job functions is the most effective means of ensuring that education and training meets the needs of the industry.
- Training in global certifications in the ITS sector is particularly important for keeping staff on the cutting edge of technology, and in turn is a requirement for upgrading into new activities. In Chile, in addition to training staff in current platforms, firms also encourage innovator-led training programs.
- Training for near-hires² is an important means of rapidly increasing the supply of labor for the industry, helping developing countries to maintain their competitiveness. In the Philippines, this practice is particularly prominent for call centers, which recruit new employees on a regular basis.

Institutions

Institutions play distinct roles in driving workforce development across the value chain. This is influenced by the existing educational and training frameworks in the countries in which the chain is embedded, the stage of the value chain in which firms in the country are located, the portability of the skills developed, and the commitment of the government to promoting growth in the industry.

- **English-language training** is highly portable and relevant for most jobs in the labor market for emerging economies. Numerous public and multistakeholder initiatives drive the development of language competencies in non-English speaking countries promoting the ICT services industry.
- **ITS** requires a depth of technical knowledge that must be accumulated through numerous training programs, ongoing education, and a variety of institutional approaches can be identified. In India, the private sector was forced to take an aggressive role in developing their workforces to substitute for poor quality in educational institutions. In Chile, the government showed clear commitment to developing this segment and offered training subsidies to firms and fostered collaboration between technical educational institutions and the industry through the Public-Private Strategic Council.

² “Near-hires” refers to good potential employees who could not be hired due to small experience or training gaps in their resume.

- **KPS and high value industry-specific BPS segments** depend on high-level technical and analytical skills that are developed over time and rely on rigorous university education. There remain certain gaps, however, between the education sector and the industry that must be filled. Nonetheless, many of the skills required for this sector are portable across different economic sectors and **multistakeholder initiatives** appear to be the most prominent approach to skills development.
- **Financing Workforce Development:** Two key trends can be identified in regard to financing workforce development for the ICT services sector. First, there is a strong shift away from public-sector investment in education and training for this industry to firm-level training due to increased competition among firms for talent and the gap between skills provided by the education sector and those required by the industry. Second, there is a substitution of public-sector financing through tax incentives and subsidies for these firm investments in workforce development. Potential spillover effects have encouraged governments to directly finance private-sector education and training.

Global-Local Interactions and Standards

Entry into the value chain often depends on the presence of a large foreign ICT service provider. These firms play a central role in facilitating knowledge transfer regarding the industry to developing countries. Local firms typically lack the competency, scale, or global market presence to compete with established Indian and developed market providers.

Standards and global certifications allow developing countries to signal their quality levels to the global market and thus compete with a large number of potential destinations. As a result, these standards have been broadly adopted at the lower end of the ICT services value chain. However, in order to upgrade into the highest segments of the value chain, know-how, innovation, and specialized university education are much more important than a specific industry standard. At the same time, voluntary standards are being adopted by some firms working in the middle and high end of the capability spectrum. Although such standards are not usually required by buyers, ICT service providers can use these standards internally to improve processes, to differentiate themselves, claim an edge over their global competitors, and strengthen their relationships with customers.

In evaluating workforce development policy for the ICT services industry, policy makers must be keenly aware of the rapid evolution and highly competitive nature of the industry and develop a broader understanding of how to engage in workforce development to facilitate upgrading into higher-level services. Our GVC analysis highlights the shortcomings of traditional workforce development frameworks in developing countries for providing either the flexibility and/or quality to meet the skill levels required by the industry. It also suggests that combined institutional approaches that foster collaboration between the private, public, and educational sectors can help to narrow this gap to meet global standards.

II. Introduction

This report uses the GVC perspective to examine the role of workforce development initiatives in a number of developing countries that are participants in the rapidly expanding ICT services industry. Once considered strictly the domain of the industrialized world, the industry features a wide array of skill-intensive activities that are now performed in developing countries. They include information technology services (ITS), business process services (BPS), and knowledge process services (KPS), which can include very advanced activities such as the remote provision of engineering services and research and development (R&D) services.

ICT services are a potential vehicle for low- and middle-income countries to participate in the global knowledge economy. The industry offers attractive compensation and career development opportunities for graduates and professionals, incorporating previously marginalized groups—including rural women and youth—into the formal labor pool, creating employment in peripheral areas and second-tier cities, and reducing brain drain and promoting re-absorption of returning émigrés. Beyond employment, participation in the industry can create demand for education, stimulating domestic entrepreneurship and the creation of business and consumer services in the local market (ECLAC, 2008).³

By 2008, the ICT services industry had created an estimated 4.1 million direct service jobs in the developing world (McKinsey, 2008). Developing countries—including Argentina, Barbados, Colombia, Costa Rica, Jamaica, Kenya, Mozambique, Nigeria, South Africa, Tunisia, and Uruguay, among others—are actively seeking opportunities to enter and upgrade in the ICT services market (ECLAC, 2008; Radwan & Strychacz, 2010). Numerous developing country governments are offering significant incentives to attract international companies to use their countries as export platforms for ICT services (Gereffi et al., 2009). There is also considerable potential for ICT-based productivity growth in sectors that leverage the use of ICT such as energy, health, financial services, agriculture, and tourism. In this context, JCP's focus on ICT services can be seen as part of a larger trend in development policy. While this offers opportunities for Jordan to learn from and connect to ICT services clusters in other countries, it also creates a high level of competition.

Our central message is that adequate and appropriate workforce skills are essential for participation in the ICT services industry, especially the higher-value subsectors identified in the CGGC's ICT Taxonomy and Subsector Selection Report: software programming, web services, and KPS. In other countries, strategic investments in workforce development by the public and private sector actors have facilitated both market entry and upgrading to higher value segments of the industry. This report illustrates how national and subnational workforce development institutions and actors in developing

³ Appendix 1 summarizes many of the perceived benefits of participation in the ICT services industry as articulated by Latin American investment promotion agencies (ECLAC, 2008).

countries can respond to globalization, work effectively with global “lead firms,” understand the new skills requirements that globalization places on their workforces, and establish a workable division of responsibilities in effective public-private partnerships (PPPs).

This report is divided into the following sections. First, we discuss the global evolution of the industry and introduce the GVC for ICT services. Second, we identify potential entry points and upgrading trajectories for global services and discuss how they can be supported through workforce development initiatives. Third, we present case studies of three developing countries—Chile, India, and the Philippines—that have succeeded in the industry and analyze the workforce development strategies they have pursued, providing examples of the long-term possibilities for developing nations.

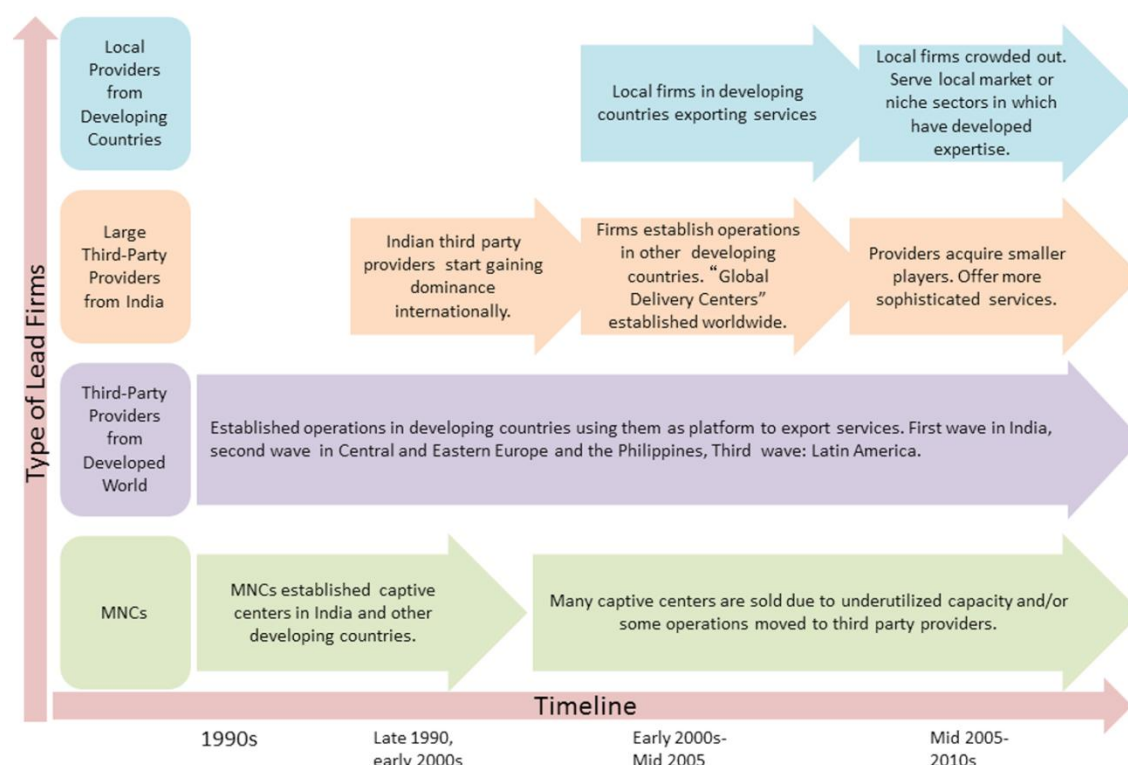
III. Global Organization of the Industry

Over the past decade, the ICT services industry has experienced tremendous growth, emerging as a dynamic global sector and as a key employment generator for a number of developing nations. Structural changes in the global economy precipitated by the ICT revolution have transformed the way companies do business by allowing for the separation of production and consumption of services, and they have allowed emerging nations for the first time to contribute significantly to the world’s services industry. In addition to the tremendous potential for direct employment, it is estimated that an additional four indirect jobs are created for every ICT services job that is created (ECLAC, 2008; NASSCOM, 2009).

The patterns of global ICT services industry development have been shaped by the business decisions of the industry’s lead firms—multinational corporations (MNCs), third-party service firms from the developed world, and third-party service firms from India—which have evolved significantly since the early 1990s.⁴ The decisions of these firms have been based on the need to improve efficiency levels (labor cost and supply), enter new markets, and gain access to “strategic assets” abroad (Lopez et al., 2008). Quality of service provision is not yet governed by global standards, although service level agreements (SLA) within business contracts between these lead firms and their clients are becoming increasing codified and standardized, including a range of performance metrics such as Average Speed to Answer and Turn Around Time.⁵ **Figure 1** illustrates the evolution of lead firm roles and activities in this period.

⁴ The role of service providers from other developing countries has differed across regions and segments of the market, and their role in the future is uncertain.

⁵ Typical SLAs include services provided, standards of service, delivery timetable, responsibilities of supplier and customer, provisions for legal and regulatory compliance, mechanisms for monitoring and reporting of services, payment terms, how disputes will be resolved, confidentiality and non-disclosure provisions, and termination

Figure 1. Industrial Organization in the ICT services Industry

Source: CGGC, Duke University.

In the early 1990s, **MNCs**, such as General Electric, Unilever, and Citibank, empowered by new information and communication technologies, began to relocate many of their routine business activities to lower-cost locations. They established the first “captive centers” through their subsidiaries in developing countries, which allowed them to reduce costs of back-office finance and accounting services, such as payroll and document management. In the late 1990s, many of these operations were spun off or sold to third-party providers by MNCs to further reduce costs and focus on core business functions.

For the third-party providers who bought or took on the functions of captive centers from their MNC clients, this process simultaneously represented an enormous business development and knowledge transfer opportunity. Beginning in the mid-1990s, these **third-party providers from developed countries**—including IBM, Accenture, EDS (now HP enterprises), and Capgemini—began operating in developing countries, using these as platforms for lower cost service exports. In addition, these firms

conditions. These contracts are negotiated on an individual basis between firms and specific terms of the contracts may vary substantially.

established new service platforms—first in India, then in Central and Eastern Europe, and later in Latin America.

Also in the late 1990s, **Indian third-party providers**—including Tata Consultancy Services (TCS), Infosys and Wipro—as well as entrepreneurial IT companies, began a phase of rapid growth, offering IT services related to Y2K⁶ and ecommerce during the technology boom, particularly to the United States, where many Indian entrepreneurs had good business connections (Arora & Athreye, 2002). During the first half of the 2000s, these firms established sophisticated Global Service Delivery (GSD) systems in which they maintain a headquarters in India, delivery centers in developing countries, and customer support offices near their customers in developed countries. For example, in Latin America during the 2000s, TCS opened operations in Argentina, Brazil, Chile, Colombia, Mexico, and Uruguay; Wipro in Brazil; and Infosys in Mexico (Gereffi et al., 2009). This innovative service delivery model has been slowly adopted by developed country third-party providers, such as IBM and Accenture.

A number of **third-party providers from other developing countries** began to export IT services in the early 2000s, targeting the Latin American regional markets in particular. In general, these organizations have not had the competency, scale, or global market presence to compete with established Indian and developed-market providers. A few large and sophisticated providers from Mexico (Softtek, Neoris), Brazil (CPM Braxis, Politec), and Chile (Sonda) have been able to export to regional markets and are beginning to export globally (Gereffi et al., 2009). However, most of the smaller indigenous companies have been driven to providing services to local markets and a few have developed niche market strategies to serve vertical (rather than general business services) markets (e.g., IT services for regional retailers).

IV. The ICT services GVC

The ICT services industry refers to the trade of services conducted in one country and consumed in another and encompasses firms' decisions to “perform functions or activities anywhere in the world” (McKinsey Global Institute, 2005, p. 454). The industry is composed of general business services that can be provided across all industries, as well as services that are industry specific. General business services support generic business functions and include three main segments:

- **ITS** is the basic building block for the ICT services value chain, centered around the production and use of software. It encompasses services such as network management, applications development, IT consulting, and software R&D. ITS services span the low-, mid- and high-value

⁶ Y2K, the Year 2000 problem was a problem for both digital (computer-related) and non-digital documentation and data storage situations at the end of the 20th century, which resulted from the practice of abbreviating a four-digit year to two digits.

segments of the chain. It includes the two focus ITS subsectors in the ICT Taxonomy and Subsector Selection Report for Jordan: software programming and web services.

- **BPS** is a highly diverse ICT-enabled services category that contains activities related to the management of enterprise resources (ERM), human resources (HRM), and customer relationships (CRM). Specific BPS services include call centers, payroll, finance, and accounting; human resources (HR) activities are present in the low- and mid-value segments. As indicated in the CGGC's ICT Taxonomy and Subsector Selection Report, BPS can provide a path for upgrading to KPS.
- **KPS** is a category of ICT-enabled services that refers to specialized activities that often require professional licensing (such as in the medical, legal, and accounting fields). KPS include market intelligence, business analytics, and legal services, which are the high value-added general segment of the chain.

Industry-specific services include offshoring of activities that are not related to general business functions and that require specific industry knowledge. This might include pharmaceutical R&D, industrial engineering, and medical transcription, among others. These services may have limited applicability in other industries (Gereffi & Fernandez-Stark, 2010).

Value added in the ICT services value chain can be related to skill levels and work experience, that is to say, the human capital inputs of ICT services. Human capital has been found to be a key determinant of value creation, competitiveness, and success in service exports from developing countries (Chadee et al., 2011; Graf & Mudambi, 2005; Nyahoho, 2010; Saez & Grover Goswami, 2010).⁷ The visual representation of the ICT services value chain presented here is based on the available proxy for value added: wages paid to employees for different activities within industry segments. These relative wages, in turn, reflect required employee education and experience levels (Gereffi & Fernandez-Stark, 2010) and provide the best indication of "low" and "high" value-added activities. As a result, low-wage activities, requiring less education and experience, appear lower on the value chain map, while higher-wage activities, requiring employees with more formal education and experience, appear in the upper section.

Table 1 shows how both competitive salary and revenue data for different segments of the ICT services value chain in a middle-income country increase from segment to segment. Employees in activities located in the lower part of the value chain have less preparation, particularly with respect to

⁷ Saez & Goswami (2010) find positive and significant correlation between human capital and service exports after controlling for institutional variables and electronic infrastructure. In addition, research by Nyahoho (2010) on the importance of factor intensity as a determinant of trade also finds that human capital is clearly related to exports of information services, while Shingal (2010) finds that human capital is one of three key variables that have the biggest impact on bilateral service trade. Chadee et al. (2011) found that human capital is considered to be the most critical source of competitiveness by management of offshore service providers.

specialized skills, and earn lower wages, while the employees in the upper section of the value chain have more specialized skills and more years of experience and therefore command higher wages.

Table 1. Employment, Revenue, and Salary Information—Selected Segments of the ICT services Industry in a Middle-Income Country, 2008

Segment	Activities	Most populous position within segment	Average education level for employees	Average revenue per employee ^a (US\$)	Median salary per employee ^a
BPS	Call Centers	Call center agents & technicians	High School / Bachelors degree	\$19,720	\$17,280
ITS	IT Infrastructure	Computer technician	High School/technical institute	\$20,704	\$16,932
	Software Development	Programmers	Bachelors / Masters Degree	\$36,788	\$28,065
	IT Consulting	Systems analysts	Bachelors / Masters Degree	\$55,956	\$45,455
KPS	Business and Financial Services	Financial analyst	Bachelors Degree in Business Administration	\$127,081	\$47,150
Vertical Activities	Engineering Services	Engineer	Bachelors Degree	\$103,844	\$53,514

Note: ^a This information is drawn from a confidential study published by Mercer 2008 for a certain country in Latin America.

Sources: Fernandez-Stark et al., 2010b; IDC Latin America, 2009; Meller & Brunner, 2009; Mercer, 2008; Wadhwa et al., 2008.

V. Upgrading in the ICT services GVC

Developing countries have upgraded their participation in the ICT services industry by performing higher value-added activities related to ITS, BPS, KPS, and industry-specific services. This has occurred as clients in the developed world have become increasingly comfortable with services more sophisticated “core” business functions that were previously carried out in the developed world to offshore providers. In the process, a variety of third-party providers operating in the developing world have acquired additional capabilities to serve these clients.

In general, upgrading refers to “a process of improving the ability of a firm or an economy to move to a more profitable and/or technologically sophisticated and skill-intensive economic niche” (Gereffi, 1999, p. 51). Upgrading occurs when multiple firms or key lead firms operating within a country begin to provide higher value added products or services. Firms may upgrade by improving production *processes*, producing more valuable *products*, acquiring new *functions*, or by entering new value chains through *intersectoral upgrading* (Humphrey & Schmitz, 2002).

Upgrading Trajectories. Five principal upgrading trajectories for the ICT services industry can be identified: (1) entering into the value chain; (2) upgrading within the BPS segment; (3) offering full-

package services; (4) expanding IT firms into KPS; and (5) specialization of firms in vertical industries.⁸ These five upgrading trajectories are presented in **Table 2**. In each segment (ITS, BPS, and KPS), process, product, and functional upgrading may occur, and multiple upgrading (shifts) processes can happen simultaneously in a given country.

Entry into the value chain: The most frequently observed way to enter the ICT services value chain is through the establishment of call center operations. This represents an opportunity for low-income countries that seek to enter into the knowledge economy.⁹ Companies seek employees with good general communication and problem-solving skills and typically hire young people with completed high school education, enrolled college students, and recent graduates. Further skills training is provided by the company. These operations rely on scalability in order to drive profitability, suggesting that these are best suited for developing countries with large populations.

Upgrading within BPS activities: This describes the shift of companies that have established basic BPS operations such as call centers into new services, including finance and accounting, payroll, and supply chain management. In other cases, upgrading can also happen by improving and expanding call center operations or even specialization in certain niches, for example, call centers for sophisticated financial services. The learning curve associated with overcoming the challenges of exporting services during the introduction of call center operations can be quickly leveraged to both improve upon current services and upgrade into higher-value services. Higher-value BPS activities rely on similar repetitive functions as call centers, although as a whole, they draw on a more educated and/or experienced labor force.

Companies that have already positioned themselves in the ITS and KPS segments may opt to provide a more comprehensive range of activities including BPS services. This process usually happens with the acquisitions of smaller BPS firms and/or creating a new business unit within the company. Maintaining the provision of low-value services, while at the same time providing high-value services, requires a large but versatile and comparatively low-cost labor supply. In small countries, inflationary pressure on wages due to a limited but skilled workforce encourages countries to upgrade into higher-value services—or lose their competitiveness in the industry to lower-cost countries. On the other hand, a large country with a significant proportion of the population earning low salaries can successfully upgrade into higher value services and at the same time remain competitive in basic services.

⁸ Process upgrading is also identified; however, due to marginal returns to economic development from this type of upgrading in ICT services, it is not discussed in detail in this paper.

⁹ Since irregularities with misuse and sale of personal data were identified in the BPS industry India in 2006, a commitment to personal data protection has become very important for countries to enter the sector. Several countries subsequently introduced legislation to improve this; however, others such as India continue to hold a significant percentage of the market without having finalized this legislation.

IT service firms searching for new ways to diversify their revenue streams opt to include KPS activities in their portfolio. IT companies that previously only offered IT services to their clients engage their customers to find solutions for “unsolved business problems rather than incomplete programming tasks” (William F. Achtmeyer Center for Global Leadership, 2008, p. 3). IT firms leverage their successful global approach to the technology industry by becoming players in the business-consulting field and hire a large number of Master of Business Administration (MBA) graduates and workers with business experience and sharp analytical skills.

Companies offering some ITS, BPS, and KPS for a wide range of industries often specialize and focus on key industries in which to develop expertise. This trajectory is closely correlated with leading productive industries in the host country. Companies hire area experts to sustain their competitive advantage in specific niche areas, drawing on existing highly qualified human capital and a well-established pipeline for educating and training professionals and technicians for the sector.

Table 2. Upgrading Trajectories in the ICT services GVC

	Diagram	Description
Entry into the Value Chain		- Common way to enter the offshore services value chain is through the establishment of call center operations. - Opportunity for low-income countries to enter into the knowledge economy.
Upgrading within the BPO Segment (Functional Upgrading)		- Companies expand their BPO services within the segment. - Improving and expanding call centers operations or specialization in certain areas such as inbound or outbound, sales, CRM management, etc.
Broad Spectrum Services (Functional Upgrading)		- Companies positioned in the ITO and KPO segments may opt to provide a more comprehensive range of activities and include BPO services. - Acquisitions of smaller BPO firms and/or creating a new business unit within the company.
Upgrading from ITO to KPO functions (Functional Upgrading)		- IT service firms include KPO activities in their portfolio. - IT companies engage customers to find solutions for unsolved business problems.
Industry Specialization (Intersectoral Upgrading)		- Companies offering some ITO, BPO, and KPO services for a wide range of industries start specializing and focus on key industries to develop expertise. - This can include both lower value and high value activities.

Source: CGGC, Duke University.

VI. Workforce Development in the ICT services GVC

Since high standards must be maintained when the provision of services is transferred from developed to developing countries, the educational level and skills in local workforces have been key drivers of location decisions in the ICT services industry (Graf & Mudambi, 2005; Hollinshead et al., 2011).¹⁰ The quality levels expected by clients, however, often far exceed those of domestic markets in the developing world; thus, in addition to access to employees with a minimum level of education, this necessitates specific additional workforce development measures. To meet these global demands, offshore service providers employ a similar approach to employee development as in the industrialized world. These include selective competency-based hiring, minimum formal education, induction sessions, specialized and on-the job training, skill certification, mentoring, and leadership development programs (Fernandez-Stark et al., 2010b; Wadhwa et al., 2008).

Table 3 outlines the different educational profiles and training requirements for each segment of the value chain. As the table shows, formal education is used as an preliminary screen for potential recruits; however, this is generally complemented by further competency evaluations (Wadhwa et al., 2008). For example, the minimum level of formal education required to work in the BPS sector is a high school diploma, but this can vary by country, and the same position may sometimes require a college degree.¹¹ Required competencies, however, are consistent across countries and include communication skills—such as active listening and voice clarity; analytical, decision-making and basic computer skills; and language ability—as required by the firm’s market.

These competencies differ according to the service performed in the value chain. In higher-value ITS and KPS activities, for example, in addition to formal tertiary education, globally recognized certifications are almost as important as signal quality and skill level of potential employees. These can include working knowledge of global software platforms (e.g., Microsoft, Cisco, and Oracle certifications) or development of financial analysis skills (e.g., CFA certification from the global CFA Institute).¹²

¹⁰ Other determining factors have included operating costs (principally driven by labor expenses), quality of the telecommunications infrastructure, language skills and cultural compatibility, time zone, government support of industry, political and economic stability, maturity of the legal system, and protection of intellectual property rights (Lewin, 2008; Manning et al., 2008).

¹¹ Preliminary research suggests that this depends on the opportunities in the local labor markets and the quality of the education system.

¹² Appendix 1 provides an overview of several of the different certifications required at each level.

Table 3. Job Profiles in the ICT services GVC

Position	Job Description	Formal Education Requirements	Training/ Experience	Skill Level	
ITO					
IT Technician	Maintains equipment and network devices, provides software support for updates.	Technical diploma/degree	Specific technical courses, on-the-job training, and experience		
IT Software Programmer	Programs software applications for general or customized use.	Technical diploma/degree	Software programming courses and certifications		
IT Consultant	Provides advice to help firms align IT strategy with their business objectives (may include information risk management, IT infrastructure, strategy, data management).	Bachelor's degree in IT/ Master's degree in engineering	Consulting/ management experience		
Software R&D Engineer	Designs, develops, and programs innovative software packages and functions.	Bachelor's /Master's/ Doctoral degree in industrial engineering/computer science/informatics	Software programming courses and certifications		
BPO					
Call Center Operator	Answers in-bound calls regarding specific products and provides general customer services.	High school/ Bachelor's degree	Two – three week training and on-the-job training		
Finance and Accounting Analyst	Provides accounts receivables and accounts payable processing, reconciliations, ledger keeping, and income and cash statement preparations.	High school/ technical institute diploma in accounting	Technical training and on-the-job training		
Marketing and Sales Representative	Supports inbound and outbound sales, sales order processes, and customer monitoring.	Technical/Bachelor's degree	Short training and on-the-job training		
BPO Quality Assurance and Team Managers	Ensure BPO agents meet specified client service standards and monitor agent performance.	Technical and university-level professionals	Technical training and on-the-job training		
KPO					
Finance Analyst	Provide guidance to businesses and individuals making investment decisions; assess the performance of stocks, bonds, commodities, and other types of investments.	Bachelor's degree in business administration	Chartered Financial Analyst (CFA) certification		
Business Analyst	Provides business services, such as market research, business opportunity assessment, strategy development, and business optimization.	Bachelor's/Master's degree in business administration	Experience		
Legal Analyst	Reviews and manages contracts, leases/ licenses. May provide litigation support services or intellectual property services.	Law degree	Experience and training in specific country legal systems		
R&D					
Researcher	Undertakes projects to increase the stock of knowledge; develops new products based on research findings.	Master's/doctoral degree	Experience/industry specialization		
Skill Level	Low 	Low-Medium 	Medium 	Medium-High 	High
	No formal education/ experience	Literacy and numeracy skills; experience	Technical education/ certification	Technical education/ undergraduate degree	University degree and higher

Source: CGGC, Duke University based on Fundación Chile, 2009; Fernandez-Stark et al., 2010b; Wadhwa, 2008.

Providing services in any level of the value chain, be it through entry into the value chain or upgrading, thus depends on the availability of the required labor qualifications and skills noted above for that stage (Graf & Mudambi, 2005). Lower levels of the value chain require a significantly larger number of employees than higher levels, which depend on quality rather than quantity. This search for suitable skills can draw on unemployed labor pools, existing employed labor attracted to the industry by higher relative wages and opportunities to work with global clients, new graduates from the growing higher education sectors in many developing countries or, as is becoming increasingly common in the industry, further developing the skills of the firm's current workforce.¹³

The dynamic and rapid growth of employment in this industry across developing countries, however, has put significant pressure on this labor supply. This has had two important consequences for workforce development. First, it has led to significant competition between firms for existing talent (Chadee et al., 2011). Firms must now focus not only on recruiting new employees, but also on retaining current employees.¹⁴ Second, clients are placing increased demands for more sophisticated services from their service providers as they become more comfortable with the offshoring model. Thus, many firms have begun to provide their employees with a broad range of additional training and education programs, including mentoring, career planning and providing access to formal degree programs, such as MBAs or other Master's programs (Wadhwa et al., 2008).

These workforce development initiatives for employees differ according to the firm's position in the value chain. Training programs in the BPS sector tend to include the extensive use of internal e-learning platforms covering areas such as domain expertise certification, soft skills, and process quality improvement in order to upgrade the skills of large workforces. Some firms also offer BPS employees access to formal degree programs in higher education. High value ITS firms focus on maintaining their workforce at the cutting edge of technology, which includes acquisition of up-to-date certifications and training that foster innovative thinking.

As the industry continues to grow and evolve both at the global and local levels, diverse models of preparing, engaging, and developing current and potential employees for different stages of the value chain have emerged across developing countries. Country cases in the remainder of this report explore the variety of private, public, and multisector workforce development strategies undertaken in six developing countries to support these market entry and upgrading efforts of firms and countries in the ICT services value chain.

¹³ Kumar and Chadee (2001) note that internal training and development can "result in specific advantages, where tacit organizational knowledge and specific on the job skills are more easily learned, transferred and applied."

¹⁴ For example, the new "cohort" of working professionals in India is known to be highly ambitious. Leaving to pursue alternative, higher paying jobs or further education is cited as one of the main reasons for employee attrition in many segments of the industry (Wadhwa et al., 2008; Williams, 2004).

VII. Developing Country Case Studies

The cases of developing countries presented in this section illustrate the role of specific workforce development initiatives in supporting the process of entry and upgrading in the ICT services industry. The cases were chosen to represent the variety of upgrading experiences in the industry, including countries of different size and geographic locations. The pioneer cases with the longest and most diverse experiences in the ICT services industry (Chile, India, and the Philippines) are presented to outline the full range of economic upgrading stages and workforce development initiatives for the ICT services industry.

We examine three country cases in depth: (1) Chile, (2) India, and (3) the Philippines. Each illustrates an alternative path of rapid growth and development of the industry. India and the Philippines are mature exporters of ICT services. India is the worldwide ICT services market leader, with both international and domestic lead firms. Over the past decades, it has upgraded to offer all services in the value chain, including industry-specific services. The Philippines has drastically expanded employment in the BPS/call center segment to become the world's largest BPS destination and is also expanding into niche services. Chile is an emerging exporter in the sector, which has leveraged its small but highly educated workforce and developed strengths in the higher end of the value chain in ITS, KPS, and innovation services in specific industries. These cases reveal distinct workforce development initiatives that helped to promote upgrading.

Table 4. Selected Economic and Industry Country Indicators, 2008

	India	Philippines	Chile	Dominican Republic
Gross Domestic Product (GDP) (US\$ billions)	1,260	167	170	46
GDP per capita (at PPP)	3,011	3,306	14,579	8,446
Offshore services revenue (US\$ billions)	47 ^e	6	0.86	NA
Offshore services % of GDP	4	3.6	0.05	NA
Total labor force (millions)	475.6	38.8	7.1	4.4
Labor force in offshore services	2,236,614	475,000 ^b	20,000	22,000
Entry Year	Mid 1990s	Early 2000s	2000-2002	2000-2002
Entry Point	Low value IT	Call Center	IT & Call Center	Call Center
Highest Value Activity	High IT, KPO, R&D	BPO, F&A, HRO	High IT, KPO R&D	BPO, F&A HRO
Enrolment in higher education (millions)	12.82 ^a	2.48 ^a	0.86	0.42
Gross Enrollment Rates (GER) in higher education (%)	11 ^a	29 ^a	47	35

Notes: ^a: 2005–2006; ^b 2009; ^e: estimates 2009. PPP is Purchasing Power Parity.

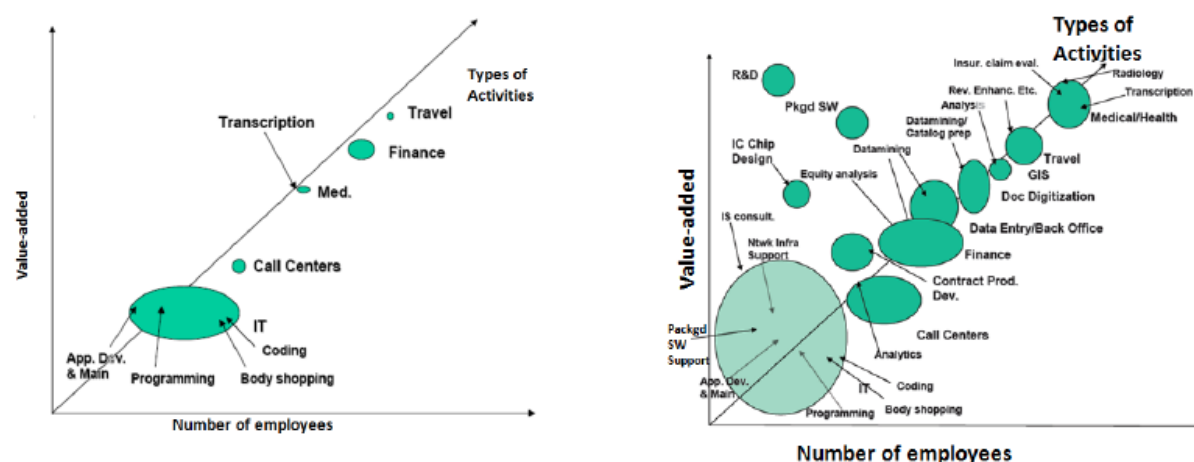
Sources: Economist Intelligence Unit, International Labor Organization, Business Processing Association of the Philippines, NASSCOM, IDC, Ministry of Human Development- Government of India, Ministry of Education-Chile; Commission on Higher Education-Philippines; UNESCO.

A. India

India is the global leader of the ICT services industry, accounting for approximately 40% to 45% of the world market (NASSCOM, 2008). India offers services in all segments of the ICT services value chain, including ITS, BPS, KPS, and a significant number of advanced services for specific industries such as finance and health care. In 2009, revenues reached US\$47 billion, accounting for 4% of the country's GDP (NASSCOM, 2009). By 2008, the industry employed 2.3 million people, with an indirect job creation of approximately 8 million (NASSCOM, 2009). The industry estimates demand for new recruits will reach 1.4 million for 2009 and 2010 (OECD, 2010).

India's upgrading trajectory involves continued expansion in all segments of the industry. The country has not abandoned the provision of low-value services in favor of high-value services. As a result, Indian services provision is marked by significant overlap, with upgrading and workforce development often occurring in parallel in different segments. **Figure 4** below illustrates this simultaneous evolution and expansion of India's capabilities in the ICT services value chain from 2000 to 2006. Firms initially entered the industry to support the IT sector, and, by 2006, they had also moved into the provision of higher-value services, such as financial and legal analysis (Dossani & Kenney, 2007; Sako, 2009).

Figure 2. Upgrading in the Indian ICT services Industry



Source: Dossani & Kenney, 2007.

Industrial Organization

A mix of large foreign providers, MNCs captive centers, and local Indian firms has characterized the ICT services sector in India since its inception. Early captive centers were closely followed by global providers, such as IBM and Accenture. Indian firms grew quickly alongside these firms to become important sources of competition in the industry. Today in India, IBM is the largest employer in the country; however, TCS, Infosys, and WIPRO follow closely.

Workforce Development

A shortage of qualified human capital in early stages of the industry led firms in the private sector to develop highly functional and efficient training and development programs, matching specific skills development to client needs. With sophisticated internal development capacity, firms now draw on college graduates from a broad range of disciplines and hire across the male-female pool, focusing on general ability and attitude rather than specialized domain and technical skills. These programs offered greater flexibility and sharper focus to training than traditional universities, and recently firms have begun to play a direct role in shaping curriculum design within universities and other established training academies. As the global market becomes more competitive and India upgrades across all industries, this ability to leverage initiatives such as formal classroom-based training, on-the-job training and mentoring in order to rapidly a large number of workers provides a country with an exceptional asset.

The following three key phases of industry upgrading can be identified (also see *Table 5*):

Stage 1. Entry into IT services in the value chain: 1990s-2010. India's ICT services industry began with the ITS segment. The country entered the new market by offering simple IT support services and continued to upgrade successfully into sophisticated software R&D. By the end of the 20th century, India was considered to be one of the most important IT providers in the world. This entry into IT services has its roots in the country's sizeable supply of low cost, English-speaking engineering talent, the phenomenon of innovative Indian "body-shopping"¹⁵ solution during the protectionist years in India, and the Y2K crisis at the end of the 20th century. As large global providers such as IBM began to seek out this cheaper talent to resolve the challenges presented by Y2K, a number of Indian IT professionals who had worked in the United States returned home having gained considerable domain expertise and began to work in these new centers and also established new Indian firms. These initiatives evolved into India's well-known leading firms, such as TCS, Infosys, and WIPRO (Dossani, 2005). These firms leveraged their relationships with multinationals in the country, adopted and adapted leading management practices to the Indian reality, and were able to emerge as successful competitors in the global IT sector.

Workforce Development. During this period, firms quickly found that the tertiary education system, while large, was unable to sustain the supply of quality engineering talent required to satisfy the exploding demand for IT services. In 2003, one firm alone, WIPRO, was hiring 1,000 employees a month (Williams, 2004). Enrollment in tertiary education increased by four million students between 1999 and 2005 and reached 12.8 million by 2006 (Agarwal, 2009), thanks to a large number of private institutions

¹⁵ Body-shopping was the name given to the practice of sending IT programmers from India to the United States to work directly on client sites. This practice was common during the 1970s and 1980s.

that emerged to support this growing demand for education.¹⁶ This showed remarkable progress in increasing access; however, competing for limited, well-qualified teaching staff, these new institutions struggled to maintain high quality standards for the growing IT sector (Altbach, 2009).

Many of the new graduates emerging from these universities were under-skilled and few were employable without further training (Wadhwa et al., 2008). To meet demand for services and maintain their position in the market, the private sector thus had to fill the gap by developing significant in-house training practices. Human capital recruitment, training, and development became a central part of corporate strategy in India and all senior management was actively involved in this development. Firms also established sophisticated feedback mechanisms to constantly refine recruiting strategies to meet their projected needs. A substantial proportion of employee technical training continues to be carried out internally, matching specific skills development to client needs. Several of the larger firms, including Wipro and Infosys, have established their own training campuses (Wadhwa et al., 2008), which increased the efficiency with which they can upgrade.

During this initial phase of upgrading, there were also a number of multisector initiatives in workforce development. To improve the education provided at universities for the offshore sector, a number of private-sector firms reached out to established institutions. Cadence India, for example, launched a partnership with over 100 colleges to train trainers, provide discounted software, and offer practical experience in design for students (Wadhwa et al., 2008). This program continues to ensure that students are already experienced users of the widely adopted Cadence software programs when they enter the workforce. Another example is Accenture's Campus Corridor Program, which has facilitated their deployment of electives for third-year engineers across numerous universities in India. Accenture also reaches out to faculty of these universities, inviting them to their Indian facilities to keep them up to date on cutting edge technology (Accenture, 2010).

Stage 2. Expansion into BPS and Upgrading into KPS Operations: early 2000s. Toward the end of the 1990s, MNCs, such as GE, had experimented with using India as a backoffice provider for BPS services. However, it was only in the early 2000s that the BPS segment began to take off in the country. The burst of the Internet bubble in 2001 highlighted the vulnerability of the IT sector focused on the provision of just one service, and the early success of these captive back-office centers encouraged IT firms to embark into BPS services to diversify revenue streams.

¹⁶ Earning "University" status in India requires an Act of Parliament and thus many of these new institutions have only gained "deemed university" status, which allows them to confer academic degrees. The lack of transparency and quality standards in the assignment of this status led to the suspension of further awards in 2007 (Agarwal, 2009).

As Indian firms expanded across the ITS and BPS segments, they came into direct competition with global service providers such as IBM and EDS. These global providers had a distinct advantage over the Indian firms as the result of their acquisition and development of business consulting divisions in the 1990s. This second phase is also marked by the country's upgrading from ITS to KPS activities. Indian firms, such as Infosys and WNS Global Services, recognized the importance of shifting their sales strategy and began offering business consulting services.

Workforce Development. Rapid growth in the BPS sector through the mid-2000s was supported by the same efficient private sector recruiting and training techniques, such as Enterprise Resource Planning systems, that track and analyze existing skills and attrition data to forecast recruitment needs (Wadhwa et al., 2008).¹⁷ Upgrading into the ITS consulting and KPS segments, however, required firms to recruit heavily from existing labor pools and MBA programs. Adjusting their compensation packages to attract top talent, companies sought out experienced consultants from leading global competitors and focused on hiring the top 10% from MBA programs.

Nongovernmental organizations (NGOs) have also played a small role in bringing marginalized groups such as rural women to the industry. With fewer opportunities to move to the city than men, these women have been found to be more loyal, helping companies to reduce their attrition rates (India Knowledge@ Wharton, 2010). Training programs ensure that high quality standards are maintained.

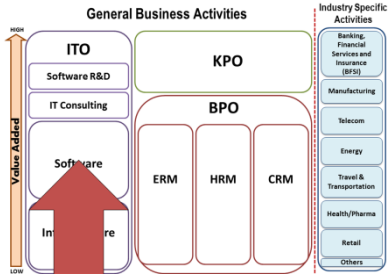
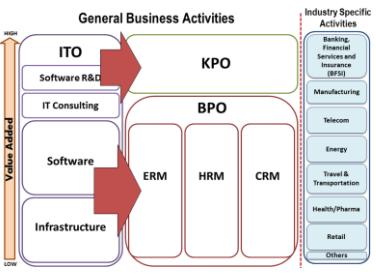
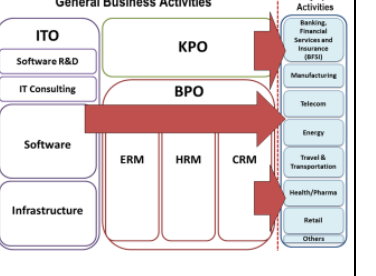
Due to the success of private sector initiatives, government workforce development initiatives were largely absent in this upgrading phase.

Stage 3. Vertical Industry Specialization: Mid–Late 2000s. The most recent upgrading in India has been a shift into vertical industry specializations, with increased intersectoral upgrading. By mid-2000s, the global service markets became increasingly consolidated, with smaller providers being absorbed by large firms. In order to differentiate themselves, firms began to specialize in vertical industries offering high- value, industry-specific services, such as R&D offshoring. In the healthcare industry, for example, by 2010, multinational pharmaceutical companies, such as TCS, began offering clinical trial services for pharmaceutical giants such as Roche (Gupta, 2008).

Table 5 provides an overview of the industry evolution and the corresponding workforce development initiatives that took place in India during the past two decades.

¹⁷ Unlike ITS services, BPS services do not require engineers and can be drawn from a broad range of disciplines.

Table 5. India: GVC Upgrading and Workforce Development Initiatives

1990s–2010	Early 2000s	Mid–late 2000s
		
Private Sector Workforce Initiatives ▪ In-house training supplements poor quality tertiary education. Several firms begin to work with universities to improve quality of graduate skills. ▪ Companies began hiring recruits from numerous different fields in the middle of their university degrees and providing in-house training to quickly get new hires up to speed. ▪ Recruitment, training and development, management and process improvement, and retention become a central part of corporate strategy.		
• Firms hire top talent from rival firms and MBA programs for KPS and IT consulting. Workshops held on benefits of the GSD model. • Training programs for BPS with accent neutralization and cultural programming. • In-house university training includes graduate-level training including MBAs and courses in leadership and management (Cohen, 2008). • Call center training. English accent neutralization		
• Firms hire staff from the industries they are serving. • Highly technical industry specific training is provided for cross-functional teams.		
• Wipro open university campus with 300 professors on staff and offer courses from Japanese to advanced engineering. Basic training begins with 12–14 weeks of introductory courses in the Wipro methodologies, technical knowledge, languages, and accents. • The Infosys Global Education Center trains over 4,000 “freshers” or new recruits per year during 14-week training sessions in state of the art facilities in Mysore, India (Schlosser, 2007). • Other firms established customized programs for potential employees through leading science, technology, and management institutions or worked closely with different universities to improve curriculum development in different disciplines, as well as providing workshops for both faculty and students. There is limited evidence of new training institutions emerging to address this growing need for HRD.		
Public Sector Workforce Initiatives		
• Government established an HRD in the Department of Information Technology. • New regional institutes in Kohima, Nagaland, and Agartala created programs to increase regional employment opportunities and facilitate availability of quality IT manpower (Department of Information Technology-India, 2009). • IT programs focus on course content, generating mentors, improving the quality of existing engineering and IT university programs, and expanding access to increase the number of skilled graduates in the IT sector.		• Government launched INSPIRE in 2008 to build R&D capacities by recruiting talent early (15 years old), providing scholarships for all tertiary education levels, and guaranteeing research fellowships. • The National Competitiveness in the Knowledge Economy program was set up to help identify demand for highly qualified human capital and the best means to develop that talent.
Multisector Workforce Initiatives		
• Cadence India launches a partnership with IIT Kanpur and Kharagpur to train faculty and provide scholarships and software. • HRD launched a 5-year Information Security Education and Awareness Program and engaged educational institutions to offer diplomas, certificates, Bachelor- and Master-level courses in information security. By 2010, 25,000 students and government officials had participated in these training programs.	• NGOs focus on drawing marginalized groups meeting the minimum education and skills requirements into the industry labor pool through the establishment of rural BPSs. With fewer opportunities, this group has shown greater loyalty and decreased the cost of attrition. • Gram IT, a rural BPS focused on youth recruitment, put new employees through a 12- week full time training program to improve their fluency in English, as well as develop computer and typing skills (Byrraju Foundation, 2010)	

Source: CGGC, Duke University.

Workforce Development As the offshore firms advance into higher-value services, the availability of highly skilled researchers is required. In initial stages of this upgrading, the private sector tapped into the existing labor pool (both university graduates and experienced professionals) of specialized talent from different industries combined with human capital from high-value IT services. However, India currently has a comparatively low number of researchers and technicians working in R&D compared to other developing countries. Firms thus focus on fostering educational upgrading and sponsoring employees to pursue doctoral programs, and this is becoming an important driver of talent development. Training emphasis has been placed on building cross-functional teams and providing technical training specific to the industry, as well as the GSD model. Training takes place both in-house, as well as through customized programs with different science, technology, and management institutions in India.

B. The Philippines

The Philippines is quickly becoming the leading destination in the world for call centers and finance and accounting services. In addition, the Philippines has also moved into vertical services with the provision of medical transcription services. In 2008, revenues reached US\$6 billion, and the BPS industry alone accounted for 3.6% of the country's GDP. That same year, IT/BPS sectors together accounted for 12.4% of the Philippine exports (BPS Services Association, 2009). By August 2009, the number of full-time employees had risen to 475,000, with an average annual increase of 40% in employment generation between 2004 and 2008. Call centers represent 61% of all employees in the industry.

Industrial Organization

The industry's success is mostly due to the numerous international BPS firms that have set up operations in the Philippines to serve the U.S., Asian, and Australian markets. These firms include leading third-party call center providers Sitel, Sykes, Convergys, and Teleperformance. In 2010, Sitel was operating seven major call centers in the country. Teleperformance offered 7,000 seats across six centers, while Convergys has a 2,041 seat center, making it the biggest call center in the world. Local firms have been present in the industry. However, with the exception of E-telecare, which ranked third in revenues before merging with Stream Global Services in 2009, these firms are quite small and they have been overshadowed by the large global providers.

Workforce Development

The development of the ICT services industry in the Philippines has been fueled by the large and steady supply of university graduates emerging from the country's tertiary education system who consider BPS service an attractive career alternative. In addition, there are industry-wide efforts to enhance both

spoken and written English of these graduates and a commitment by the government to provide specific training programs to facilitate their entry into the sector. The tertiary education system in the Philippines is recognized for its high enrollment levels: 29% of the university-aged population are enrolled in one of approximately 2,000 higher education institutions in the country (UNESCO Institute for Statistics, 2010). In 2008, the Philippines graduated approximately 490,000 college students. This has provided an ample supply of human capital for the ICT services industry. Most workforce training initiatives were focused on improving competitiveness in the BPS segment.

The ICT services industry in the Philippines has evolved rapidly and three upgrading stages can be identified:

Stage 1. Entry into the value chain through BPS call center services: Late 1990s. The Philippines entered the value chain through the provision of call center services around the turn of the century. Pioneer firms such as Sykes set up call center operations in the country in 1997, with just 16 employees, and by 2003, it had grown to over 2,000 agents (Sykes, 2010). By 2009, the country had the same number of call center agents as India (The Economic Times, 2010).

Workforce Development. The Philippines' successful entry and expansion into the call center industry can be attributed to the large number of English speakers in the country and low labor costs. Given the country's historical ties with the United States, a significant proportion of the population are fluent in American English,¹⁸ and offshore service providers soon found that Philippines agents were more culturally compatible with American clients than those in India. Thus, the minimal need for voice and cultural training has helped the fast growth of call centers in the country. In addition, the Philippines call center sector provides an attractive career alternative for college graduates in the country, and salaries in the industry are highly competitive in the domestic labor market (Friginal, 2009).

In multistakeholder initiatives, the industry association Business Process Association of the Philippines (BPAP) has opted to share information from the National Competency Test with educational institutions to help them ensure their curriculum meets global industry requirements. The government supported this initiative through the Commission for Information and Technology by providing financing for the first 10,000 applicants to take the test for free (Valermo, 2010). Other collaborations between firms and universities have been established to train future call center employees, such as a pilot program between the BPS firm Sitel and the University of Cordilleras.

¹⁸ The Philippines is the third largest English-speaking country in the world, and 72% of the population is fluent in American English (BPS Services Association, 2009).

Stage 2. Upgrading throughout the BPS segment: Mid-2000s. The country's ICT services sector has upgraded through the BPS segment, expanding services from call center operations to finance and accounting, allowing the industry to establish a dominant presence on the global market. By 2010, Manila had become the world's largest city destination for BPS activities (Vashistha & Nair, 2010).

Workforce Development. The sector continued to expand into higher value BPS services, thanks to the relatively high percentage of the population that hold college degrees, as well as the general suitability of the labor force to work in MNCs. Employability rates for finance and accounting graduates are twice as high in the Philippines as in India, and 2.5 times for generalists, given that higher education in this country has followed Western models (Beshouri & Farrell, 2005). Most university courses in finance and accounting are taught according to U.S. standards, providing widespread talent for the establishment of back-office operations for many American banks and financial institutions (Singh et al., 2008). Overall, it is estimated that two-thirds of the 490,000 college-degree graduates in 2008 completed programs suitable for the offshore sector (BPS Services Association, 2009). The private sector was thus able to draw on this segment of the labor pool in order to drive growth through the value chain.

In both the first and second stages of upgrading, the government has focused on providing substantial funding for training to direct underutilized labor capacity towards the growing BPS segment in the country. **Box 1** highlights these initiatives.

Box 1. Training-for-Work Scholarship Program—Philippines

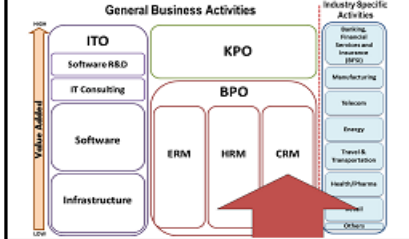
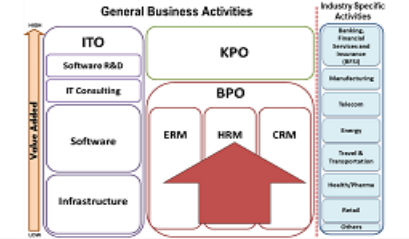
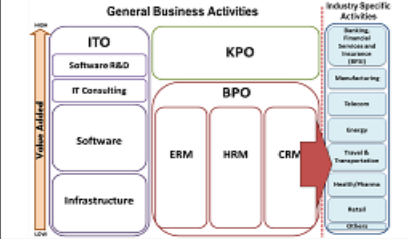
In 2008, through the **PGMA Training for Work scholarship**, the government distributed around 40,000 scholarships focused on workers across the ITS and BPS sectors. The call for applications invited “recent high school graduates, employees looking for a career change, underemployed or unemployed” people to apply on a need-blind basis. Over 30,000 people have graduated from these training programs and 67% of them are now employed in the ICT services industry (BPAP, 2009). In 2009, President Gloria Macapagal-Arroyo expanded this training for work program to quickly ramp up near hires.* According to the BPAP, 75% of these near hires subsequently found work in the industry, and an estimated 8,000 people were expected to complete this program in 2009.

*“Near hires” are potential employees for the sector that are rejected in the recruitment process due to specific shortcomings in their skills. Program training focuses on developing near hires weaknesses in order to usher them into the workforce as quickly as possible (Oliva, 2008).

Stage 3. Vertical industry specialization: late 2000s. In addition to these two previous upgrading trajectories, the Philippines have also sought to upgrade into industry-specific offshoring sectors with the inclusion of services for the medical industry, establishing the country as a destination for medical transcription. The foray into the medical transcription industry draws on the enormous supply of trained medical professionals in the country. Table 6 provides an overview of the industry evolution and

the corresponding workforce development initiatives that took place in the Philippines during the past two decades.

Table 6. The Philippines: GVC Upgrading and Workforce Development Initiatives

Late 1990s	Mid-2000s	Late 2000s
		
Private Sector Workforce Initiatives • Short 2-3 week training for call center operations. • Opportunities to practice and in-house language trainers provide constant monitoring and coaching. • National Competency Test and database helps to reduce recruitment delays and costs. • American expatriates work with agents in various areas of language production and task performance. • ADEPT, a program designed to improve English language skills of BPO applicants, is launched in universities. Additional English language improvement programs introduced to raise "near-hires" to U.S. standard levels amongst graduates.		
Public Sector Workforce Initiatives • 40,000 PGMA Training for Work scholarships offered for the ITO and BPO industry. • In 2009, program expanded to "near hires". • In 2009, government also provides crash training for out of work engineers and overseas Filipinos returning to the country for hiring in the BPO sector. • Government offers scholarships to healthcare professionals for specialized training, including laboratory work; knowledge about foreign health care systems, particularly that of the United States; and accents and idioms to prepare them to provide high quality services for mainly U.S.-based doctors (Philippines Medical Transcription, 2007).		
Multisector Workforce Initiatives • Educational system has favored curriculum related to BPO rather than ITO activities, particularly in finance and economics. Two-thirds of college-degree graduates in complete programs suitable for the sector.		
• As a result of the crisis, the Trade Union Congress was contracted by the government to provide finishing courses for call center agents and for medical transcriptionists (Boboy Syjuco, 2010). • In 2007, University of the Cordilleras launched a pilot preparatory course in English proficiency, technical competency, and customer relations collaboratively designed with a U.S.-owned BPO Sitel Philippines (Cabreza, 2007). • Middle management training programs developed by BPAP with Ateneo de Manila University and De La Salle University. Harvard Business Publishing, BPAP also developed an e-learning tool, combining online and class activities. 100 managers graduate in first year.		

Source: CGGC, Duke University.

Workforce Development. The establishment of a medical transcription service sector tapped into a large and predominantly jobless medical workforce.¹⁹ The scarcity of jobs in the past had led many of these Filipino workers to migrate abroad to find employment, resulting in a large brain drain. Medical staff are widely recognized for their quality internationally and a significant number of them work in hospitals and medical facilities around the world. This makes them very suitable to serve developed countries in all type of medical transcription activities.²⁰ In order to facilitate the growth of this niche, initiatives were taken by the private sector to provide certifications for staff to meet global transcription standards. The privately owned MTC Academy, the largest medical transcriptionist certification institution in the Philippines, established a partnership with the American Association for Medical Transcription (AAMT), matching the curricula and central examination system (MTC Academy, 2010).

The government has also supported the growth of this segment, offering scholarships to healthcare professionals for specialized training including laboratory work, knowledge about foreign healthcare systems, particularly that of the United States, and accents and idioms to prepare them to provide high-quality services for mainly U.S.-based doctors (Philippines Medical Transcription, 2007). (See Figure 6 for more detail on GVC upgrading initiatives in the Philippines.)

C. Chile

Compared to India and the Philippines, Chile is a small, but high-value player in the ICT services industry (Fernandez-Stark et al., 2010a). Chile offers services in the high-value ITS and KPS segments, as well as services such as R&D in select industries, including agriculture and mining. The country continues to offer some call center and lower-value BPS activities, as well, but these have mostly migrated to lower-cost countries in Latin America. By 2008, the country registered close to US\$1 billion in service exports (IDC Latin America, 2009b). The ICT services industry employed 20,000 people at the end of 2008. The development of this industry benefitted substantially from targeted industrial policy driven by the country's economic development agency, la Corporación de Fomento de la Producción (CORFO).

Industrial Organization

MNCs and large global services providers have led the ICT services sector in Chile, although several mid-size companies and the largest firm, Sonda, also play an important role in the IT segment. Small local IT firms can be found at the high end of the value chain, contributing to advanced software development and R&D. The engineering service export sector has been dominated by large foreign firms,

¹⁹ Medicine is the third most popular career choice in the country,

²⁰ The Philippines has a large and growing number of nurses. Enrollment in the medical field increased from 150,000 in 1999–2000 to 550,000 in 2005–2006 (National Statistical Coordination Board, 2010). Salaries for medical transcriptionists are on par with those of registered nurses (approximately US\$220 a month).

including Fluor, Bechtel, and SNC-Lavalin. Smaller companies have contributed to exports in a minimal way, and typically export their services to Peru or Colombia. In 2005, Comicro, Chile's largest domestic BPS firm was sold to TCS, and subsequently the sector has been almost the exclusively realm of large global service providers including Capgemini, Sitel and Teleperformance.

Workforce Development

Two key factors have provided Chile with an important source of competitive advantage in entry and upgrading in ICT services. First, the government has played an essential role through the provision of the high-tech workforce development incentives for foreign offshore companies (see **Table 7**). These incentives facilitated investments in certification and English-language training, as well as recruiting and training highly specialized personnel.

Table 7. List of Incentives under the High Tech Investment Program-Chile

Incentives	Financial Support	Maximum
On-the-job Training (HT3)	New employee training program	Up to 50% of annual salaries (Max=US\$25,000 per person)
Specialized Training & Recruitment (HT6)	Acquirement of specific knowledge or recruitment of experts	Up to 50% of specialized training or recruitment. (Max = US\$100,000 per person)

Source: CORFO, 2009.

Second, Chile's strong tertiary education has been important for providing a small but technically qualified labor pool to support the development of high-value niche activities for the value chain. The past two decades in Chilean tertiary education have been characterized by tremendous growth, and the number of graduates doubled between 1998 and 2007, reaching 82,200 in the latter year (Ministerio de Educación, 2009).

The following three major upgrading phases can be identified within the country:

Stage 1. Entry into the value chain through ITS and BPS services: Early 2000s. Chile entered the ICT services value chain in 2000, offering both IT and BPS services. The country initially attracted regional shared service centers for MNCs operating in Latin America, such as Citigroup and Unisys. However, with its small population and no particular strengths in the IT sector, this small middle-income country was an unlikely choice for entry into the industry. Chile's successful entry as an ICT services provider is to a large degree the result of the active role played by the government in promoting the country as an ICT services platform.

Workforce Development. During the initial period of entry into the value chain, many of those newly enrolled in the tertiary education system were the first generation in their family to attend

university, and many had to combine studies with work (Brunner, 2007). This group fed into the newly established BPS segments as part-time employees with quality education. BPS firms provided short two- to three-week induction and training programs. The scalability of many of these services, however, was restricted to Spanish-speaking markets, due to the limited number of English speakers in the country.

On the other hand, existing talent in engineering was a significant driver for the installation of IT centers in the country. Strong engineering faculties at Chile's well-respected universities and an evolving domestic IT market provided a limited but high quality supply of talent.²¹ The private sector complemented this strong educational base by providing English training, as well as certifications and workshops in leading software platforms, to ensure their staff remained on the cutting edge of technology. Many companies financed training initiatives through the incentives of the High-Tech Program and training was conducted either in-house or by existing external training organizations.

Stage 2. Upgrading into high value ITS and KPS segments: Mid-2000s. Chile rapidly upgraded into the high-value ITS and KPS segments after 2006. These segments continue to become more specialized, and, in IT services, many Chilean teams are dedicated to providing solutions for highly complex and unique problems. Following the selection of the industry in 2007 as 1 of 8 key clusters to drive economic growth, renewed support from the government provided further impetus for expansion. That same year, the government established a Public-Private Strategic Council to manage the newly created Global Services Cluster. This council represents foreign service providers in Chile, industry associations, educational institutions, and representatives from the public sector, including the Ministry of Economy and the Ministry of Education (Castillo, 2008).

Workforce Development. As ICT services continued to evolve, the high-quality and limited supply in engineering forced rapid upgrading into high-value niche sectors. As firms realized they would be unable to compete with countries such as India on large scale projects, they used a relatively small number of high-quality engineers to develop expertise in specific areas of software development. The private sector focused on improving the innovative environment for its workforce by increasing global exposure through online forums with offices around the world, providing certification training in global platforms and software, and offering mentorship to improve leadership and teamwork development (Gomez et al., 2009). Furthermore, in many of the captive centers (for example, Citigroup, J.P.Morgan, Equifax), upgrading was facilitated by transfer of knowledge through both formal and on-the-job training carried out by employees based in the developed world and India.

Government initiatives include its eagerness to tap into the mobile, professional workforce that was once captured by Silicon Valley. An open immigration policy has allowed for talent to move to Chile to

²¹ In 1999, the Chilean government introduced the Digital Agenda to increase ICT readiness of the economy.

help bridge the gap as new skills are developed locally (Schenkel & Knezovic, 2009). In 2010, the government created Start-Up Chile, an innovative program to attract entrepreneurs to set up IT companies in Chile.²² If successful, this program will help build world-class domestic IT companies that few countries outside of India have been able to do. In addition, the ICT services industry became one of a limited number of priority sectors for national study abroad scholarships for technical training and internships administered by BecasChile.²³

Upgrading into KPS activities has drawn principally on the large number of graduates in business administration and experienced professionals in the business community. As in India, private sector training in this segment includes GSD workshops provided in-house, as well as programs focused on leadership and management skills, with both internal and external trainers. The private sector firms that established service export operations—such as Evalueserve, leverage their e-learning tools, such as global teleconference calls lead by trainers based in India—and incorporate a high level of on-the-job training and mentoring provided by experienced managers who help their trainees work through projects on a step-by-step basis.

Stage 3. Vertical industry specialization: mid 2000s. A third upgrading trajectory can be identified in the country's expansion into the provision of specialized engineering and R&D services. As offshoring of higher value services has expanded globally, Chile has tapped into its considerable expertise developed around its key productive sectors: mining, agriculture, forestry and aquiculture. This has been particularly successful in engineering services for the mining industry, which accounts for one-third of the country's offshore service exports (IDC Latin America, 2009b). The importance of engineering services to the ICT services industry is reflected in their special representation on the Public-Private Strategic Council.

Workforce Development. The private sector has focused on raising awareness of R&D as a career alternative, fostering collaboration with researchers from abroad and creating opportunities for technical and professional staff to work together to improve efficiencies (Campos & Schlechter, 2009). Upgrading has occurred most rapidly in the mining sector, where Chilean engineering had established a solid reputation worldwide. The country graduates approximately 5,000 engineers annually, the majority of whom are very highly qualified technically.

Government workforce initiatives that promote upgrading into the sector include the establishment of the National Innovation System in 2007, which helped place R&D and innovation as high national priorities for investment and development. New scholarships to pursue Master's and doctoral degrees

²² The program provides 90% of start-up costs, including employee salaries, as well as providing infrastructure and logistics support for a total of up to US\$40,000 (CORFO, 2010).

²³ These scholarships are based principally on merit and career trajectories, with socioeconomic means accounting for just 10% of the evaluative process.

abroad increased the number of researchers available in these high value segments. The government also extended the High-Tech Incentives Program in 2009 to cover R&D functions in industry-specific sectors, and it awarded support to Monsanto, Pioneer and Seminis to establish R&D labs in northern Chile, focused on improving seed production. **Table 8** outlines these upgrading stages and the corresponding workforce development initiatives that took place in Chile.

Table 8. Chile: GVC Upgrading and Workforce Development Initiatives

2000–2008	2007–2010	2010
Private Sector Workforce Initiatives		
▪ BPO sector draws on large number of new university students and provides 2–3 week induction workshops and training. ▪ IT companies draw on engineering talent and provide extensive certification training in Microsoft, Cisco, Sun Microsystems, etc. ▪ Firms offer English training.	▪ Firms leverage their e-learning platform for employees offering broad range of programs from English to accounting and leadership.	▪ Private sector focused on raising awareness of career alternatives in research and development. ▪ Engineering firms focused on improving management and leadership skills, English, and global exposure of employees.
▪ The country's strong technical tertiary education system provides the industry with a small but qualified labor pool.		
Public Sector Workforce Initiatives		
▪ Perfeccionamiento Intensivo en Inglés: English training scholarships offered for IT specialists. 3,000 scholarships provided in three years. ▪ BecasChile extends academic scholarships to technical programs and internships abroad for the global services industry.	▪ Start Up Chile launched to attract entrepreneurs in high-value export services sectors in both ITO and other niche sectors. ▪ National Innovation System established to promote innovation in all economic sectors facilitates growth in the sector.	▪ BecasChile Scholarship program launched to increase the number of highly skilled workers in the labor force in niche industries. ▪ HiTech program also extended to cover niche industries.
▪ HiTech training incentives (HT3) offers provide 50% of new employee on-the-job training costs (maximum: US\$25,000 per employee). ▪ HiTech Program training incentives (HT6) offer 50% of training costs (maximum: US\$100,000 per employee) for specialized training or recruiting ▪ Servicio Nacional de Compensación y Empleo offers income tax deductions for firms' training expenses (available to all companies in the country).		
Multisector Workforce Initiatives		
▪ Increased interaction between private firms and technical institutions improves IT curriculum. ▪ GenShare and DuocUC sign an agreement for training of IT programmers in application development.		▪ Engineering firms represented on Public-Private Council of the Offshore Services Cluster and contribute to human capital development policy.

Source: CGGC, Duke University.

D. Institutions

There are different roles that institutions play in driving workforce development across the value chain. This is influenced by the existing educational and training frameworks in the countries in which the chain is embedded, the stage of the value chain in which firms in the country are located, the portability of the skills developed, and the commitment of the government to promoting growth in the industry.

Language training: As economies become increasingly globalized, English language skills have grown in importance to facilitate international trade in goods and services across all economic sectors. This skill is highly portable and relevant for most jobs in the labor market for emerging economies. In the ICT services industry in particular, language skills are key in all stages of the value chain and in many countries, firms must still pay a premium for English-language speakers.

BPS: Given that the short-term training programs focus principally on internal company protocols and software (limited portability of skills)—while leveraging general communication, problem solving and decision-making skills are developed in high school and college—additional workforce development in the BPS segment is generally carried out internally by the private sector (e.g., Chile and India). However, in the Philippines, due to the importance of the sector to the national economy and limited alternative employment opportunities, the public sector has also committed to driving workforce development for this sector.

ITS: The institutional approach to workforce development for the ITS segment is more complex, as the industry requires a depth of technical knowledge that must be accumulated through numerous training programs and ongoing education. Given the disparities in the quality and availability of technical and engineering education in the different countries studied, a variety of approaches can be identified. In India, as both the public and private educational institutions struggled to maintain high quality in the face of growing enrollment, the private sector was forced to take a highly proactive role in developing their workforces. Some companies almost bypass the tertiary education system completely by hiring second-year students and training them internally.

KPS and high value industry specific segments: Where the ICT services industry depends on high-level technical and analytical skills that are developed over time and rely on rigorous university education, multistakeholder initiatives appear to be the most prominent approach. Many of the skills required for this sector are portable across different economic sectors. Training for these skills can also strengthen general managerial competencies that are seen as important bottlenecks in emerging economies.

Workforce development requires an active and innovative commitment to investments in education and training. While a detailed discussion of these changes is beyond the scope of this paper, two key trends emerge from the case studies that warrant analysis. First, there appears to be a strong shift

away from a sole focus on education and training for this industry to firm-level provision, as firms compete for talent and offer increasingly attractive opportunities for further education to retain and attract qualified personnel. Second, government or public sector financing increasingly is provided through tax incentives and subsidies for private sector investments in workforce development. The meteoric rise of India's offshore service sector and the subsequent opportunities for developing countries to enter the global knowledge economy with higher wages, better jobs, and transfer of technology have proven to be highly attractive to developing countries.

E. New Global-Local Interactions

Lead firms in the ICT services GVC played a critical role in entry into the industry in all of the countries studied. These firms established captive centers (i.e., wholly owned subsidiaries) in developing countries to provide low-cost services to their operations in the developed world. With a significant deal of headquarter oversight, these firms facilitated the transfer to knowledge, implementing corporate training programs and streamlining services to meet their global standards. As a result of both staff turnover and the eventual sale of these captive centers to third-party providers, multinational lead firms left considerable know-how installed in these developing countries. By continuing to demand the highest levels of service controlled by certification processes such as the ISO standards (see **Appendix 1** for a summary of industry standards), many MNCs facilitate workforce development and industry upgrading around the world.

The modus operandi of the global third-party providers, and the Indian providers in particular, has been driving upgrading around the world. When these providers establish service centers, their training programs leverage the workforce development model that has been so well refined in India. Staff in other developing locations have access to tremendous online university resources and teleconference training from the main headquarters, and many senior managers are taken to India for months of onsite training. As these firms seek to expand into regional markets, such as Latin America and the Middle East, they are using these training systems to rapidly upgrade the capabilities of their regional suppliers.

The diffusion of the high standards required by leading third-party providers and their MNC clients have ensured the widespread adoption of professional certifications and industry standards in developing countries. Where providers meet both domestic and export demand, this has facilitated broader adoption of world-class standards in the domestic industry as local firms are required to raise their levels to compete with these large foreign firms. Standards have been clearly established on the low end of the value chain, in particular with respect to the growing awareness of security issue in the protection of personal data and call centers. In the higher segments of the value chain, global skills requirements in terms of English and a global perspective are important for upgrading, because there is

more interaction between the client and colleagues based abroad. Know-how, innovation, and specialized university education are more important as one advances along GVCs.

VIII. Conclusion

The ICT services industry can provide a host of opportunities for Jordan: increasing employment, facilitating the entry into the knowledge economy, and boosting trade and investment by providing access to new markets. Entry into the ICT services GVC is relatively easy in comparison with more location-bound, integrated, and capital- and scale-intensive industries such as agriculture, motor vehicles, and ICT hardware. The basic requirements of the ICT services sector include a reliable, up-to-date, low cost, and internationally linked network communications infrastructure; and language or cultural proximity to clients. Most importantly, the sector requires the availability of a well educated, high quality workforce with the ability to be “customer- and user-centric” – i.e., to understand, evaluate, respond to, and anticipate customer and user needs. The good news is these resources are important public goods regardless of industrial policy and should be aggressively pursued in any case.

Jordan’s ICT workforce and entrepreneurial class (including returnees) have many strengths. Jordan also has an active venture capital community, which is helping the private sector generate sufficient sophistication to move beyond its prior dependence on the government and international aid organizations for business. However, as Jordan moves into the more sophisticated, internationally and regionally linked ITS, BPS, and KPS services that provide higher paying jobs, the skill and infrastructure requirements will become higher and more specific, and it is important to advance as rapidly as possible in this direction.

Moving Jordan’s ICT services cluster up the ICT services value chain will lead to more than increases in export revenue—the level of knowledge transfer will also rise along with the technical skills required to perform higher-level services. This sort of positive co-evolutionary dynamic, where the local industry develops in tandem with the global industry, is precisely what is needed if JCP is to meet its goals. If Jordan’s ICT cluster is well integrated with GVCs, the rapid pace of growth and technological development in the global industry will help drive similar developments in Jordan. The JCP’s cluster approach must be wary of focusing too narrowly on improving linkages within Jordan. In the globally integrated ICT sector, better local linkages will be necessary, but insufficient, to accomplish the program’s broad development objectives.

In evaluating workforce development policy for Jordan’s ICT service cluster, stakeholders should be keenly aware of the rapid evolution and highly competitive nature of ICT services. A detailed understanding of the global and regional trends, actors, and standards in key ICT services subsectors (such as those identified in the CGGC’s ICT Taxonomy and Subsector Selection Report: software

services, web services, and KPS) will be required for the JCP to tailor workforce development efforts in ways that facilitate immediate, rapid upgrading.

The skills and qualifications of both the entrepreneurial base and the broader workforce will determine how quickly Jordan realizes its potential in the ICT services sector. Our analysis highlights the shortcomings of traditional workforce development frameworks in developing countries. To provide both the flexibility and quality to meet the skill levels required by the global industry, effective collaboration between the private, public, and educational sectors is needed. Only in this way can Jordan bridge the gap between current capabilities and the growth potential offered by global ICT service standards.

Appendix 1: Standards in ITS

Industry Quality Standards

The ICT services industry has not yet adopted any official “legal” standards; however, certain voluntary standards or best practices models have been encouraged to enhance the credibility of superior services of a third-party provider in the global market. The most popular quality standards in this industry are:

ITS: Software Development

- **CMMI.** Capability Maturity Model Integration (CMMI) is a process improvement approach that helps organizations improve their performance. CMMI was developed at Carnegie Mellon, Software Engineering Institute. CMMI focuses in the three following areas:
 - CMMI for Development (CMMI-DEV): Product and service development;
 - CMMI for Services (CMMI-SVC): Service establishment, management and delivery; and
 - CMMI for Acquisition (CMMI-ACQ): Product and service acquisition.

For example, Accenture has certified their operations in these developing countries: Argentina, Brazil, China, Czech Republic, India, Latvia, Mauritius, Mexico, the Philippines, and Slovakia, among others (Software Engineering Institute-Carnegie Mellon, 2010).

- **eSCM-SP.** The eSourcing Capability Model (eSCM) is a framework developed by ITSqc at Carnegie Mellon University designed to allow service providers to continue their organizational improvement (ITSQc, 2010).
- **ISO 9001-2000/2008.** This certification applies to specific requirements for quality management systems. This certification aims to enhance customer satisfaction through the effective application of the ISO system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements. Developing countries are leading the growth in certification.

Table A-1. Growth Rate ISO 9001:2000/2008 Certifications, Worldwide

	Dec. 2005	Dec. 2006	Dec. 2007
North America	19.4%	3.0%	-22.5%
Europe (including CEE)	17.6%	9.8%	4.2%
Australia/ New Zealand	-2.6%	3.1%	-57.6%
Africa/West Asia	53.7%	47.8%	10.5%
Central and South America	32.2%	30.6%	33.9%
Far East	11.8%	21.8%	14.8%

Source: ISO.

- **ISO/IEC 27001:2005** is designed to ensure the selection of adequate and proportionate security controls that protect information assets and give confidence to interested parties. In recent years, India has been awarded the second highest number of certifications annually after Japan. (ISO, 2009).
- **ISO/IEC 20000-1:2005** promotes the adoption of an integrated process approach to effectively deliver managed services to meet business and customer requirements. For an organization to function effectively, it has to identify and manage numerous linked activities. Coordinated integration and implementation of the service management processes provides ongoing control, greater efficiency and opportunities for continual improvement.

Appendix 2. Selected Career Trajectories in the ICT services Value Chain

Table A-2 provides an overview of how the accumulation of these skills can potentially advance employee career trajectories in the industry.

Table A-2. Selected Career Trajectories in the ICT services GVC

Entry ↑	ITS		BPS		KPS	
	Project manager software development	Master's degree + certifications + interpersonal skills			Business/account manager (representing client)	MBA+ interpersonal skills+ experience
	Team leader	Bachelor's degree + certification + interpersonal skills	Team Leader	Bachelor's degree + company certification skills + interpersonal skills	Consultant	MBA+ interpersonal skills+ experience
	Software engineer/ Developer/Programmer	Bachelor's degree + certifications	Project manager	Bachelor's degree + company certification skills + interpersonal skills	Senior or lead Business Analyst	MBA + interpersonal skills
	Test software	Associate's degree plus certifications	Supervisor	Associate degree + interpersonal skills	Business Analyst	MBA
	Technical writing	High school diploma/Associate's degree	Trainee	High school diploma/ Associate degree	Junior business analyst	Bachelor's degree
	Position	Education/Skills	Position	Education/Skills	Position	Education/Skills
	Software Development		Call Center Agent		Business Analyst	

Note: Interpersonal skills include those important nontechnical skills that are required in all human interactions. These include personal qualities such as emotional intelligence, perseverance, motivation, self-discipline, assertiveness and creativity, and social skills such as the ability to work well in a team, empathy, effective communication, conflict management and leadership (Jordan, 2009).

Source: CGGC, Duke University.

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