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ANALYSIS OF THE EXPORT POTENTIAL OF ICT AND ICT-ENABLED PRODUCTS AND SERVICES IN THE DOMINICAN REPUBLIC

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ACRONYMS

AVE	Virtual Classroom
BPO	Business Process Outsourcing
CMM	Capability Maturity Model
COPC	Customer Operations Performance Center
CPU	Central Processing Unit
CTI	Computer Telephony Integration
DR	Dominican Republic
DSL	Digital Subscriber Line
ERP	Enterprise Resource Planning
FDI	Foreign Direct Investment
HR	Human Resources
ICT	Information and Communications Technology
IIPA	International Intellectual Property Association
ISO	International Organization for Standardization
ISP	Internet Service Provider
ITES	Information Technology Enabled Services
ITU	International Telecommunications Union
INDOTEL	Dominican Institute for Telecommunications
INFOTEP	Institute for Technical and Professional Training
INTEC	Santo Domingo Technological Institute
ITES	IT- Enabled Services
ITLA	Technical Institute of the Americas
MNC	Multinational Corporations
NASSCOM	National Association of Software and Service Companies
SEE	Secretariat of State for Education
TTS	Text to Speech
OCR	Optical Character Recognition
OSHA	Occupational Safety and Health Administration
PUCMM	Pontific Catholic University Mother and Teacher
R&D	Research and Development
SEE	Secretariat of State for Education
US	United States of America

Executive Summary

Executive Summary

This report is intended to provide citizens and policy makers in the Dominican Republic (DR) with information, analysis, and suggested strategic priorities for actions which will enable the citizens of the country to more effectively participate in export-related sectors of globalize commerce directly or indirectly related to Information and Communications Technologies (ICTs).

The foundations of such effective participation lie in the current states of factors such as geographic location, political stability, ICT infrastructure, human resource availability, and legislation. The greatest deficiencies in these areas were found in the number of appropriately-educated workers, the quality of the national electricity grid, relatively low level of Internet penetration, and problems with the enforcement of intellectual property protection. Overcoming these shortcomings will require sustained and coordinated action on the part of the national government.

An evaluation of various commercial sectors related to ICTs was carried out. In the area of “ICT industries” – hardware, software, and network products and services – it was concluded that the manufacture and assembly of hardware is not especially promising for the country, although offering hardware-related services such as remote data center services shows some potential. The successful production of commercial software products will be restricted by congested and highly competitive international markets, although opportunities seem to exist in certain niches such as “open-source” software and specialized applications for niches in which competition is relatively low.

A far higher potential for commercial success was seen in the provision of software services – especially contract programming – and the provision of front-office call center services and back-office clerical work to foreign clients who either have offices in the DR, or who can be provided with services through telecommunications networks (“offshore outsourcing”). The success of the country in these areas depends critically on the availability of a sufficient number of highly-trained workers; there are a number of indirect indications that the current number of such workers is insufficient to support a large number of clients, but a systematic inventory of the skills and numbers of workers must be carried out to make the actual situation clearer, and to plan effectively for the creation of a large number of new workers to meet future demand.

Even though these areas may appear promising, it is also clear that it is possible to become trapped in “low-end” services provision characterized by low salaries, poor working conditions, and low investment in employee training. Emphasis should be placed at all times on trying to position the country’s citizens and businesses as providers of more skilled services, and to favor those foreign businesses who are oriented towards the use of such services, and the training of Dominican workers to supply them.

Comparisons were made between the DR and a group of other developing countries who are the closest competitors to the DR in the provision of services to developed country clients, and the attraction of Foreign Direct Investment (FDI). The major conclusion that came from this comparison was that the country would do well to

position itself as a “Nearshore” services provider whose attractiveness is based in substantial part on geographical proximity, familiarity with U.S. culture and society, and the familiarity that a large number of U.S. tourists have with the country, as well as on competitive labor prices and excellent international connectivity.

SWOT Analysis and Recommendations

I. General environmental factors

Population size:

Strength:	N/A
Weakness:	Small population size
Opportunity:	N/A
Threat:	Largest developing nations can produce a large number of well-trained workers in spite of generally poor educational systems; small population size makes the quality of the educational system a critical factor for competitive success
Recommendations:	*Make all possible efforts to improve the performance of the educational system and the number of secondary- and tertiary-level graduates it produces in commercially important areas*

Geographical location:

Strengths:	Geographical proximity to the U.S.; time-zone similarity to the U.S.; strong tourism industry and easy movement of Dominicans to and from the U.S. (creating a Dominican “diaspora” community)
Weakness:	Cannot benefit from “overnight work” as India.
Opportunities:	Evolution of the offshore outsourcing market and strategies for locating offshore offices of multinational corporations (MNCs) place a premium on geographical proximity, English-language skills and customer service orientation, and familiarity with developed-country cultures
Threats:	Increasing awareness in other countries in the region (and around the world) of the strategic advantages for services provision of proximity, language skills, service orientations, familiarity with foreign cultures, and diaspora communities
Recommendations:	*Market the country as a reasonably-priced “nearshoring” services provider, stressing geographical closeness to the U.S., familiarity with U.S. culture and society and the familiarity of U.S. tourists with the country; develop an outreach program to contact and communicate with diaspora members*

Image:

Strengths:	Positive image as tourist destination; absence of armed conflicts and widespread political rights suppression
Weakness:	International perception of weaker political institutions and less political stability than those of many competing developing countries
Opportunity:	Possibility of positioning country as attractive "nearshore" provider of outsourced services and location for foreign offices of MNCs
Threat:	Competition from other regional developing nations with more positive political images
Recommendation:	*"Accentuate the positive" in marketing the country by stressing location, familiarity with client countries' cultures and the lack of armed conflict and suppression of political rights that characterize some competitors*

ICT infrastructure:

Strengths:	Competitive telecommunications market; rapidly expand-ing cellular telephony; excellent international connectivity; Free Zone regime that concentrates heavy telecommuni-cations users for special attention within a national environment of substandard connectivity
Weaknesses:	Unreliable electricity; low national penetration of computers and Internet connectivity
Opportunities:	Possibility of extending connectivity within the country through new wireless technologies; existing initiatives to subsidize the purchase of computers by the public, and to provide computers and Internet connectivity in schools, provide a foundation for greatly expanded efforts in these critically important areas
Threats:	Widespread inability to participate effectively in modern commerce; lack of international competitiveness in the networked international provision of services and the attraction of ICT-related FDI
Recommendations:	*Improve the national electrical grid; investigate the extension of regular telephony and Internet connectivity at a metropolitan and national level through the use of long-range wireless technology; assure effective regulation of the electromagnetic (wireless) spectrum by the government; greatly extend the penetration of computers, Internet connectivity, and "ICT literacy" training in schools; dedicate more resources to government programs that promote the purchase of computers by the public*

Human resources and education:

Strengths:	Spanish speakers (for call- and contact-center services to Hispanics in the U.S.); unknown but substantial number of English speakers; familiarity with the cultures of the U.S. and other developing countries through the tourism industry and Diaspora; reputation for friendliness and sympathetic attention; relatively low wages
Weaknesses:	Small number of workers trained to carry out ICT-related activities (high national rate of adult illiteracy; very low rates of secondary and tertiary graduation; very low exposure to ICTs and their use in home or schools); critical lack of information about the number and skills of workers in strategically important ICT and business services sectors
Opportunities:	Existing initiatives for ICT training and for specialized training in business services areas (call center activities, English language), as well as proposed legislation which will facilitate distance learning, all provide a foundation for greatly extended activities to improve workforce quantity and quality in strategic areas – necessary to take advantage of increasing opportunities for international services outsourcing and ICT and ICT-related FDI attraction
Threats:	Increasing national dependence on low-skilled and low-paid work in extremely competitive markets, with no reasonable short- or medium-term expectations of climbing market value chains
Recommendations:	*Invest heavily in the improvement of the national educational system to improve secondary and tertiary graduation rates; greatly increase exposure to ICTs and their use in primary and secondary education; strengthen distance learning initiatives; refine and expand specialized training in ICT and business services areas; carry out a national skills and educational system inventory to provide a reliable description of the current status of the national workforce available for international services provision and the attraction of FDI, and a factual basis for future planning in these areas*

Legislation:

Strengths:	Existing “e-commerce” legislation; pending *Ley de Delitos Electrónicos;* laws and treaty signings to protect intellectual property (IP)
Weakness:	Widespread international perception that the *enforcement* of IP protection laws is deficient
Opportunities:	Passage of a strong and well-written *Ley de Delitos Electrónicos* and vigorous enforcement of existing laws and treaty

commitments related to IP protection will signal the readiness of the country to participate in higher levels of “knowledge-economy” commerce

Threats: International perception of the Dominican Republic as not respecting IP rights will deprive the country of a chance to participate in some of the most attractive areas of modern international commerce

Recommendations: *Pass well-written* Ley de Delitos Electrónicos*; vigorously enforce existing laws and treaty commitments related to IP protection and publicize this increased enforcement internationally*

II. Sectorial analysis

Note: Some weaknesses can impede the formation of local companies in most of the ICT- and ICT-enabled business sectors discussed in this document. To avoid listing these factors repetitively in descriptions of different sectors below, they are listed here once before making more sector-specific commentaries.

General impediments to local company formation:

1. Lack of funding and credit for new ICT companies
2. Lack of information about international market opportunities and competition
3. Lack of international marketing efforts to generate visibility for companies and their products and services
4. Lack of certification of product and service quality using internationally-recognized standards
5. Lack of professional ICT associations to assist in funding, investigation, marketing, etc.
6. Lack of systematic efforts to take advantage of the diaspora community in developed countries for funding, information, marketing assistance

Recommendations to foment local company formation:

1. Provide government grants or subsides for companies in strategic areas, and government assistance in finding local or foreign investors and stimulating the formation of local venture capital funds
2. Government and local businesses should search for international trade statistics and demand data for hardware, software, and office products and services in the countries of potential clients, and investigate the products, services, prices, and marketing strategies of their competition
3. Local businesses should undertake international marketing programs and searches for possible partners in foreign countries, with assistance from the government.

4. Local businesses should make all possible efforts to evaluate and implement internationally-recognized quality certification methodologies, to have workers qualify for various professional certifications, and to publicize their qualifications in the international marketplace.
5. Form ICT-sector-specific professional associations.
6. The government and private sector associations should cooperate to identify, contact and organize members of the Dominican community living abroad who might be especially disposed towards contributing financial support, technology, entrepreneurship, and market intelligence.

Sector-specific SWOT analysis

Hardware (production and assembly):

Strength:	Reasonable value of workers.
Weaknesses:	Poor electrical supply; scarcity of highly-trained engineers; lack of large chip fabrication facilities; lack of "supplier ecosystem" to support final hardware systems assembly.
Opportunities:	N/A
Threats:	Entrenched competition from established Asian providers; possibility of being able to provide only the lowest-level and lowest-paid types of services.
Recommendation:	*Do not emphasize.*

Hardware-related services (example: outsourced data center services):

Strengths:	Excellent international connectivity; low technician wages.
Weaknesses:	Lack of previous experience; small technically-trained workforce; impediments to local company formation listed on Page viii.
Opportunities:	Possibility of participating in rapidly growing market for outsourced lower-level (technical) hardware and software services.
Threats:	Competition from other developing countries in the Central American and Caribbean region
Recommendations:	*(See recommendations for stimulation of local company formation on Page x)*

Software products (commercial software):

Strengths:	N/A
Weaknesses:	Relatively undeveloped national commercial software sector; lack of information about size, skills, areas of expertise and

capacities of local commercial software companies; impediments to local company formation listed on Page ix

Opportunities: Development of commercial software for increasingly popular open-source platforms; development of software in areas of national expertise; sale of software to members of the Dominican diaspora

Threats: Global market saturation in common Microsoft Windows-based office software categories; increasing interest of software MNCs in penetrating regional markets

Recommendations: Continue and extend current government efforts to compile information about the national software sector; see also recommendations for stimulation of local company formation on Page x

Software services (example: outsourced programming):

Strengths: Excellent international connectivity; low programmer wages; possible image as reliable "nearshore" services provider

Weaknesses: Size of available labor pool; lack of information about skills, areas of expertise and capacities of local software services companies; impediments to local company formation listed on Page ix

Opportunities: Large and growing international demand for programming services`, either for local "captive" offices of MNCs, or for clients who remain in their own countries ("offshore" programming) – especially to a growing number of smaller developed-country businesses who are not natural clients for the largest foreign programming services providers in Asia

Threats: Intense international competition to provide programming services

Recommendations: Support and extend university and other training programs in strategic programming areas; gather infor-mation on the size and capacities of the programming labor force; market the country as an attractive "nearshore" software services provider; see also recommendations for stimulation of local company formation on Page x

Outsourced front-office services provision:

Strengths: Geographical location; excellent international connec-tivity; previous experience with telemarketing and customer contact center provision; English and Spanish language skills; familiarity with U.S. culture; "customer-service" culture; relatively low wages

Weaknesses: Lack of information about size and skills of relevant workforce (and indirect indications that this labor force may be limited); impediments to local company formation listed on Page ix

Opportunities: Building on existing positioning in front-office services provision to grow the local industry; moving into higher-value and higher-paid types of services; taking advantage of existing call-center and English language training initiatives to generate a larger skilled labor force

Threats: Intense international competition; possibility of being limited to providing only low-value services; possibly insufficient labor force; improvements in office automation technologies; U.S. legislation favoring domestic providers

Recommendations: Gather information on current size and capabilities of existing front-office labor force; emphasize provision of higher-level services to foreign clients outside or inside the country ("offshore" or local MNC "captive" clients); continue and expand existing language and customer service training programs; position country as "nearshore" provider of front-office services; see also recommendations for stimulation of local company formation on Page x

Outsourced back-office services provision:

Strengths: Geographical location; excellent international connec-tivity; relatively low wages

Weakness: Lack of information about size and skills of relevant workforce; lack of substantial experience in provision of outsourced back-office services; limited capacity of educational system to generate large numbers of skilled office workers; impediments to local company formation listed on Page ix

Opportunities: Increasing participation in one of the fastest-growing areas of international outsourcing

Threats: Intense international competition; possibility of being limited to providing only low-value services; possibly insufficient labor force; improvements in office automation technologies; U.S. legislation favoring domestic providers

Recommendations: Gather information on current size and capabilities of current labor force that might be able to provide common back office business services to foreign clients; emphasize provision of higher-level back-office services (accounting, human resources management, etc.); position country as "nearshore" provider of back-office services; see also recommendations for stimulation of local company formation on Page x

SECTION I
INTRODUCTION

SECTION I
INTRODUCTION

The World's human population is growing strongly, with national growth rates inversely related to the wealth of the countries involved[1]. As one of many results of this situation, the economies of less-developed countries are every day in stronger competition with each other to provide developed-country markets with those exported products and services that can be produced by growing ranks of relatively lower-paid workers, as they try to generate the resources necessary to improve nutrition, education, infrastructure, and other vital factors that contribute to the overall quality of life of their citizens. Such improvements can also be assisted through the attraction of Foreign Direct Investment (FDI), where developing countries are also in increasing competition with other countries in similar circumstances, as well as with developed countries.

The increased global penetration of telecommunications networks and computers (ICTs) has provided developed-country clients with unprecedented access to information about the global offer of products and services, so that developing country businesses are every day less able to obtain and keep foreign export customers, or attract and keep foreign investors, simply because these foreigners are unaware of the availability and quality of competing offers. On the other hand, ICTs also make it increasingly possible and economical for businesses in developing countries to make themselves visible internationally, to establish positive images and brands, and to communicate with potential and actual clients in other countries.

Likewise, ICTs can be used to create highly efficient customs services, and national and international logistics systems, which can give a country substantial competitive advantage (and the absence of which will constitute a severe competitive disadvantage). The Internet and improved logistics have even made it economically feasible for the first time to enter into relatively high volumes of retail sales of single items to individuals in other countries ("international e-commerce"), rather than limiting international commerce to the bulk shipment of merchandise to wholesalers, resellers, and industrial consumers.

The economies of those highly developed countries who are the most desirable clients for many of the goods and services produced in developing countries have been moving away from manufacture of physical goods towards the provision of intangible services. These services were at first provided by persons or organizations that were of necessity in close physical proximity to their clients, but the increasing penetration of ICTs has made it possible to provide services to clients around the world, while the services providers remain in their own country – even, at times, in their own homes. Many businesses in developed countries are deeply interested in the possibility of contracting services delivered over telecommunications networks from developing countries ("offshore outsourcing"), providing an extremely attractive opportunity for developing economies.

[1] *World Population Prospects: the 2004 Version* <www.un.org/esa/population/publications/WPP2004/2004 Highlights_finalrevised.pdf>

In general, the explosive increase in the use of ICTs in global commerce means that citizens of any country which wish to compete in commerce in an "information-based" world must be able to interact efficiently with skilled ICT users and ICT-supported businesses in other countries, use these same tools and techniques in their own businesses, and have a clear idea of the opportunities that creative ICT use can offer in the international marketplace.

There is no doubt that the market for the types of products and services that will be discussed in this document is enormous. Total global spending on ICTs is variously estimated to have been between US$1.4 trillion and US$2.1 trillion in 2003-2004[2], with global spending on ICT services alone reaching almost US$600 billion in 2004[3]. In the area of outsourcing, total global spending on ICT infrastructure outsourcing is estimated to have been US$146 billion in 2004, while application outsourcing spending for the same year is estimated to have been US$35 billion, and 2004 global spending in Business Process Outsourcing (BPO) – the most rapidly-growing outsourcing segment surveyed – was US$112 billion[4]. India has been one of the most successful developing countries in positioning itself to take advantage of this enormous tide of investment in ICT and ICT-related products and services, earning an estimated US$17.9 billion dollars in the 2004-2005 fiscal year from exports of software and IT and BPO services[5]. The current document will provide the Dominican Republic (DR) with much-needed information that will assist it to position itself among the growing ranks of other developing countries that are attempting to enjoy this same kind of success at a more modest but still highly significant level.

There is, and has been, no question that the DR must make the best possible use of ICTs and the national ICT infrastructure to maintain and improve its export competitiveness and attraction of FDI in the coming years. The author was invited to carry out a visit to the country in the middle of March of this year to discuss how this might be best achieved for ICT and ICT-related businesses in conversations with members of the private, public, and academic sectors; the results of those discussions, as well as recommendations based on these results, additional readings, and experience in other countries, are presented in the following pages.

The presentation begins with a discussion of certain general aspects of the Dominican environment that could facilitate or impede the development of a national "information economy" in which extensive ICT use will be critically important, and in which ICT-related exportation and attraction of FDI related to ICTs and their commercial use will be most successful.

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[2] *IT, Telecom Infrastructure Spending Creeping Up Worldwide* <www.networkingpipeline.com/showArticle.jhtml?articleID=22104319>; *NASSCOM Resource Center* <www.nasscom.org/resourcecentre.asp>; *IDC lowers global IT spending forecast, citing war and economic woes* <www.computerworld.com/management topics/management/itspending/story/0,10801,80001,00.html>

[3] *Market Share: IT Services, Worldwide, 2004 (Preliminary Statistics)* <www.gartner.com/DisplayDocument?doc_cd=127457>

[4] *Utility Computing as Sourcing Solution* <www.sourcingmag.com/home/home.aspx?i=02_5/18/2005_day_ 00_00>

[5] *NASSCOM Resource Center* <www.nasscom.org/resourcecentre.asp>

Succeeding sections of the document will introduce and analyze certain ICT and ICT-related products and services which are currently in substantial international demand, as well as concepts and information that allow us to evaluate the feasibility and attractiveness to Dominican businesses of providing these products and services to foreign clients. Information from this and previous discussions will also help us to evaluate the possibility that the Dominican Republic can successfully attract foreign investors who are interested either in setting up ICT-assisted companies of their own in the country, or in investing in existing companies to serve clients outside the country.

The selection of environmental factors to be considered was relatively straightforward, due to a growing consensus about the factors that are important in evaluating the attractiveness of different countries as providers of "offshore outsourcing", and a similar consensus arising from a long period of international development and refinement of "e-readiness analysis" methodologies. Some already-existing studies of e-readiness of the Dominican Republic, and preliminary documents for the development of Information Society Initiatives[6] were very useful in rapidly obtaining certain kinds of information needed for this analysis, although many other sources were also consulted, and the orientation and conclusions reached in this paper are entirely the author's own.

On the other hand, when the discussion turns to the development of ICT-related *strategies* that can be mounted on the foundations provided by the environment, we encounter a problem; since the use of ICTs is so pervasive in all aspects of modern commerce, a full discussion of the ways in which strategies might be developed and improved would require a consideration of almost all sectors of the Dominican economy – something which is far beyond the scope of the current study. As a result, it was necessary to choose certain areas of international ICT and ICT-enabled commerce for particular consideration here, while acknowledging that many other areas are left undiscussed. Fortunately, it was generally agreed upon in the discussions carried out in the study's field work that a few areas were particularly deserving of discussion.

In the first place, it is obviously relevant to discuss businesses which are directly involved in the "ICT sector" as it is usually defined – those business which create, sell, and maintain software and hardware (telephones, computers, and peripheral devices including networking hardware), or which create and maintain telecommunications networks, and/or offer services (including consulting) directly related to hardware, software, and networks. For reasons which will be discussed more fully in following pages, the most promising of these areas for the future of the Dominican Republic from the point of view of the consultant have to do with providing *hardware-related services*

[6] E.g., *The Dominican Republic: Readiness for the Networked World*. Global Foundation for Democracy and Development (2004), Santo Domingo; *Estrategia Nacional para la Sociedad de Información* (2004) <indotel. gov.do/edominicana/ eDominicana-Version-Final.pdf>; *República Dominicana: Hacia un plan estratégico para la implementación de las TICs como herramienta para el Desarrollo*. <www.edominicana.gov.do/ contenidos/archivos/Rep Dominicana- Hacia una estrategia TIC4D.doc>. See also *Comparison of E-Readiness Assessment Models* <www.bridges.org/ereadiness/ report.html> for a general discussion and comparison of methodologies.

and software, which will accordingly receive the majority of discussion about the "ICT sector".

The attractiveness of providing *services* extends beyond the ICT sector itself, into the area of providing services to international clients in a wide range of "non-ICT" areas which are nonetheless made possible and profitable by the creative use of telecommunications networks and computers – the international provision of "ICT-enabled services"[7], as opposed to the "ICT services" of the previous paragraph. This is attractive to the Dominican Republic not only because of the wave of interest in "international outsourcing" in developed countries (and among competitors in developing countries), but also because the country already has substantial experience in providing one type of outsourced service through the operation of "call centers" or "customer contact centers", and is beginning to see a rise of interest in a second area – contracted programming services for foreign clients.

Given clear present interest in these two areas, the possibility that a far wider range of services could be offered in the future, and the particularly strong fit between international services provision and the presence of a first-class international telecommunications infrastructure in the country, it was readily agreed by participants in our discussions that services outsourcing was especially deserving of consideration in this study.

[7] Also commonly referred to as "IT-enabled services" (ITES)

SECTION II
GENERAL ENVIRONMENTAL FACTORS

SECTION II
GENERAL ENVIRONMENTAL FACTORS

Attempts to define realistic strategies for modernization of the Dominican economy in the coming years must take into account the resources that are currently available, and barriers to growth and transformation of the economy that may be encountered during the process of modernization. Certain aspects of the Dominican Republic and its economy and society are especially important in this regard when we are considering the promotion of ICT and ICT-enabled services exports, and capturing FDI based on the possibility of participating in profitable ICT and ICT-related activities.

A) Location

The huge increase in the global penetration of economical and reliable telecommunications has in many ways made the physical location of participants in international commerce irrelevant. However, even in situations where the items being bought and sold are completely digital, and can be marketed, sold, delivered, and serviced over telecommunications networks, the relative locations of providers and consumers can have important commercial implications.

In the area of outsourced services provision, for instance, customer representatives may travel at least occasionally to the sites of their services providers in other countries for purposes of evaluation of employees and facilities, and in-person coordination of tasks. In addition, representatives of local providers may need to travel to the countries of their clients to receive training, define strategies, and so forth. In these situations, the time, cost, and inconvenience of personnel travel between the client's country and the provider's country become an important factor. The Dominican Republic is well-situated to minimize travel time and costs from the United States, along with Canada, Mexico, Central America, and other Caribbean countries.

Time zone differences between clients and providers can also be extremely important. For instance, operating a customer contact center which provides live interaction between customers and customer agents means that the agents must be awake and available when customers need them; if the majority of contacts are handled during customer daylight hours, then it is much simpler to staff a contact center if local time in the contact center location is at least close to the time of the customers' location. Indian customer contact center operators, who have been extremely successful in serving large U.S. businesses, are now finding that their employees are becoming strongly dissatisfied with a job that requires them to work during the depths of the local night[8].

Marked time zone differences can also be an advantage, if clients want to "hand off" work at the end of their own work day, or provide some kind of services coverage during times when regular employees are out of the office. Turning again to India for an example, some U.S. medical facilities have found it to be extremely convenient to contract the services of Indian radiologists to study x-ray plates during the U.S.

[8] *Call Center Maladies* <www.dqindia.com/content/dqtop202k4/empSurvey2004/2004/104110814.asp>

nighttime, when local radiologists are either out of the facilities, or otherwise in short supply[9].

Given the Dominican Republic's time zone, the country should have a strong competitive advantage against more distant competitors – in Europe or Asia, for instance – in providing a stable and well-trained workforce for live interaction with customers in the U.S. during U.S. daylight hours.

When trying to attract foreign investors, it is sometimes advantageous if a country can present itself as a "gateway" to entire regions that investors are interested in – a strategy that Ireland has long followed with respect to the European Union, and Singapore has stressed with respect to access to Asia. Costa Rica has also had some success in attracting regional headquarters of multinational corporations (MNCs) by positioning itself as a central location within Central America, and an entry point to extending business coverage to South America.

In the case of the Dominican Republic, it is possible to think of presenting the country as a gateway to the Caribbean and Latin America, although it would face strong competition from Miami (although labor costs are much higher in the U.S.), Costa Rica, Chile, and Puerto Rico for the Latin American gateway position, and from English-speaking members of the British Commonwealth (Bermuda, Jamaica, Barbados, etc.) for the Caribbean gateway position.

Perhaps the outstanding strength that the Dominican Republic would have if it chose to pursue this strategy is the quality of its international telecommunications infrastructure; when trying to attract companies which need to continuously transmit and receive large amounts of information, the fact that the country has far more international transmission capacity than countries like Costa Rica and Jamaica, and a competitive telecommunications market, makes the country highly attractive[10]. The leading competitor in the Caribbean region in this niche would almost undoubtedly be Puerto Rico, which is a landing point for a large number of submarine cables (although once again, higher local salaries might be a competitive disadvantage).

B) Political Environment

The overall political and social environment of a country can have an enormous local impact on the degree to which its ICT sector can grow and flourish. In addition, international perceptions of the stability and transparency of a foreign society often heavily influence foreign investors' decisions on whether to invest in ICT-sector companies in that country, or locate their own businesses there.

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[9] *Hospital Services Performed Overseas* <www.washingtonpost.com/wp-dyn/content/article/2005/04/23/AR2005042301551.html>

[10] See *When an Ex-Monopoly Stays a Monopoly: The Jamaican Example* <http://telexchange.net/news/CPT2003032.pdf> for information about the lack of Jamaican telecommunications competitiveness.

While it is difficult to assign exact values for the amount of "freedom" that a country's inhabitants enjoy, or on the "quality" of a nation's business legislation, we will still profit from considering a few well-known indices of social and political factors compiled by international organizations. This not only gives us a rough idea of the relative positioning of various countries with respect to stability and transparency, but also gives us a very good idea of foreign *perceptions* of these factors, since the publications that contain these indices are among the sources most consulted by foreign governments, businessmen, and investors. This comparative information is presented in Table 1, on the next page.

In this and following tables with similar formats, various attributes of the Dominican Republic will be compared to similar attributes in 23 other countries, including Canada, seven countries in Asia, eight in Europe (including Israel), and seven others which together with the Dominican Republic are in the area referred to as "Latin America and the Caribbean". We do not include information about most-developed nations in these tables because the Dominican Republic is not trying to compete with most-developed nations so much as it is trying to serve their markets. All of the countries in Table 1 are in clear competition with each other to supply developed countries with the ICT and ICT-enabled products and services that we will be discussing in the following pages. Information about Puerto Rico is not included because, although it is indeed a strong competitor of the Dominican Republic in many areas, comparative information about the country is scarce or non-existent in the sources used here due to its extremely close commonwealth relationship with the United States, which results in frequent aggregation of Puerto Rican data with that of the U.S.

Only four of the countries considered – Singapore, Ireland, Israel, and Canada – can be regarded as relatively wealthy. Most of the Asian countries are the principal "early leaders" in the provision of ICT and ICT- enabled products and services from developing to developed countries, while Thailand and Vietnam are relatively recent entries in this market. In the European group, Ireland and Israel were likewise early providers of international ICT products and services, while the rest of the group (members of the ex-Soviet Bloc of countries including Russia and Central Europe) have very recently entered into international ICT sector competition. Some of the countries in the Latin American and Caribbean group have provided international call center services for developed-country clients for more than a decade, but all of these countries are now trying to position themselves as serious providers of a far wider range of ICT and ICT-enabled products and services.

The "Political Institutions Index" is a component of the World Economic Forum's well-known Global Competitiveness Index, and is an attempt to indicate the relative degree of political transparency and openness of different countries based on the answers given by business leaders and entrepreneurs in each country to a series of questions about the judiciary, property rights, public procurement, and corruption. The Dominican Republic ranks 64th in the entire sample of 102 countries covered in the study and 18th in the group of 24 countries in Table 1. The countries that project the strongest image of honesty and dependability to foreign clients and investors are Singapore, Israel, Chile,

Canada, and Ireland, while the least dependable countries appear to be the Russian Federation, the Philippines, Romania, and Argentina.

Table 1: Political Environment
(sorted within country groups by public institutions rank)

	Country	Public institutions rank[11] (among 102 countries)	Political stability rank[12] (among 184 countries)	Freedom[13]
Asia (n=7)	Singapore	6	16	Partly Free
	Malaysia	34	71	Partly Free
	Thailand	37	67	Free
	China	52	89	Not Free
	India	55	144	Free
	Vietnam	61	71	Not Free
	Philippines	85	127	Free
Europe (n=8)	Israel	15	159	Free
	Ireland	25	11	Free
	Hungary	33	22	Free
	Czech Rep.	47	29	Free
	Poland	58	56	Free
	Bulgaria	62	61	Free
	Russian Fed,	81	124	Not free
	Romania	86	77	Free
Latin America and the Caribbean (n=8)	Chile	19	27	Free
	Costa Rica	49	22	Free
	Mexico	50	89	Free
	Brazil	53	96	Free
	Dominican Rep.	64	94	Free
	Jamaica	70	105	Free
	Panama	71	77	Free
	Argentina	88	141	Free
	Canada	24	23	Free

The "Political Stability Index" is based on multivariate analysis of subjective assessments by a number of international organizations, NGOs, and risk rating agencies, and is intended to express the relative probabilities that given governments will be "destabilized or overthrown by possibly unconstitutional and/or violent means, including terrorism". Projecting an image of political stability is vital, given the very high level of worries by developed-country clients and investors in this area in the post-9/11 environment.

[11] G*lobal Competitiveness Report 2003-2004: Executive Summary* <www.weforum.org/pdf/Gcr/GCR_2003_2004/Executive_Summary.pdf>

[12] *Political Stability* <humandevelopment.bu.edu/dev_indicators/show_info.cfm?index_id=117&data_type=1>, see *Governance Indicators for 1996–2002* <www.worldbank.org/wbi/governance/pubs/govmatters2001.htm> for methodology

[13] *Annual Survey of Political Rights and Civil Liberties <www.freedomhouse.org/research/freeworld/2004/table2004.pdf>*

The Dominican Republic ranks 94th out of 184 countries in the entire study sample in this regard, and 17th out of 24 in the countries in Table 1. Leaders once again include Ireland, Singapore, Canada and Chile, while Hungary, Costa Rica and the Czech Republic also have highly positive images. Russia, the Philippines, and Argentina are once again near the bottom of the list, while India and Israel – a leader in the Political Institutions Index – are worst off. With the exception of Argentina, which is commonly regarded as highly unstable for economic reasons, all of the other countries at the bottom of the list are affected by regional conflicts and sectarian violence.

The Freedom index is based on a checklist evaluation of political rights and civil liberties derived from the Universal Declaration of Human Rights. The most obvious feature of this index is the high concentration of "partly free" and "not free" scores in the group of Asian countries – only the Russian Federation receives an unsatisfactory rating outside of the Asian group.

Based on the previous discussion, the Dominican Republic will apparently be perceived as less transparent and politically stable than many of its competitor nations. It would do best to compare itself more to its competitors in the Latin American and Caribbean region than to those outside the region in these regards, although it would also be useful to stress its lack of involvement in regional conflicts, and the absence of political suppression that occurs in many competing Asian countries and the Russian Federation.

C) ICT Infrastructure

Obviously, in order to carry out activities that will be directly related to or facilitated by ICTs, Dominican businesses must have easy and economical access to a reliable national electrical system, and an ICT infrastructure – telephones, computers, and telecommunications networks.

The best information available about penetration of ICTs at a national level comes from the 2002 National Census of homes. These figures show that 34.15% of all homes in country have telephones, 5.45% have computers, and 2.81% have access to the Internet. Table 2, below, shows the percentage of homes in the 14 municipalities of the country that are in the top 10 of all municipalities with regard to percentage of homes with telephones, with computers, and/or with Internet access accounts.

As can be seen, homes in the metropolitan areas of Santo Domingo and Santiago are the leaders in all areas of ICT penetration, and, with the exception of the municipality of Las Terrenas, highest ICT penetration is concentrated in two areas – along the south-central coast and in a region stretching northward from Santiago to the northern coast (see Appendix A for a map of the provinces that contain these municipalities).

Although there are no comparably detailed figures for *businesses* in the country, we may safely conclude that the highest concentrations of business users of ICTs are likewise concentrated in and near major metropolitan areas, although the specific

percentages of ICT penetration are undoubtedly higher for businesses than for homes, and commercial activities in areas such as tourism and agriculture may result in "pockets" of higher ICT penetration in relatively remote areas. The concentration of basic infrastructure in metropolitan areas is in no way unusual, or an indication of under-development of the country – the economics of construction of telecommunications networks dictate that even the most developed countries in the world show the same general pattern. The absolute percentages of telephone, computer, and Internet access penetration are, however, well below similar figures for other countries that are competing with the Dominican Republic, as we shall see below.

Table 2:
ICT Penetration in Dominican Homes[14]
(% of homes with telephones, computers, or Internet)

Region	Province	Municipality	Telephones	Computers	Internet
Distrito Nacional	Distrito Nacional	Santo Domingo De Guzman	60.22%	18.66%	11.90%
Distrito Nacional	Santo Domingo	Santo Domingo Este	54.31%	9.24%	3.91%
Distrito Nacional	Santo Domingo	Santo Domingo Oeste	50.14%	7.71%	3.14%
Norcentral	Santiago	Santiago	46.95%	8.25%	4.39%
Noroeste	Valverde	Mao	42.35%	4.16%	1.80%
Este	La Romana	La Romana	40.92%	5.31%	1.99%
Distrito Nacional	Santo Domingo	Santo Domingo Norte	40.65%	5.04%	2.11%
Norcentral	Puerto Plata	Puerto Plata	38.71%	5.37%	2.50%
Valdesia	Peravia	Distrito Municipal Sabana Buey	38.58%	0.85%	0.68%
Valdesia	San Cristobal	Bajos De Haina	37.21%	3.24%	1.16%
Este	San Pedro De Macoris	San Pedro De Macoris	36.70%	4.49%	1.94%
Norcentral	Puerto Plata	Sosua	34.16%	5.00%	2.44%
Valdesia	San Cristobal	San Cristobal	34.06%	4.28%	1.40%
Nordeste	Samana	Las Terrenas	29.77%	3.48%	2.95%

The household census figures do not divide "telephones" into fixed-line and cellular services, but statistics available on the Web site of INDOTEL[15], the state telecommunications regulator, indicate that in 2004 there were approximately 10.6 fixed-line telephones per 100 inhabitants of the country, and 28.8 cellular telephones per 100 inhabitants; cellular accounts are increasing more than 6 times faster than fixed-line accounts (19.4% vs. 3% per year). This strong growth in cellular lines as opposed to fixed lines is also a global phenomenon; telecommunications providers in developed countries are struggling to adapt themselves to their customers' decreasing use of fixed lines, and developing countries are finding that cellular telephony is by far the best way to extend telephone coverage with limited resources[16].

Even though the current penetration and growth rate of cellular telephony is excellent news for the country, the far lower penetration of fixed lines is a problem, since fixed

[14] *Resultados Definitivos VIII Censo de Población y Vivienda 2002, Vol. II: Características Viviendas y Hogares* <www.one.gov.do>
[15] <www.indotel.gov.do/adjuntos/estadisticas.aspx>
[16] *They Can Hear You Now* <www.latimes.com/technology/la-fg-cellular21oct21,1,378394.story?coll=la-headlines-technology>; *The real digital divide* <www.economist.com/printedition/displaystory.cfm?Story_ID =3742817>

phone lines are the most popular way of connecting to the Internet – either with temporary "dial-up" connections, or permanent "broadband" connections using Digital Subscriber Line (DSL) technology; it is worth noting that representatives of telephony providers have stated that most of the existing fixed telephone lines can support DSL services, which is an extremely positive finding. INDOTEL figures show that slightly more than 103,000 out of a total of 106,000 Internet accounts currently depend on telephone lines; this total number implies a per-capita Internet penetration rate of slightly more than 1 citizen in every 100.

This figure is low compared to those of competing countries. The gap between 1% of average Internet penetration and 10% of average fixed line penetration shows that the low Internet penetration figure cannot be attributed solely to a shortage of appropriate telecommunications infrastructure; a significant part of the difference may be due to factors which have been found to be important in other countries in similar circumstances, such as the high cost (or perceived high cost) of computers, the lack of basic computer skills, the high cost (or perceived high cost) of connectivity, and/or a lack of understanding of the advantages of using the Internet. However, it is still certain that the infrastructure that connects homes and offices to main network "backbones" must be greatly extended in the near term to permit the country to compete seriously in modern markets.

Expanding fixed telephone line coverage is expensive and relatively slow, while using traditional dedicated solutions such as T1 and fractional T1 lines is unreasonably expensive for clients in the presence of more modern "broadband" alternatives. The use of cable television infrastructure is not likely to provide a widespread solution either; the only relatively economical and quick-to-implement strategy that seems to be available is the use of wireless connectivity. Companies such as Centennial and Tricom are already providing a limited wireless equivalent of fixed-line service to homes and offices in some metropolitan areas, but the true potential of wireless connectivity can be seen in a worldwide trend towards converting entire towns and cities into wireless broadband "hot spots"[17] – often done by municipal governments rather than traditional telecom-munications providers – and the extension of wireless Internet connectivity to remote rural areas[18]. The possibility of similar initiatives in the Dominican Republic should certainly be investigated.

The state of international bandwidth availability is one of the undoubted high points of the country's telecommunications infrastructure. Representatives of the largest international telecommunications provider in the country state that the Dominican Republic has the highest per-capita international bandwidth in Latin America, and the third-highest amount of international connectivity in Latin America in absolute terms. This bandwidth is provided in a ring configuration, which provides redundant

[17] *U.S. cities set up their own wireless networks* <www.nytimes.com/reuters/technology/tech-life-wireless.html>; *Taipei gets world's largest Wi-Fi grid* <edition.cnn.com/2004/TECH/internet/11/22/taiwan. cybercity.reut/index.html>
[18] *Reaching the far reaches of the world -- without wires* <edition.cnn.com/2004/TECH/internet/10/18/ wireless.rural/index.html>

transmission capabilities in case of problems in isolated locations along the transmission paths.

It is important to remember when considering the adequacy of in-country Internet connectivity in the short term that while the penetration of fixed lines is far higher in metropolitan areas than elsewhere, it is always possible to *concentrate* businesses outside metropolitan areas that have needs for Internet connectivity – the Free Zones of the country are excellent examples of situations in which users with demands for reliable electricity and high-speed connectivity are clustered together and connected to the Internet with a minimum of problems; this same strategy can be used in office centers, apartment buildings, and any other metropolitan or non-metropolitan situation in which many users are close together, and can share a limited number of high-speed connections. Occasional users of the Internet can also go to government-sponsored telecenters or private-sector Web cafés, but while these may promote a vital "Digital Culture" in the country, this strategy of moving users to the technology, rather than the technology to the users, is far from an acceptable solution for full-time ICT-enabled commerce.

The Free Zones are also appreciated by their occupants because they provide an environment in which electric supplies are reliable; given the frequent outages of sections of the national power grid, and the high cost of providing backup electrical supplies on a business-by business basis, the strategy of sharing expensive generating resources among groups of users is extremely useful. As Internet-based commercial activities related to exports begin to spread throughout the country, the wide availability of dependable electricity will assume ever greater importance.

We must once again consider how the Dominican Republic compares to its closest competitors in the provision of ICT and ICT-enabled products and services. Table 3, on the next page, uses the same format as Table 1 to present comparative information on the most basic indicators of ICT infrastructure penetration – cellular and fixed-line telephony, computers, and Internet access accounts.

We can see that the Dominican Republic ranks near the bottom of all of these countries in terms of total telephone penetration, above only the Philippines, Vietnam and India. In the area of fixed-line telephony, it ranks above these three countries and Thailand, and in the area of cellular telephony, it is 15th in the group of 24 countries. Using the computer penetration figure from the ONE 2002 household survey, the Dominican Republic ranks 16th out of 24 competitor countries in computer penetration, and using the ITU's generous figure of 6.07 Internet accounts per 100 citizens the country ranks 19th out of 24 competing nations.

Al least two of the competitor countries in Table 3 have implemented national initiatives to provide citizens with Internet-connected computers at low prices. In Costa Rica, the Ministry of Science and Technology has implemented Programa Acceso[19], with the assistance of private-sector partners such as the Intel Corporation and Microsoft, and

[19] *Programa Acceso: Tecnología para Costa Rica* < www.micit.go.cr/programas/acceso.htm>;

public-sector allies such as state banks and the state monopoly Internet access provider. In Brazil, the PC Conectado program[20] is aimed at providing economically-priced computers with "open-source" software rather than standard commercial operating systems and applications from companies such as Microsoft.

Table 3: Basic ICT Infrastructure Indicators
(telephones, computers, and Internet access accounts / 100 citizens;
sorted within groups by total telephony penetration)

		Telephones (2003, except where noted)			Computers	Internet	
	Country	Total	Fixed	Cellular	2002	2003	2002
Asia (n=7)	Singapore	130.28	45.03	85.25	62.20	50.88	50.44
	Malaysia	62.36	18.16	44.20	14.68	34.41	31.97
	Thailand	49.91	10.49	39.42	3.98	11.05	7.76
	China	42.38	20.90	21.48	2.76	6.32	4.60
	Philippines	31.07	4.12	26.95	2.77	--	4.40
	Vietnam	8.78	5.41	3.37	0.98	4.30	1.85
	India	7.10	4.63	2.47	0.72	1.75	1.59
Europe (n=8)	Israel	141.89	45.82	96.07	24.26	--	30.14
	Ireland	137.10	49.13	87.96	42.08	31.67	28.03
	Czech Rep.	132.49	36.03	96.46	17.74	30.80	25.63
	Hungary	111.74	34.86	76.88	10.84	23.22	15.76
	Bulgaria	84.69	38.05	46.64	5.19	20.58	8.08
	Poland	76.97	31.87	45.09	10.56	23.25	23.00
	Romania	52.36	19.94	32.42	8.26	18.41	10.10
	Russian Fed.	50.20	25.27	24.93	8.87	--	4.09
Latin America and the Caribbean (n=8)	Jamaica	84.97	16.92 *	68.05	5.37	--	22.85
	Chile	73.24	22.11	51.14	11.93	27.20	23.75
	Brazil	48.65	22.29	26.36	7.48	--	8.22
	Costa Rica	45.89	27.77	18.12	19.72	28.76	19.31
	Mexico	45.44	15.97	29.47	8.30	12.00	9.97
	Argentina	39.64 *	21.88 *	17.76	8.20	--	11.20
	Panama	38.96	12.20	26.76	3.83	6.16	6.18
	Dominican Rep.	38.71	11.54	27.16	5.45 **	10.24	6.07
	Canada	107.04	65.14	41.90	48.70	--	48.39

Source: World Telecommunication Indicators Database
(International Telecommunication Union, 2003)

** Data from 2002*
*** Data from ONE National Household Survey*

In the Dominican Republic, the Secretariat of State for Education, Science and Technology has made a valuable start in this direction with a fair in which Dominican teachers were offered a RD$5,000 subsidy and favorable financing terms towards the purchase of a PC and printer, with a free one-year Internet access service to the

[20] *Brazil: Free Software's Biggest and Best Friend* <www.nytimes.com/2005/03/29/technology/29computer .html>

Internet[21]; this approach must be extended to a far wider audience if the necessary impact is to be created.

The one cause for optimism that comes from the initial comparison of the Dominican Republic with other countries in Table 3 is that three of the acknowledged leaders in global outsourcing (India, China, and the Philippines) and two of the leading attractors of FDI (India and China) are ranked below the Dominican Republic in all cases except that of fixed-line telephony, in which China leads the Dominican Republic by a substantial margin. The strategy that these countries use to overcome their infrastructure deficiencies is that of concentrating their ICT-intensive industry in high-technology clusters, "software parks", and Free Zones – a solution with which the Dominican Republic is quite familiar.

D) Human Resources and Education

Without a well-educated, and educable, workforce, no country will be able to compete internationally in the areas which we will be considering, even if they have access to unlimited amounts of telephony, computers and Internet connectivity.

We can begin this discussion by considering Table 4, on the next page, which presents basic educational data for 22 of the 24 countries that were covered in previous tables for which data is available concerning adult literacy and net primary and secondary enrollments in schools; this data gives us an idea of how well the educational systems of the different countries are functioning at a general level.

The Dominican Republic ranks 21st out of the 22 countries for which relevant data is available in terms of adult literacy, above only India. It ranks 7th in terms of net primary enrollment, but last in terms of net secondary enrollment – an indication of an enormous dropout rate between primary and secondary education[22]. In this case, there is no solace to be had from comparing the country to India or China; not only is the Dominican Republic's secondary enrollment figure less than that of either of those countries, but India's far lower adult literacy rate is to some degree compensated for by the sheer size of the country, which means that even if a low *percentage* of adults is literate, an enormous *absolute number* are. Meanwhile, in the absence of great size, the European group and Canada have very high secondary enrollment; only Costa Rica is generally similar to the DR in terms of size and low secondary enrollment.

The Dominican Republic's human resources should be familiar with the basic use of computers and the Internet to participate in modern ICT and ICT-related commerce. Given the low penetration of computers and Internet access in homes, the formal educational system is the best hope that most developing countries have of training their children in these areas. Somewhat less than 10% of Dominican public schools

[21] *Doing Business In the Dominican Republic* <www.buyusainfo.net/docs/x_1553961.pdf>
[22] See also *Meeting the Millennium Development Goals in the Dominican Republic: Identifying Critical Areas for Policy Action* <www.earthinstitute.columbia.edu/cgsd/documents/suki_dr_mdg.pdf>

have ICT centers[23]; this compares favorably to the situation in Costa Rica, a leader in software development and outsourcing services in Central America, where 11% of public primary schools have computer laboratories and 5% have Internet access[24]; however, any optimism which this comparison gives us must be tempered somewhat when reading reports of widespread problems with finding, training, and keeping teachers for the ICT centers[25].

Table 4: Basic Education Indicators and Population (2001)
(Singapore and Russia excluded for lack of enrollment figures;
sorted within groups by net primary enrollment)

				% Net Enrollment	
	Country	**Population (Millions)**	**% Adult literacy**	**Primary**	**Secondary**
Asia (n=6)	Malaysia	25.2	88.70	95.20	69.40
	China	1,257.0	90.90	94.60	70.00 *
	Vietnam	81.4	90.30	94.00	65.30
	Philippines	81.1	92.60	93.00	56.50
	Thailand	63.1	92.60	86.30	48.00 *
	India	1,056.9	61.30	82.80	60.00 *
Europe (n=7)	Israel	6.8	95.10	99.90	88.90
	Poland	38.6	99.70	98.00	90.80
	Ireland	4.0	99.00 **	95.50	82.40
	Hungary	10.3	99.30	90.80	92.10
	Bulgaria	7.5	98.50	90.40	86.70
	Czech Rep.	10.1	99.00 **	88.50	89.50
	Romania	21.7	98.20	88.40	80.00
Latin America and the Caribbean (n=8)	Argentina	37.0	96.90	99.00	80.80
	Mexico	102.1	90.50	99.40	60.20
	Panama	3.1	92.10	99.00	62.40
	Dominican Rep.	7.8	84.00	97.10	40.80
	Brazil	176.0	86.40	96.50	71.60
	Jamaica	2.6	87.30	95.20	74.90
	Costa Rica	4.2	95.70	90.60	49.90
	Chile	14.7	95.90	86.50	78.60
	Canada	31.7	99.00 **	99.60	97.60

Source: World Bank EdStats Database 2001 (devdata.worldbank.org/edstats/cd2.asp)
** World Bank Data from 1998; last available year*
*** World Bank Estimate*

The situation is undoubtedly better in the private schools of the country, some of which have extremely well-developed ICT training programs, but since these educate less than 10% of all students (see Reference 23), we must conclude that the great majority

[23] *República Dominicana: Hacia un plan estratégico para la implementación de las TICs como herramienta para el Desarrollo* < http://www.edominicana.gov.do/contenidos/archivos/Rep Dominicana- Hacia una estrategia TIC4D.doc>
[24] *Tecnologías de Información y las Comunicaciones (TICs) y el futuro desarrollo de Costa Rica: El desafó de la exclusión* < www.caatec.org/publicaciones/COSTA_RICA_DIGITAL_3.pdf>
[25] *The Dominican Republic: Readiness for the Networked World*. Global Foundation for Democracy and Development (2004), Santo Domingo

of the country's younger students receive no formal training in ICT use. Vital programs such as the SEE-Verizon Aulas Virtuales para la Enseñanza (AVEs) and the SEE-INDOTEL secondary school laboratories must be supported and constantly extended to the maximum possible degree if this situation is to be improved.

The 2002 National Census indicates that approximately 10% of the population had at least entered university studies in that year, and that approximately 4.5%, or slightly more than 388,000 people, had completed at least a bachelor's degree, of which 58,000 had also completed a higher degree[26]. These figures give us some idea of the overall size of the "highly-educated workforce" which is a necessity for transforming developing economies into "knowledge-based" economies; however, we also need to form some idea of the relative availability of graduates in different areas.

The type of human resource availability most commonly discussed in e-readiness assessments has to do with ICT workers, ranging from lower-level computer hardware technicians, user support specialists, and systems operators, to the highest levels of computer science and electronics engineering specialists. The best figure available for the total size of the highest levels of this segment of the population appears to be 4,000 persons with a college degree in a "technical" (ICT) area (see Reference 23); this seems rather low, considering that conversations with representatives of INTEC and the Pontificia Universidad Católica Madre y Maestra (PUCMM) give us reason to believe that the total number of university graduates in ICT-related specializations in the country may approach 1000 persons per year.

Not all ICT specialists need to have university degrees in their areas of expertise, and a number of organizations are working to provide less extensive, but still highly useful, training in ICTs. INFOTEP, for instance, has at least 60 educational centers which provide some computer literacy training, 20 which provide more in-depth training in programming and hardware, and 4 which provide training in telephony technology; these last two programs may inject a few hundred lower-level technicians into the economy every year. Similar programs in other public and private institutions may raise the numbers of such "technical", as opposed to "computer literate", human resources created into the low thousands per year.

The Dominican Republic is the home of the Instituto Tecnológico de Las Américas (ITLA), located in a leading-edge Cyber Park, which provides training activities not only in the area of ICTs *per se*, but also in the use of high technology in industry, government, and other areas. One source[27] credits them with having carried out training in areas such as critical reasoning, fundamentals of ICTs, and use of ICTs in government and education that reached 35,000 persons in 2½ years; while the number of strictly technical graduates that they produce (as opposed to those trained in basic computer literacy and the use of ICTs in fundamentally non-ICT areas) is undoubtedly

[26] *Resultados Definitivos VIII Censo de Población y Vivienda 2002. Vol IV: Características Educativas, Cuadro 07* <www.one.gov.do>; Reference 23, above, gives a figure of 340,000 university graduates, and 40,000 with a higher-level specialization, master's degree, or doctorate.
[27] *Gobierno-e & Estrategia Nacional de TIC* <www.seescyt.gov.do/contenidos/archivos/GobiernoE.ppt>

far lower, this is one of the most hopeful signs encountered that the Dominican Republic is beginning to generate ICT-familiar and ICT-skilled human resources on the scale that will be needed in the future. Improved provision of distance learning, supported by the proposed *Reglamento de Educación Superior no Convencional*, will hopefully also assist in the creation of the volumes of educated workers that the country so strongly needs to modernize the national economy.

The ITLA is also noteworthy for working with hardware and software suppliers to provide certifications in specific technologies, such as Cisco networking equipment, and for working to form an alliance with the Stevens Institute of Technology in the United States and the PUCMM to provide advanced training in the use of technologies for the creation and strengthening of businesses. Other universities are following the same strategies: INTEC offers technology certification programs (as well as a new graduate-level degree in telecommunications), and the PUCMM is also coordinating with the Rochester Institute of Technology in the United States to provide a master's degree program in telecommunications technology. As we will see, this type of internationally-recognized certification is vital in convincing international clients of the quality of the manpower that the country is offering them.

All of the programs mentioned in the last paragraphs are not yet generating high volumes of university graduates in technical areas, and university graduates trained in the use of ICTs for non-ICT goals, but they certainly serve as crucial leaders and examples in the unfolding process of modernization through the use of ICTs. The ITLA is also involved in the creation of "centers of excellence" in training in the areas of call centers and software programming. These, together with the new government initiative to provide "English immersion courses", will also undoubtedly contribute greatly to improve the qualifications of Dominican workers to participate in call centers and other types of outsourced services provision.

It is extremely important to note that the greatest impact of ICTs on increases in national productivity will almost certainly occur, not in the growth of "ICT industries" *per se*, but rather in the impact that ICTs will have in other sectors of the economy. For this reason, although it is indeed vital to produce adequate numbers of technically-trained human resources, it is even more important to produce people who are well-trained in their own areas of interest, and who also know how to take advantage of ICTs to achieve their goals with increased efficiency and economy. This kind of human resource is one of the most attractive things that the country can have when trying to attract FDI, and in providing outsourced services through the Internet.

In this context, it becomes vital to discover how many graduates are being produced in areas other than that of ICTs. One source (see Reference 23) states that in 1999, 70% of enrollment in higher education in the Dominican Republic was in 7 areas – accounting (13%), education (12%), law (11%), marketing (10%), information technology (10%), administration (7%), and medicine (6%). Accounting, marketing, and administration are classic areas in the new market for "Business Process Outsourcing"

(BPO) services, and niches also exist for legal and medical services in the outsourcing marketplace.

If these disciplines remain popular in the present, and the students that are enrolled in these programs graduate with a good understanding of basic computer and Internet use, then the Dominican Republic is generating an extremely valuable resource for future international commerce and FDI attraction. Unfortunately, although there is some information about the number of workers in a few very general categories in the 2002 National Census, there does not appear to be any centralized source of information about the availability and capabilities of human resources in the country that would be truly useful in assessing the potential of the country's labor supply in the face of economic modernization. The creation of an organization similar to Ireland's Expert Group on Future Skills Needs <www.skillsireland.ie> would be an enormous advantage in future planning efforts.

E) Legislation

As commerce changes to take advantage of ICTs, and becomes increasingly international, it is often necessary to modify and extend existing legislation and pass new laws in order to accommodate new realities.

One of the most common barriers to improving ICT-related competitiveness in developing countries is the existence of legally-sanctioned telecommunications monopolies, either state-owned or private. While monopoly providers may have had good reasons to exist in the past, the present and future depend vitally on widespread, high-quality, and reasonably-priced telecommunications services, and there is substantial and growing evidence that competitive telecom-munications markets deliver this kind of service far better than any type of monopoly.

Fortunately, the Dominican Republic now has an open telecommunications market; the positive results of this situation can be seen in the statistics for cellular penetration and growth cited previously, the number of competing cellular providers in the country, and a comparison of the cellular situation in this country to that of Costa Rica, where the monopoly telecommunications provider has been unable to keep up with demand for cellular telephones, and is generating an increasingly large waiting list[28]. There is substantially less competition in other sectors of the national telecommunications market, but such competition is at least permitted.

In INDOTEL, the country also has a legally-defined telecommunications regulator to protect citizens against possible abuses by telecommunications providers, and to assure real competition. Given the increasing importance of wireless communications for data as well as voice transmissions, INDOTEL should also be extremely effective in the administration and regulation of the use of the electromagnetic spectrum for wireless communications.

[28] *Agotados celulares en el pais* <www.nacion.com/ln_ee/2005/febrero/08/pais2.html>

The country is also well-situated in other legal areas. Traditional commercial codes and legal definitions of concepts such as “contracts”, “identity”, “signatures”, and “witnesses” are often found to be inadequate when Internet commerce begins to gain importance in a country, and the passage of new “electronic commerce” legislation becomes necessary.

Table 5: e-Commerce legislation and Protection of Intellectual Property (2004) [29]

	Country	e-Commerce legislation	Copyright	Patent (*)	IIPA (**)	Piracy (***)
Asia (n=7)	China	Pending	Yes	Maybe	3	92%
	India	Yes	Yes	Probably	2	73%
	Malaysia	Yes	Yes	No	1	63%
	Philippines	Yes	Yes	Maybe	2	72%
	Singapore	Yes	Yes	Yes	NR	43%
	Thailand	Yes	Yes	Maybe	2	80%
	Vietnam	Pending	Yes	Maybe	NR	92%
Europe (n=8)	Bulgaria	Yes	Yes	Yes	2	71%
	Czech Rep.	Yes	Yes	Yes	--	40%
	Hungary	Yes	Yes	Yes	1	42%
	Ireland	Yes	Yes	Yes	--	41%
	Israel	Yes	Yes	Yes	2	35%
	Poland	Yes	Yes	No	2	58%
	Romania	Yes	Yes	Yes	1	73%
	Russian Fed.	Yes	Yes	Maybe	2	87%
Latin America and the Caribbean (n=8)	Argentina	Yes	Yes	Maybe	2	71%
	Brazil	Yes	Yes	Probably	2	61%
	Chile	Yes	--	--	1	63%
	Costa Rica	Pending	Yes	No	NR	68%
	Dominican Rep.	Yes	Yes	Yes	2	76%
	Jamaica	Pending	--	--	--	--
	Mexico	Yes	Yes	Maybe	--	63%
	Panama	Yes	Yes	Maybe	--	69%
	Canada	Yes	Yes	Yes	NR	35%

* “Probably” - strong legal precedents support subject matter protection; “maybe” - some favorable legal precedents exist

** International Intellectual Property Association ratings – (NR) Not Rated 2004 (1) bilateral discussion required (2) inadequate IP protection (3) failure to abide by earlier agreements to correct problems

*** Based on the difference between new computer and new software purchases

[29] Sources: Interviews; *McBride Baker & Coles International Database for E-Commerce and Digital Signa-tures* <www.mbc.com/ecommerce/international.asp>; Copyright and patent information from *International Legal Protection for Software* <www.softwareprotection.com/2004_Chart.htm>; Intellectual Property Asso-ciation (IIPA) status from <hwww.iipa.com/pdf/2004SPEC301USTRHISTORY.pdf>; Software piracy esti-mates from the Business Software Association <www.bsa.org/globalstudy>. India’s National Association of Software and Services Companies <www.nasscom.org/artdisplay.asp?cat_id=681> reports that Ireland does not have patent protection, but Table 4 presents information from a single source for the sake of consistency.

The Dominican Republic has passed a *Ley de Comercio Electrónico, Firmas y Documentos Digitales* which extends existing laws to cover electronic commerce, which puts it on an even standing with almost all of the countries in our list of international competitors (Table 5).

The Dominican legislature is currently working on a *Ley de Delitos Electrónicos* that will cover a number of areas of "computer and Internet crime", including the provision of pornography, fraud, sales of prohibited substances, and so forth. Extremely importantly, the draft legislation also covers the areas of unauthorized modification of data stored on computers, interception of transmissions, and crimes against intellectual property.

The Dominican Republic is a signatory to many International treaties and conventions related to the observation of patents, copyrights, trademarks and other methods of intellectual property protection. These conventions, together with existing national laws covering patents and copyrights, which the Dominican Republic also has (see Table 5), form the basis for the protection of the information and digital products (software, music, movies, etc.) that are increasingly at the core of modern commerce – a basis that will hopefully be supplemented by the provisions of the proposed *Ley de Delitos Electrónicos* when it is passed into law.

It is vital that the Dominican Republic have excellent protection of this sort. Any Dominican business that has trade secrets, or patented products, or that sells software or music, will want to be sure that its intellectual capital is not being stolen within the country, as well as outside of it; any foreign business that wishes to locate itself in the country will likewise want to assure itself that its valuable information is legally and effectively protected against theft.

In addition, the subject of protection of personal information in foreign countries is especially important when trying to provide outsourced services; in an era of increasing concern over "identity theft" and the political controversy in the United States over offshore outsourcing, any hint that personal information of clients is being stolen[30] by local workers or organizations can be fatal to a national outsourcing industry. The better that the *Ley de Delitos Electrónicos* covers these situations, the higher the importance of passing the law as quickly as possible.

There have been serious complaints about the level of *prosecution* of intellectual property rights violations in the Dominican Republic as they relate to broadcast content, music and software[31]. In addition, there have been severe criticisms of industrial property laws and activities which are held to have permitted the unauthorized duplication and sales of pharmaceutical products which are under patent in other countries[32]. This has resulted in the country being classed as having inadequate

[30] ***Offshoring and Privacy Protection*** **<www.citizen.org/trade/offshoring/privacy/index.cfm>**
[31] *IIPA 2004 Special 301 Report* <www.iipa.com/gsp/2004_Feb17_GSP_Dominican%20Republic.pdf>
[32] *2004 Special 301: Dominican Republic* <www.phrma.org/international/resources/13.02.2004.603.cfm>

intellectual property protection by the influential International Intellectual Property Association (IIPA).

As a result of perceived poor legal protection of ideas, at least one major international software vendor has decided not to share the code for its programs with local software companies – a practice which helps the local companies to develop software that works better with the international company's products, but which will not be done in this case for fear that the program code could be stolen by local companies with legal impunity.

Another indication that the protection of intellectual property in the country is less than it should be is found in the data published by the Business Software Association, an organization dedicated to combating the use of illegally obtained software. Their figures for the year 2004 (see Table 5) show the Dominican Republic to be the leader in software piracy in the Latin American and Caribbean, with slightly more than three-quarters of all business software in use estimated to be illegal. Steps are underway to remedy this situation, but it must be said that the international image of the Dominican Republic is of a country that is presently not well-positioned to attract foreign companies and investors with high investments in proprietary information and processes, or that will be processing large amounts of sensitive customer data.

When comparing the various countries in Table 5, it is clear that Canada is the overall leader in protection of intellectual property and low rates of software piracy. When considering the attractiveness of countries as providers of offshore outsourcing, this advantage is to some degree offset by much higher worker wages than in other countries, as we shall see.

Most of the lower software piracy rates are in the wealthier countries in the European group, while the Russian Federation, Romania, and Bulgaria have very high piracy rates, and half of the European competitors are also rated as having significant intellectual property protection problems. In the Asian group, only Singapore (again, the wealthiest country in the group) seems to be a relatively secure location to work with intellectual capital, while the Latin American and Caribbean group also has high software piracy rates, although only half of the countries are rated as problematic by the IIPA.

While China (the world leader in FDI attraction) and India (the world leader in outsourced services provision) are poorly extremely ranked in terms of intellectual property protection, we cannot therefore conclude that the degree of such protection is irrelevant in improving international commerce. Once again, the secret of these two countries lies in a combination of enormous size and overall poverty.

China represents the world's largest opening market, and most of the investment that it is attracting is oriented towards participating in that opening; the extremely cheap labor that is being contracted to serve international audiences is far more for manufacturing than for services provision. India, on the other hand, is the leader in provision of skilled intellectual labor and services because it is generating hundreds of thousands of

excellently-educated workers per year, willing to work for a fraction of the wages that would be paid similar workers in developed countries.

The Dominican Republic neither represents an irresistible market, nor is it able to provide a large number of very well-educated workers (nor, for that matter, can it provide unskilled labor as cheaply as China or India); its future success in international commerce will therefore depend critically on making the best use of the resources that it does have, and in developing advantages which its competitors do not have. In information-based economies, clear respect for, and forceful protection of, intellectual property is one of the clearest competitive advantages the country can have, given its absence in so many competing nations.

SECTION III
ANALYSIS OF SECTORS

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Keeping the background information presented in the previous section of this document in mind, we can now begin to evaluate different sectors of the international ICT and ICT-enabled marketplaces to identify those areas which seem to be especially deserving of attention by the Dominican business community and government.

A) ICT Industries

The two categories that come immediately to mind when thinking of "ICT industries" are *hardware and software products* – machines or devices, and the standardized programs which are used to make them perform useful activities related to the storage, transmission, and analysis of information. In fact, most types of "ICT businesses" derive at least some part of their income from the provision of *services* related to hardware and software, such as configuration, maintenance, user support, and consulting on the best use of the technology in particular circumstances. In addition, *network transmission media*, such as long-distance and neighborhood networks of cables and wires, and even the atmosphere itself (in the case of wireless communication), are neither hardware nor software as commonly understood, but are absolutely necessary for modern ICT use.

There is a common tendency to think primarily of computers when thinking of hardware, but devices to direct network traffic, such as switches and routers, as well as traditional and advanced multi-function telephones, are also vital parts of modern ICT hardware infrastructure. Likewise, the software industry is not limited to selling thousands or millions of copies of the same *products* to wide audiences, but also includes custom programming, configuration, maintenance and training *services* on a customer-by-customer basis. We will evaluate these various niches and market segments below, from the point of view of attempts to increase the competitiveness of the Dominican economy in international commerce.

A1. Hardware

A1a. Hardware manufacture and assembly. Major computer and network hardware companies purchase most of the hardware for their machines from specialist suppliers of components (CPUs, memory, disks, monitors, etc.) and assemble these components into the actual machines that they sell. The most complex and resource-intensive type of component manufacture is the fabrication of semiconductor integrated circuits (chips, cards, and boards), which is most frequently done in billion-dollar fabrication plants, or "fabs", in Taiwan, China, Singapore, South Korea, and Malaysia. One country in Latin America – Costa Rica – has managed to attract an Intel Corporation fab, and the

Mexican government is working with U.S. investors to build an industrial park in Baja California near the U.S. border aimed at attracting chip fabricators[33].

The factors that determine the attractiveness of an area for chip fabricators include first-class infrastructure (air and ground transport, water supply, power and telecom-munications), stable business environments with export zones, and a sufficient supply of well-educated local workers[34]. Problems with the power grid and the capacity of the post-primary educational system would certainly count against the Dominican Republic when being evaluated in these terms.

Beyond direct manufacture of components, there is a level of activities having to do with systems assembly. The most efficient "Just-In-Time" systems manufacturers such as Dell require that all of their components suppliers be within a few miles of their assembly plants[35], and highly value assembly near the purchasers of the systems in order to minimize transport costs; much assembly therefore takes place in U.S. cities, in plants staffed by low-cost local residents (including "high-school graduates and welfare recipients entering the workforce"[36]). Developing countries trying to attract systems manufacturers' assembly work must bear in mind that they also need to attract and support ecosystems of suppliers, that they should be close to the location of the ultimate buyers of the hardware, and that one of their strongest attractions will be the low cost of local labor.

One argument against a national pursuit of hardware assembly work is that there does not seem be a way for Dominican workers and businesses to enter into this eminently low-margin type of work and climb the value chain towards later high-margin work within the same or related sectors – something that seems to be possible in several other areas we will consider. Designing computer chips and other components is being increasingly outsourced, for instance[37], and commands far higher prices and profit margins than simple assembly; however, previous assembly experience does little to pave the way into this niche, which rather requires the local presence of considerable numbers of highly skilled electronics engineers, which the Dominican Republic does not presently have.

A1b. Hardware-related services – data center outsourcing. An interesting example of a more knowledge-intensive and higher-margin hardware-related area is that of providing *outsourced data center services* to international clients. The earliest examples of outsourcing of data center resources predate the commercial use of the Internet, including outsourcing of computing center hardware, software, and human resources of some larger corporations to companies such as IBM and EDS, who were experts in

[33] *Chip Factories Envisioned for South of Border* <www.latimes.com/business/la-fi-mexchips15jul15,1,1730454.story?coll=la-home-business>
[34] *An Interview with Intel Corporation: Investing in Costa Rica* <www.nvmundo.com/costaricarealestate/investinfo/intelinterview.htm>
[35] *Virtual Integration and its Impact on Operations Management* <users.wpi.edu/~bkpathak/virtual integration.doc>
[36] *Dell Computer confirms Midstate deal* <www.tennessean.com/sii/99/05/07/dellmain07.shtml>
[37] O*utsourcing Innovation* <www.businessweek.com/@@4WNj@ocQjjS7lg0A/magazine/content/05_12/b3925601.htm>

maintaining extremely expensive mainframe computers, managing their operating systems, and administering the back-end database applications that were housed on these computers. With the growth of the commercial Internet, smaller businesses and individuals began to develop needs for outsourced computing center resources as well – needs which were originally met by Internet Service Providers (ISPs) who provided network access to their own centralized computing centers, in which a client could rent disk space, processing power, and shared use of the provider's dedicated Internet connection that allowed public access to a client's Web site.

Since the early days of ISP Web page hosting, the concept of using outside facilities for "low-level" computing center services (including access, power, storage, processing time, data backups, and technical human resources) has expanded enormously, to such a degree that businesses in some cases are now renting a range of computer center services that completely removes the necessity of having their own computer centers, and the cross-border rental of a full range of computer center services is now a possibility. The most basic of these services include the following:

- *Data storage*. Businesses of all sizes are now using outsourced facilities to *store* their data, even when the data is not to be used for public-access Web sites. This is done for a variety of reasons – to provide the advantage of Internet access to data from any point with an Internet connection, to provide economical storage for clients that many not wish or be able to purchase their own server computers, or to meet a greatly increased demand for "business contingency" or "disaster recovery" services (assuring that data is available in backup facilities in case natural disasters or acts of terrorism make the original data centers unavailable)[38].
- *Networked rental or processing time*. Data or application hosting always involves the use of computer processors ("*processing time*") to respond to user requests. Networked rental of processing time has greatly expanded in range and complexity, with recent interest centering around "on-demand" or "utility" rental of processing time on an as-needed basis, rather than paid for in flat monthly fees[39].
- *Remote administration*. There are many ways in which *administration* of low-level ICT resources can be done on an outsourced basis. In the traditional case of Web page hosting, a client uses the services of ISP technicians who maintain computers, operating systems, network connections, data backups, and so forth in the provider's facilities. It is now possible, however, for a service provider's staff to manage resources outside the provider's own data center – administering clients' local and wide-area network connections (remote configuration and administration of network devices, monitoring of connection status, optimal routing of

[38] See <www.emc.com>, <www.rentsys.com/recovery/>, <www.availability.sungard.com/Solutions/Managed +Hosting>, etc.
[39] See <www.everdream.com>, < //www-306.ibm.com/e-business/ondemand/us/index.html>, etc.

traffic, etc.), remote managing servers and networks on client premises, and providing remote security configuration and vulnerability monitoring[40].

At the present time, most of the providers of such new-generation ICT outsourcing services are in the United States, but some developing-country providers are also beginning to enter into these niches – In the Dominican Republic, for instance, Verizon is already considering offering outsourced data center services to national and international clients. Smaller local ISPs and data center owners may not have the same international visibility and reputation as multinationals such as Verizon, but this is not to say that they cannot be successful in providing data center services – small companies in Panama and Costa Rica[41] already have international clients for outsourced data center services, and more companies are considering entry into the market as foreign clients become more accustomed to the idea of data center outsourcing. In one controversial case – Internet sports betting – a large part of an entire global information-based industry has come to be hosted and maintained in data centers in Costa Rica and various Caribbean islands[42].

The primary attraction for foreign clients of using local providers is usually lower cost, which in turn is usually rooted in far lower salaries for developing-country technicians than for equivalent technicians in developed countries. The Dominican Republic is certainly competitive in this regard; Table 6, on the next page, shows that the average Dominican computer center staff worker's salary is a fraction of the salaries for comparably-titled computer center staff in the U.S.

Clients may initially contract services because of low costs but they stay with providers over time because of quality of services and professionalism. Therefore, providers who wish to stay competitive over time will focus heavily on basic service quality and customer service. As we will discuss more fully in following sections, an excellent strategy to help develop this quality and professionalism is to form associations of ICT professionals, whose members share in the costs of investigating quality issues, and of implementing quality initiatives, standards, and internationally-recognized certification programs. The national Government should be strongly interested in supporting, and perhaps subsidizing, such initiatives as well.

There are significant advantages for Dominican businesses in entering into this type of commerce, and in providing high-quality services – not only because they can initially gain more money from selling services to foreign clients than to local ones, but also because providing basic data center services in a professional way is an excellent way to form a relationship with foreign clients that allow the provider to cross-sell and up-sell additional products and services at higher levels in the value chain.

[40] See < www.iss.net/products_services/managed_services>, <enterprisesecurity.symantec.com/Security Services/content.cfm?ArticleID=682&EID=0>, etc.
[41] E.g., Inter@merica <www.interamerica.net> in Costa Rica
[42] *An Industry That Dares Not Meet in the Country of Its Best Customers* <www.nytimes.com/2004/05/17/ business/worldbusiness/17wager.html>; *All bets are on* <www.economist.com/displaystory.cfm?story_id= 3242391>

Table 6: Average U.S. and Dominican Computer Center Staff Salaries (2004)[43]

Position	United States	Dominican Republic	DR as % of US
Data entry	$25,006	$3,658	14.63%
User support	$27,500	$7,643	27.79%
Systems operator	$32,968	$5,681	17.23%
Network administrator	$38,600	$13,959	36.16%
Systems manager	$60,000	$23,158	38.60%

The barriers to entry in this marketplace for local businesses are similar to barriers to entry in the software market, which will be discussed more fully in the next section: they include the difficulty of obtaining information about foreign markets, the creation of a positive image of the quality and reliability of the services provided (and of the country itself), and, in the case of smaller new businesses, of obtaining credit for the start-up and early maintenance and growth stages of the business.

A2. Software. The production of software is currently far more interesting for most developing countries than the production of hardware. In fact, the governments of most of the countries in our comparative tables have made the development of local software industries a strategic priority, following the lead of such early innovators as "the 3Is" – India, Ireland, and Israel. The following short description of these pioneer initiatives will serve to make several important points that will be useful for our discussion of the case of the Dominican Republic.

A2a. Ireland, Israel, and India. *Ireland* was the first of the three pioneers to undertake a truly successful program to strengthen the national software industry. This began in the 1970s, when a number of multinational corporations were interested in extending their presence into Europe, and were attracted to Ireland as an English-speaking and culturally similar gateway to the continent, with a relatively large and well-educated workforce and far lower telecommunications costs than those of mainland Europe.

At this time, the Irish software industry was small, partly as a result of low domestic demand for software, but there were clear reasons to make the development of the software industry an official priority – it placed little demand on natural resources, did not require massive manufacturing activities which might have caused negative environmental impacts, required relatively little start-up investment compared with manufacturing, produced products and services which were absolutely critical to the functioning of modern businesses, and would help to counter the increasing emigration of technically-trained Irish to more developed countries.

The Irish strategy was based on attracting multinational corporations which were strong users of ICTs (and especially software companies such as Microsoft), providing local workers for these companies who would learn more about software and the software

[43] The U.S. figures are from the Bureau of Labor Statistics <www.bls.gov/ncs/home.htm#data>; Dominican data was provided by ROS Consultoría y Seguros.

industry during their period of employment, and who would later use that knowledge and experience to create stronger local software companies. To attract these businesses, the Irish government offered a number of incentives including lower corporate tax rates and low tariffs on imported technology.

Interestingly, the Irish strategy did not work precisely as planned, due among other things to the fact that the multinationals were more interested in hiring technical support staff, quality testers, and document writers than those outstanding local programmers and entrepreneurs who would be most likely to form their own software companies; the local companies that benefited most from the presence of the multinationals tended to supply them with low-technology services like printing and packaging[44]. This is similar to what has happened more recently in Costa Rica with the arrival of the Intel Corporation's chip fabrication plant – although the company has indeed hired many local technically-trained workers, the most visible local impact of the plant has been in the business it has generated for local suppliers of materials and non-technical services.

The attraction of multinationals to Ireland did have a number of positive effects beyond local non-technical employment, including the strengthening of high-technology clusters – areas in which large numbers of technically-trained workers live (which tend to be mostly urban or suburban and located near large educational institutions), which attract large companies with substantial technology investments and technical personnel needs, which in turn attract support and supply organizations for high-technology businesses. The end result of this concentration of actors is a rich environment of professional and personal networks in which ICT and ITC-enabled business activities can be carried out in a maximally efficient manner.

While technology clusters can certainly grow without any centralized planning (as in the classic case of California's Silicon Valley), some national governments have made explicit efforts to create new clusters in "high-technology parks", including "software parks", which have enjoyed varying degrees of success. In the case of Ireland, the government did not so much try to create new clusters, as support existing clusters and proto-clusters through supplying infrastructure – an "organic" strategy often regarded as more productive than centralized planning of new clusters (see Reference 44). The government also strongly promoted the national software industry with publicity, marketing assistance, trade fairs, and other activities primarily carried out by Enterprise Ireland, the Department of Enterprise, Trade, and Employment.

A great number of Irish have emigrated to the United States during the last 150 years, and their tendency to retain social and cultural links with their original homeland has created an Irish diaspora (a community of people in many countries linked through their ancestors' common origin in a single country). This history of relatedness has greatly aided Irish efforts to obtain information about the U.S. marketplace, to form relationships with possible clients and allies in the U.S., and to obtain foreign investment in Irish industries including that of software. A seemingly minor event such as the Lord Mayor of

[44] *National Software Industry Development: Considerations for Government Planners* <http://www.is.cityu.edu.hk/research/ejisdc/vol13/v13r10.pdf>

Dublin's annual visit to San Jose, California to celebrate the start of "Irish Week"[45] (an event originally arranged between a San Jose mayor of Irish ancestry and Irish trade promoters) actually brings together the political leaders of Silicon Valley and Ireland's most technologically developed metropolitan area, which has helped to influence the decisions of many of the large number of Silicon Valley companies which have located facilities in Ireland.

Irish software companies have collaborated with each other through the creation of the Irish Software Association <www.software.ie>, which provides its members with information about industry best practices and potential markets, and lobbies actively for legislation aimed at the promotion of the national software industry. The industry has also stressed the implementation of quality standards and certification in order to improve both the quality of the software products themselves, and the image of Irish software in the external marketplace.

In the 1980s, *Israel* had several critical advantages for the formation of a strong local software industry: abundant human resources, produced by a traditional emphasis on excellence in technical education and the arrival of a large number of highly-educated political refugees from Soviet bloc countries; and skills and experience in programming in areas such as networking, network security, and cryptography, as a result of its historic involvement in regional conflict and military development. The military had also funded one of the strongest Research and Development (R&D) sectors in the world.

Although Israel had a stronger internal demand for software than Ireland, it still needed to find outside clients for software since, like Ireland, the country's population was too small to support a dynamic software market by itself. Because of the strengths mentioned above, Israel did not need to turn primarily to the provision of software *services* to inbound multinational corporations, as Ireland did, but was rather able to focus on the sales of its own high-quality software *products* to foreign clients.

While the market focus of the two national industries was very different, the development of the Israeli software industry shared a number of elements in common with the development of the Irish software industry. The Israeli industry relied on the existence of high-technology clusters[46] to facilitate the process of new business growth; the government made strong efforts to promote the national software industry and links between national and foreign businesses (through initiatives such as the Israel-US Binational Industrial R&D Program and the activities of the Israeli Export and International Cooperation Institute <www.export.gov.il>); the presence of a strong diaspora community in the U.S. and other developed countries contributed heavily to linkages, alliances, and flow of information and funds from outside countries into the Israeli software industry; and the Israeli software vendors formed the Israeli Association of Software Houses <www.iash.org.il> to share information between members and lobby for favorable legislation. In all of this, maintaining a reputation for high-quality products has been a key competitive advantage.

[45] *San Jose Sister Cities* <www.sjeconomy.com/businessassistance/irsistercities.asp>
[46] *Israel's Silicon Wadi: The forces behind cluster formation* <siepr.stanford.edu/papers/pdf/00-40.pdf>

Although *India* had a software industry dating back to the 1970s, the most interesting period of the software sector's development began in the mid-1980s, when multinational corporations such as CitiBank, Hewlett-Packard, and Texas Instruments, attracted by the large number of highly-educated and low-salaried Indian programmers available, established wholly-owned subsidiary ("captive") companies in India to do programming for their parent companies (and later for other clients).

The quality of the Indian employees' work and English language use were found to be excellent, and more foreign companies began to investigate the possibility of having their programming done in India. However, U.S. companies' reluctance to pass the majority of business-critical software creation outside the country lead to the growth of "bodyshopping" – Indian companies sending their employees to the U.S. under special visa status to do outsourced (but in-house) programming work, often for lower wages than those paid to U.S. citizens in equivalent positions.

A number of problems with bodyshopping, including a fiercely competitive market and resulting low profit margins, loss of best employees to U.S. companies, and restrictive U.S. immigration and visa laws[47], combined with the growth of faster and more economical international telecommunications capabilities and the high reputation of Indian programmers, led to the evolution of a new service provision model – "offshore" outsourcing, with the clients in the U.S. and the contracted programmers in India. Although Indian software companies still continue to provide bodyshopping services, and are also involved in the creation of commercial "shrink-wrapped" software products for national and international sales, offshore outsourcing of application development and services is currently the largest sector of the Indian software export industry[48].

Policies implemented by the Indian government played a strong role in the development of the software industry in the country, among the most important of which were reduction of import taxes on hardware and software, tax reduction on import earnings, the creation of the Indian Institutes of Technology (intended to create a large number of highly-skilled technical workers), and the creation of the Software Technology Parks of India, free zones which focused on software companies and served to stimulate high-technology clusters in several areas in the country[49].

As we might expect from the Irish and Israeli cases, the Indian software industry also skillfully exploited the Indian diaspora community (especially the large number of Indians in high-technology companies in other countries[50]), and formed a powerful National Association of Software and Service Companies (NASSCOM;

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[47] *Congress cuts visas for skilled foreign workers* <www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2003/10/01/MN55780.DTL>

[48] *Growth of Indian IT Services and Software -FY 2000-2005E* <www.nasscom.org/artdisplay.asp?cat_id =810#2>

[49] T*he National Innovation System that Made India's IT Success Possible* <www.nstda.or.th/nstc/Seminar/paper/pdf/paper_KJJoseph.pdf>

[50] *India And Silicon Valley: Now The R&D Flows Both Ways* <www.businessweek.com/magazine/content/03_49/b3861010_mz001.htm>, *Chinese and Indian Networks in Silicon Valley* <www.sipa.org/resources/Data_Summary_v5_0801.pdf>

<www.nasscom.org>), charged with informing its members of trends and market opportunities, promoting Indian ICT and ICT-enabled businesses in foreign countries, and lobbying for favorable legislation. Even more than Ireland and Israel, Indian software companies have stressed the issue of quality in their work: NASSCOM and other organizations have focused so heavily on the subject that almost half of the software companies in the world that have achieved the Carnegie-Mellon Capability Maturity Model (CMM) Level 5 rating – the highest level of quality certification possible in the best-known software quality certification methodology – are in India.

A2b. Software products. Profit margins for software products vendors are often far higher than those of software services vendors, due in great part to the fact that once a successful software product is created, the marginal costs of creating millions of additional copies are almost zero, while providing services involves non-trivial new costs for each new client.

Selling software products to a mass market involves substantial costs for mass marketing, and almost inevitably involves providing ancillary services such as customer support; many product vendors also actively seek to provide paid additional services such as software customization, training, systems integration, and strategic planning, which, although they are more costly to provide on a customer-by-customer basis, have the virtue of providing a recurrent revenue stream[51]. Nonetheless, the overall attractiveness of providing software products remains clear.

Israel was the only country of the 3Is that chose to focus primarily on providing software products. It is important to note that Israeli software companies focused on *niche* markets for networking and security rather than trying to penetrate *mass* markets such as operating systems or word processing; mass success generally depends on successfully competing with multi-billion-dollar multinational corporations such as Microsoft and Oracle.

It is possible to develop “regional mass market” software products. In Costa Rica, one of the leaders in the Latin American software community, the largest software vendors originally built their markets on relatively uncomplicated and inexpensive Spanish-language versions of “ERP” (Enterprise Resource Planning) software that managed business data (administrative, financial, human resources, inventory, etc.) on machines with Microsoft operating systems, and concentrated on selling those products in Costa Rica and other countries in the region which were not originally priority markets for multinational software vendors. As those multinationals have become more interested in selling their products in smaller countries, as the prices of these products fall, and as Spanish-language versions of their products become common, the Costa Rican vendors are finding themselves in an increasingly competitive and congested market environment.

The chances of Dominican software companies creating regional versions of standard office software for machines with Windows operating systems with any degree of

[51] Michael Cusumano, he Business of Software (2004). Free Press

success in the current market are slight. However, a building rebellion in developing (and some developed) countries against the use of Microsoft operating systems and applications, and in favor of "open source" software[52], might provide a niche in which relatively generic Dominican software might find a large market. Local commercial software vendors should certainly investigate this possibility.

It is also possible that Dominican software companies could identify specific "knowledge domains" in which local businesses and persons have first-class capabilities, and in which there does not as yet exist significant competition to provide specialized software. Companies in Jamaica[53] and Singapore, for example, have had success with developing software to manage maritime and customs activities in seaports, while the Hong Kong Jockey Club produced widely-used software to support off-track betting stations[54]. One Dominican interviewee suggested aviculture as a likely area of local expertise that could be embedded in a software product; others will certainly come to light in the future, once the software industry and the government understand that it is worthwhile to look for such opportunities.

Israel was fortunate to have a large amount of highly-skilled technical manpower available to support its software industry from the first. Information presented in earlier sections of this document about the overall number of technically-trained Dominicans suggests that there are not as many skilled programmers in the country as we would like to see – a conclusion that is supported by various interviewees' comments about difficulties in finding programmers with experience in such important areas as Java and Microsoft .NET, and about increasing competition for skilled labor leading to competing salary offers and higher wages.

More exact information, such as that which will hopefully be supplied by the government's recent attempts to build a directory of local software companies, will play a vital part in estimating the potential for short-term growth in the local software products industry, and how much effort the private sector, government and universities will have to dedicate to creating a sufficient body of appropriately-trained workers – an effort which must be made, and made soon, if the country is to compete successfully in the global software marketplace.

Simply producing more programmers should not be the primary goal of any effort to improve the software manpower shortage in the country – attention must also be paid to the specific skills that those programmers have or should have, including training in industry-standard languages, techniques (objects, components), development methodologies, and related skills such as user interface design and project management.

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[52] *Developing Nations See Linux as a Savior From Microsoft's Grip* <www.latimes.com/technology/la-fg-linux9aug09,1,166750.story?coll=la-headlines-technology>; *Brazil: Free Software's Biggest and Best Friend* <www.nytimes.com/2005/03/29/technology/29computer.html>

[53] *PCS: Data hub of local shipping* <www.techjamaica.com/content/view/613/50/>

[54] *Developing Software Overseas* <www.byte.com/art/9406/sec7/art6.htm>

In the absence of a pre-existing critical mass of programmers, software entrepreneurs, and software companies, strategies to make the best use of existing resources are critically necessary. The Dominican government has helped to create the “Cyber Park” which contains the ITLA, much as India created new Software Technology Parks; although it is not intended specifically to be a “software park”, if the Cyber Park attracts a sufficient number of software companies, skilled workers and entrepreneurs, then it may generate the sort of synergistic effects for the local software industry that the best software clusters in other countries have shown (to date, this clustering effect does not seem to have occurred). The country should not, of course, place all of its hopes on a single cluster; the government could also follow the Irish model of “organic” support for existing concentrations of software companies, workers, and universities, providing infrastructure and other types of support as necessary.

Another strategy for leveraging existing resources that we saw in the discussion of the 3Is is the formation of professional associations, whose members share the costs of market investigation and foreign marketing, who join together to make their voices heard in the drafting of legislation that affects the local software industry, and who share their experiences among their members. There does not presently appear to be any nationwide Dominican ICT or software professional association (although some interviewees spoke of plans to form a Dominican software producers association), and local businesses would be extremely well advised to create one as soon as possible.

Given the importance of such associations, the government should actively assist in their formation, although it is important to note that the associations should not depend completely on the government, or be in some way or another government-sponsored councils; the possibility of constructive disagreement between local businesses and the government should always be open.

Since smaller businesses from countries that are only recent entrants in the global software market face substantial problems in investigating their possible markets and making themselves known outside the country, the government should also enthusiastically support these local businesses by helping in the funding of market research, international marketing of the national software industry, and assistance with trade fairs, visits of potential clients (and foreign investors) to the country, and other common commerce promotion strategies – all of these in parallel with the activities of private sector professional associations.

Finally, both the private sector software businesses and the country as a whole stand to benefit from the creation and effective enforcement of intellectual property and data privacy laws (as discussed previously), and of the implementation of effective quality certification standards that can be applied both to the software industry in particular, and to the wider ICT and ICT-enabled sectors. Doing so will not only improve the quality of national products and services, but will also contribute to a positive image of the country as a whole as modern, efficient, and fair.

A2c. Software services. Ireland and India focused their efforts on the provision of software services (programming, support, training, etc.), rather than products. Ireland aimed at providing skilled technical manpower for offices of ICT-rich multinational corporations (that is, either foreign ICT companies, or foreign companies that made extensive use of ICTs) situated within the country, with the eventual goal of stimulating the formation of local software companies, while India was the home of three different approaches:

1. Having foreign multinationals set up branches of their ICT departments in India, staffed by low-salaried and high-quality Indian programmers and technicians ("captive outsourcing" to MNC-owned organizations in developing countries)
2. Sending Indian programmers and ICT experts to work in the home-country offices of foreign corporations ("bodyshopping")
3. Providing the services of Indian programmers working in the Indian offices of Indian providers to foreign clients who kept their operations in their home countries, but interacted with their Indian providers through telecommunications networks ("offshore outsourcing").

All of these approaches are at least theoretically possible for Dominican businesses, but we will not discuss the "bodyshopping" alternative further here, since it is being increasingly replaced by the "offshore" alternative, and is in any case usually the lowest-margin strategy amongst the alternatives. The remaining three alternatives can actually be divided into two categories, since both the Irish strategy and the Indian "MNC captive" strategy rely on attracting at least some divisions of foreign businesses to the country of their local providers, which can be clearly contrasted to the pure "offshore" strategy of keeping foreign clients' offices mostly or totally in their own countries.

The attraction of multinational corporations to developing countries is one of the most common strategies for the attraction of FDI, and the Indian-captive and Irish models are simply versions of the general MNC-attraction approach that regard employing local ICT staff and strengthening the local ICT industry as extremely important local benefits of MNC presence. The offshore model likewise addresses the development of the local ICT sector, and also has implications for the attraction of FDI, even if it does not stress the physical presence of MNCs in the country – if local offshore outsourced services providers are successful, foreign investors may invest in them directly, or create similar businesses of their own within the country; foreign outsourcing organizations may form alliances with local providers to mutually extend services offerings and geographical coverage, or simply acquire local businesses to provide labor for their own offshoring activities.

The Irish experience clearly shows that attracting the physical presence of ICT-rich MNCs may not necessarily lead to the creation or growth of independent local software *businesses*, although it will most likely strengthen the local ICT sector by providing salaries and increased experience levels for local *employees* of MNCs, and may contribute to the development of geographical *clusters* of corporate ICT users, ICT

workers, and support organizations. Only the offshore model guarantees that locally-sited software *businesses* will be directly benefited by serving foreign clients, and even in this case these "local" software companies may not be locally *owned* – as mentioned above, it is increasingly common for foreign outsourcing providers to simply acquire local software services businesses in developing countries, or create their own, with the profits from the use of this lower-priced local labor flowing mostly to foreign owners and investors[55].

As far as generalizations can be made about the popularity of these alternatives in the current international marketplace, it would seem that when migrating certain of their internal departments or functions to foreign countries, the largest MNCs have tended to favor either keeping direct control of the workers in those countries ("captive" outsourcing), or contracting for the use of developing-country workers hired by other multinationals such as IBM Business Consulting, Accenture, EDS, or Hewlett-Packard. At times when MNCs move from captive to independent provider strategies[56], they still tend to choose very large and well-established providers; only large developing-country software services outsourcers such as India's Tata Consultancy Services, Wipro, and Infosys are likely to have an assured future directly providing outsourced software services to the largest foreign clients.

It would be a mistake to conclude from this observation that the Dominican Republic should focus solely on the attraction of captive MNC software services operations, and accept their relatively indirect stimulus to the local software sector. Among other things, there is a growing tendency for smaller businesses in developed countries to take advantage of offshore outsourcing[57], and these potential clients do not have the financial or organizational capacities to actually set up their own foreign branch offices, or to employ the largest multinational outsourcing providers – thus opening a promising market niche for Dominican software services providers to exploit. If successful efforts are made to establish and maintain contact with the Dominican diaspora in developed countries, these expatriates might also constitute an attractive and receptive market for Dominican Republic-based software services providers.

Most of the factors that determine whether the Dominican Republic can compete internationally in attracting captive software services operations, and in creating successful local businesses that sell software services to foreign clients, are already familiar from previous discussion and need further little discussion here – location, political environment, infrastructure, and so on. A few aspects of software services competitiveness need to be discussed further here.

No other factor in the evaluation of outsourced programming alternatives is more frequently mentioned than *average programmer salaries*, even though there are a number of problems with the figures commonly used – they are highly variable (local promoters give low estimates, competing countries give high estimates for their

[55] *U.S. firms move IT overseas* <news.zdnet.com/2100-9595_22-976828.html>
[56] *Out of Captivity* <www.economist.com/displaystory.cfm?story_id=3389328>
[57] *The Outsourcing Food Chain* <www.businessweek.com/smallbiz/content/mar2004/sb20040311_4465_ sb014.htm>

competition's labor, some authorities seem to be guessing); little or no attention is paid to variations in the quality of work, amount of experience, and specializations and certifications of the programmers; and a salary figure reflects only a part of the total cost of maintaining a productive programmer. None-theless, information such as that presented in Table 7 gives us a crude idea of the *relative* costs involved in employing programmers in the various developing countries in our group of national competitors; the salaries are presented as ranges rather than exact figures in an attempt to accommodate some of the variability encountered in national salary estimates.

Table 7: Ranges of annual programmer salaries in Competing Developing Countries[58]

	$10,000 or less	**$10,001 - $15,000**	**$15,001 - $20,000**	**$20,001 - $30,000**	**$30,001 or more**
Asia	India Vietnam	China Malaysia Philippines	Thailand	Singapore	
Europe		Bulgaria Hungary Poland Romania Russian Fed.		Czech Rep.	Ireland Israel
Latin America / Caribbean		Costa Rica Dominican Rep. Jamaica Panama	Argentina Brazil Chile Mexico		
Canada					Canada

Indian and Vietnamese programmers are the lowest paid in our group of competitors; the strong reputation of Indian programmers (and the lack of experience of Vietnamese programmers in the offshoring arena) makes them by far the most attractive option for clients looking for programming services in foreign countries, although it is interesting to note that high demand for these professionals is beginning to drive their salaries up[59] – a serious problem in a market that is so sensitive to price, and something that may make a "second tier" of outsourcing destinations (such as the Dominican Republic) more attractive in the future, if they can avoid the same cost increases.

The largest group of countries, including the Dominican Republic, fall into the $10,000 - $15,000 annual programmer salary range. In the Asian group, Malaysia and the Philippines already have a long history of providing outsourced programming services; the European countries in this range have less experience in the sector, but a very

[58] Dominican information from ROS Consultoría y Seguros. Other information from *Comparison of the Leading OSD Countries* <www.outsourceinfo.org/Pages/Table%20of%20OSD%20Countries.asp>; *2004 ITtoolbox Salary Survey* <security.ittoolbox.com/research/survey.asp?survey=Salary4_survey&p=1>; *The Big Payoff: CertMag's 2004 Salary Survey* <www.certmag.com/articles/templates/cmag_feature.asp? articleid=981&zoneid=9>; *The DQ-IDC India Salary Survey'04* <http://www.dqindia.com/content/top_stories/ 2004/104100601.asp>, Payscale.com <www.payscale.com/countries.asp?aid=6837&raname=SALARY>

[59] *Getting Pricey?* <www.dqindia.com/content/strategy/hrd/2004/104120901.asp>

strong reputation for scientific and mathematical training as a legacy of their Soviet Bloc history; and the Central American and Caribbean countries have neither extensive experience nor strong reputations for the quality of their technical education. These countries also have the problem of a small overall population size, which means that the pool of available skilled human resources will likewise be small, which in turn means that competition for these resources, and accompanying raises in salaries may occur quickly; we have previously mentioned interviewee comments about rising programmer salaries in the Dominican Republic as an apparent result of such competition.

The next-highest range of salaries is represented in Asia by Thailand, which does not have much experience in outsourced programming provision, but does have a reputation for strong political institutions and a growing economy. It is accompanied by a group of three South American countries and Mexico, which likewise have little history in the provision of outsourced programming. Most of these countries do have other competitive advantages – a reputation for strong education and political and economic environments in the case of Chile; physical proximity and cultural linkages to the U.S. in the case of Mexico; and simple size in the case of Brazil, whose large population (like that of Mexico) is attractive to those organizations which might be considering serving foreign local markets or their own regional offices as a part of their overall international strategy. Argentina has a reputation for a strong educational system which has to be balanced against its political and economic instability and the relatively high prices of its programmers.

All of the countries with average annual programmer salaries of $20,000 or more are noted for the relative excellence of their infrastructure, political and economic environments, and education. Their shared competitive disadvantage is the cost of their manpower – in the case of Ireland, for example, the basic high cost of programmers plus the increasing strength of the Euro versus the Dollar has already caused some U.S. companies using outsourced Irish ICT services to move their outsourcing to India[60].

Having high programmer salaries is not necessarily fatal to winning outsourcing business, as can be seen by considering the case of Canada. Although the average annual programmer's salary in Canada is the highest of any country's in the group of competitor countries in our analysis, it is in fact still successful in attracting U.S. software development clients. This situation is based on the fact that Canada's physical nearness, its strong cultural similarity, and its general familiarity are all reassuring to U.S. businesses which are worried about the risks involved in outsourcing to countries that are too far away, or unstable, or simply somehow too unfamiliar, and who are willing to pay higher prices for greater confidence in their outsourcers[61].

[60] *Ireland must outsource to be competitive* <uk.news.yahoo.com/040819/95/f0pxk.html>
[61] *U.S. firms look north for outsourcing help* <www.computerworld.com/managementtopics/xsp/story/0, 10801,68591,00.html>; *Canada, the Closer Country for Outsourcing Work* <www.nytimes.com/2004/11/30/ business/worldbusiness/30outsource.html>

This preference for the familiar and the nearby has generated a “Nearshoring” niche which is also being competed for by Mexico[62] and other nearby countries. The demonstrated existence of a demand for nearshoring, together with the relative closeness of the Dominican Republic to the U.S., the presence of a strong Dominican diaspora in the U.S., and the familiarity that many U.S. tourists have with the country, all combine to suggest that the country could have some success in stressing its “closeness” and “familiarity” when promoting outsourcing services.

The importance of finding a selling point of this kind is made clearer when we consider that our previous analysis has shown very few clear-cut competitive advantages for the Dominican Republic in terms of the factors that we have discussed. Any chance to develop a sense of confidence in the country on the part of foreign clients is vital, and a “nearshoring” orientation to publicizing the country – along with the quality assurance and intellectual property protection initiatives discussed previously – can help to establish that confidence.

B) ICT-Enabled Businesses

We now turn to a consideration of certain types of businesses which are not directly involved in the provision of ICT products and services, but rather take advantage of those products and services to make other types of commercial activities more effective, more efficient, and more economical. For reasons discussed in the first section of this document, the discussion is limited to the provision of non-ICT services to foreign consumers by means of telecommunications networks.

It is useful to separate the discussion into the provision of “front-office” services – those related to activities that involve close contact with actual or potential clients, such as customer service and marketing – and “back office” services, which involve activities that take place without the immediate participation of clients. The term “Business Process Outsourcing” (BPO) applies to outsourcing of both front-office and back-office services, although the term is sometimes erroneously used to refer only to outsourcing of back-office services.

In the following section, we examine a classic front-office outsourcing strategy with a long history in the Dominican Republic – call centers – and in the next section we discuss the range of possible back-office outsourced services that might be offered from the Dominican Republic to business clients in developed countries.

B1. Call Centers. Acquiring and retaining clients are, by definition, among the most important things that any business does. Acquisition of customers is greatly facilitated by marketing, while effective customer service promotes the retention of acquired clients. Certain business processes involved in each of these activities are being increasingly outsourced to developing countries.

[62] *Can Mexico Develop a Software Maquiladora Industry?* <tendencias.infoamericas.com/article_archive/2003/038/038_industry_analysis.htm>

Dealing first with marketing, we divide the area into *mass* marketing, which is one-way communication with a wide audience using traditional mass media (radio, television, newspapers), and *direct* marketing, which is oriented towards initiating and maintaining contact with particular individuals or businesses whose contact data is maintained in "lists" in sophisticated database systems. Direct marketing is usually carried out using traditional mail, e-mail, or telephone calls ("telemarketing").

There is little or no reason to consider offshore outsourcing of direct marketing activities based on the use of traditional or electronic mail from developed to developing countries (other than attempting to avoid increasing legal prosecution of massive e-mail spammers[63]). Telemarketing, which relies on personal contact, has been outsourced for decades, driven primarily by the savings that can be realized from using lower-priced labor in developing countries; customer service activities have followed this same path offshore at a somewhat later time.

B1a. Low-end and high-end services. Before discussing how the Dominican Republic can compete successfully in services niches that can depend on the presence of call centers, it is important to point out that there is a wide variation in the attractiveness to the country itself of hosting different types of front-office services providers, based on the quality of human resources needed and the salaries that employees receive.

The effectiveness of telemarketing is measured in terms of the amount of sales or other desired results that are achieved with a specified number of calls. Some telemarketing strategies are naturally inefficient in these terms: simple outbound (call center-to-prospect) "cold calls" to numbers from unselective lists such as telephone books, for instance, are usually regarded as nuisances by their recipients, and rejected out of hand (just as is the case with spam e-mailings or "junk mail"). Cold approaches are therefore only likely to be profitable if they are inexpensive to implement, with high failure rates compensated for by high volumes of cheap agent calls (just as high rejection rates for spam e-mails are overcome by the almost negligible cost of mass e-mailings).

Those captive or independent telemarketers which choose to emphasize maximization of call volume and minimization of costs – whether from dependence on cold calling or for some other reason – often have highly stressful work environments, are prone to change their locations based on changes in employee wages, and offer only relatively superficial employee training, rather than imparting valuable and transferable skills that permit employees to move upward within a company, or to qualify for better employment in other companies[64]. Attracting or supporting companies which are strongly oriented towards this approach does little to increase the longer-term competitiveness of the country through the improvement of the national skills inventory.

The hiring of more highly-educated or socially-skilled workers for telemarketing, or making higher investments in telemarketing employee training, is more likely in

[63] *CAN-SPAM Act of 2003 <www.spamlaws.com/federal/108s877.shtml>*
[64] *How and When Does Management Matter? Job Quality and Career Opportunities for Call Center Workers* <www.geog.psu.edu/courses/geog497labor/Readings/BattHunterWilkFinal10-2002.pdf>

situations in which the marketer is making outbound calls using carefully compiled lists of people who are likely to be receptive to certain offers, or when handling inbound calls, in which prospects are calling agents in response to publicity efforts in other media, and the simple act of calling indicates prior interest in the offers being made.

Most call center operators are not, in fact, solely oriented towards the extremes of low-end cold calls or high-end, "high-touch" individualized attention to callers, but carry out a range of services, providing low-end services when they have excess capacity, and hoping to climb the value chain towards more personalized and customized services whenever the opportunity presents itself. It would benefit both independent call center operators and the country as a whole if a systematic study were made of how to provide more high-end work in call centers for Dominicans; this study could be carried out by a professional association of call center operators (a strategy mentioned previously for other sectors), perhaps assisted by the Dominican government.

Any such study should also take into account threats to the established telemarketing industry, such as the recent implementation of a national "'Do Not Call Registry" in the United States[65], which limits the amount of calls that can be made and imposes increased administrative overhead on telemarketers, and a proposed "Call Center Consumer's Right to Know Act" [66], which would require call center agents to disclose their physical location outside the U.S. – a potentially serious drawback at a time when job offshoring is seen by some U.S. citizens as a threat to the national economy.

Use of more skilled (and more expensive) agents is also more common in the area of *customer service*, whose perceived value to developed country businesses has soared as strong pressures to improve efficiency and profits have made the lower costs of customer retention relative to customer acquisition especially significant[67], and as interactive Internet services have raised customer expectations of the level of services that they should receive[68].

One of the strongest responses to the need for improved customer service has been increasing *automation*, since effective automation promises to be not only more economical than using high-paid U.S. workers, but more economical than using workers from any country in the world. The creation of increasingly effective corporate "self-service" Web sites, together with rising penetration of computer use and Internet connectivity in developed countries, may well be the most serious threat to employee job security in customer service centers around the world in the medium term; in the area of telephone-based customer service, sophisticated computer-telephony integration (CTI) technologies are not only making traditional voice-menu applications more useful, but are also being linked with voice-synthesizing "Text-to-Speech" (TTS)

[65] See <www.donotcall.gov>
[66] *Kerry Aims to Protect U.S. Jobs with Call Center Consumer's Right to Know Act* <kerry.senate.gov/high/record.cfm?id=215182>
[67] *CRM: pay attention to retention* <techupdate.zdnet.com/techupdate/stories/main/0,14179,2877897,00. html>
[68] *Power at last* <www.economist.com/printedition/displaystory.cfm?Story_ID=3810230>

applications to allow sophisti-cated voice responses to customer requests without the participation of human agents[69].

At the present time, however, automated customer service is still far from perfect[70], and there is still a strong short-term demand for highly-trained and highly motivated customer support staff. The higher costs of such staff lead to a significant opportunity for countries which can supply relatively high-quality office labor for lower wages than those in the U.S., either to staff captive MNC customer support centers, or to work in the facilities of independent local providers of such services to corporate clients in developed countries.

B1b. Human Resources for front-office services. As is the case in all of the other sectors discussed in this document, location, political environment, ICT infrastructure, and other general factors will have a large influence on the competitiveness of the Dominican Republic in the provision of outsourced front-office services. Since these factors have been discussed extensively in other parts of this document, we can concentrate here on the issue of the availability of appropriate human resources. Our starting point, as usual, will be the issue of labor costs.

Table 8 presents estimates of the hourly wages for English-speaking call center agents in the Dominican Republic and other countries in Latin America and the Caribbean, two Asian countries (the Philippines and India), Canada (a nearshore solution for U.S. clients), the U.S. itself, and the interesting case of U.S. communities on the U.S.-Mexican border, which represent one of the lowest-cost alternatives within the U.S. The total hourly cost of maintaining a telemarketing employee in any country may be three or more times basic salary, when factors such as the cost of international telephone calls, office space, employee benefits, and other items are included in calculations[71]; since these figures also do not take specific account of the relative quality or experience of the labor provided, we must conclude once again that salary figures should be used only as very rough indicators of relative labor costs.

While bearing in mind our previous discussion of the inadvisability of focusing primarily on the provision of lower-paid call center labor, and admitting that some countries such as India and the Philippines offer agents for less than half the salary of their Dominican counterparts, we can still regard these figures as showing that the Dominican Republic is competitive with a number of other countries in the cost of basic call center agents.

With regard to the available *amount* of available and appropriately-skilled workers for front-office outsourcing, the Dominican Republic begins with the twin disadvantages of not having a large population in absolute terms (as India and China have), and not

[69] *Cisco And IBM Partner In Contact-Center Products* <www.informationweek.com/showArticle.jhtml?articleID=162100217>
[70] *Company Call Centers Alienating Customers* <www.forbes.com/business/2005/01/19/cz_0119findsvpinhuman.html>
[71] Compare the salary figures in Table 7 with “fully loaded” figures in *Sun, Sea, Surf and Call Centers* <www.callcentermagazine.com/article/CCM20020823S0013>

educating a high percentage of the population at the secondary level and beyond (as do the European competitors in our tables, as well as Argentina and Chile).

Table 8: Hourly Wages for English-speaking Call Center Agents[72]

Country	US$ / hour *	Country	US$ / hour
Philippines	$1.34	Jamaica	$3.50
India	$1.50	Mexico	$3.75
Nicaragua	$2.00	Costa Rica	$5.25
Argentina	$2.25	Puerto Rico	$6.00
Brazil	$2.55	Canada	$6.00
Dominican Rep.	$3.38	U.S. border	$7.00
Panama	$3.41	U.S.	$10.75

*When ranges were given, averages were computed;
when converting between monthly and hourly wages, a month with
22 work days and a day with 8 working hours were assumed

During the consultant's site visit, several Dominican interviewees stated that one of the most promising aspects of attracting call centers to the country was precisely the fact that workers did not need to have the same high levels of formal education that are necessary for other types of outsourcing, such as applications programming, thus making a larger percentage of the total population qualified to handle call center work. It is certainly true that call centers in the United States are often staffed by workers with high school educations, or part-time college students, but competing developing countries are emphasizing the fact that the call center staff they provide have university educations as one of their main competitive advantages[73]. To offer less in the Dominican Republic would be to lose competitiveness – especially in the higher-value customer services area. Therefore, we must conclude that there is likely to be a shortage of appropriate labor in the Dominican Republic of the type that would make the country competitive with other developing countries.

To gain further insight into this issue, several Dominican operators of captive and independent call centers, and managers of free zones, were asked about the current levels of availability of qualified agents, and all of them indicated that they had experienced no notable problems with filling new or vacated call center positions within short periods of time. An interesting difference appeared when they were asked about the possible impact of the Dominican government's recent efforts to attract a number of

[72] CEI-RD; *"Gracias por Llamar" (Thank You for Calling)* <www.callcentermagazine.com/showArticle.jhtml ?articleID=15201442>; *India: an Investment Policy Proposal* <www.global-trade-law.com/India %28Meredith %29.ppt>; *What call centers give the highest entry level salary?* <www.pinoyexchange.com/forums/archive /index.php/ t-137466.html>; *Locating Call Centers Closer to Home* <www.callcentermagazine.com/article/ CM2002082 3S0012/2>; *Nicaragua Wants to Become A Nearshore Hot Spot* <www.outsourcing-offshore .com/ nicaragua.html>; *Call Center Outsourcing in Latin America and the Caribbean to 2008* <www.invest jamaica. com/sectors/it/reports/callCenteCaribbean2008.pdf>; *Guide to Establishing Call Centres in Jamaica* <www investjamaica.com/sectors/it/presentations/calCentreGuideFinal090604.pdf>; *Panama: National IT Strengths and Weaknesses* <www.american.edu/initeb/cs6223a/analysis.htm>

[73] *Call Center Outsourcing - Financial Implications* <www.outsource2india.com/why_outsource/articles/Call_ center_outsourcing.asp>

new call center operators to the country; in this case, most of the interviewees expressed reservations about the ability of the country to provide substantial amounts of highly-qualified new agents in the short term.

Developing-country governments often offer incentives to attract call center operations; among many other items[74], these offers usually include some type of help with manpower training to expand the available labor pool. Jamaica's state vocational training agency, for example, offers a call center curriculum in addition to basic technical training and provides call center operators with subsidized training for their employees[75]. In the Dominican Republic, it is hoped that ITLA's call center program and the government's new English Immersion program will produce enough appropriately skilled workers to attract and keep call center operators who are currently evaluating new locations for their facilities, but a firmer base for evaluating the present and near-term future availability of front-office workers is clearly needed, and a systematic investigation of the subject should be undertaken as quickly as possible.

When carrying out this investigation, explicit attention should be paid to the levels of experience that workers have in certain knowledge domains not specifically related to call center operations. Low-level telemarketing work may be done with workers that are superficially trained in the necessities of each new call center client's approach, and whose interaction with contacts is guided mostly by "scripts" developed by the client and the call center staff, but as the level of contact management provided rises in complexity (and salary), better background experience and more elaborate training become necessary. A recent report on call centers in Latin America and the Caribbean shows the areas in which most call center agents are employed in the region:

Table 9: Service areas In Latin American and Caribbean call centers [76]
Ranked in descending order of call center agents employed

1. Financial services
2. Communications
3. Technology
4. Manufacturing
5. Travel and tourism
6. Healthcare
7. Entertainment, media and leisure
8. Retail
9. Distribution and wholesale
10. Public sector
11. Utilities
12. Other

Another study, this time of call center customer service agent salaries in the United States[77], shows that highest salaries are paid in the areas of software, financial services, and hardware support, followed by healthcare, utilities, and a number of other

[74] For more detailed information, see *India: Winning the Race for Contact Centre Dominance in Asia* <www.joneslanglasalle.com/research/documents/India_WP.pdf>; *Call Center Outsourcing in Latin America and the Caribbean to 2008* <www.investjamaica.com/sectors/it/reports /callCenteCaribbean2008.pdf>; *Opportunities in Jamaica's Contact Centre Industry* <www.investjamaica.com/sectors/it/presentations/ callCentreWorkshop_files/ frame.htm>
[75] *Call Centre Guide* <www.investjamaica.com/sectors/it/presentations/calCentreGuideFinal090604.pdf>
[76] *Call Center Outsourcing in Latin America and the Caribbean to 2008* <www.invest jamaica.com/sectors/it/ reports/callCenteCaribbean2008.pdf>
[77] *Managing Financial Services Call Centers* <www.cuttingedgeinfo.com/reports/fs80_call_centers_summary .pdf>

categories. It is interesting to see the close correspondence between the very highest U.S. call center customer service salaries and the demand for agents in regional call centers; having local labor with substantial experience or training – academic or otherwise – in the areas of financial services, technology, and so forth would undoubtedly be a strong competitive advantage for the country. Any other areas with which inhabitants of the Dominican Republic might have unusually strong familiarity could also form the basis for the competitive offer of call center services, just as these local strengths might form the basis for the creation and sales of domain-specific software products (see comments on page 28).

There are other aspects of the Dominican labor force that are clearly competitive advantages for the provision of front-office services to the U.S. The country has a long history of inbound tourism, and of extensive migration of Dominicans to the U.S. (accompanied by the maintenance of strong relationships between those Dominicans in the U.S. and the Dominican Republic, and the return of many Dominicans after substantial time spent in the U.S.). These factors have resulted in a large number of English-speaking Dominican residents with a strong familiarity with U.S. culture and attitudes – a combination that is absolutely vital for the effective person-to-person interaction between U.S. residents and foreign services providers that is at the heart of front-office outsourcing. Only the Philippines in Asia, Ireland and Israel in the European group, Mexico and Canada in North America, and Puerto Rico, Costa Rica, Panama and Jamaica in Central America and the Caribbean can boast of similar human resources.

Another competitive advantage for the Dominican Republic stems from the fact that almost one-seventh of the U.S. population is currently classed as “Hispanic or Latino”[78], and an important fraction of this group prefers to receive telephonic assistance in Spanish. The developing countries best positioned to provide this kind of assistance are, of course, in Latin America, with the exception of the Philippines and low-income Hispanic communities within the U.S. itself; the fact that Spanish-language support is best provided by bilingual Spanish-English speakers to accommodate occasional English-language clients and the frequent use of English words in Spanish conversations[79] leaves the Dominican Republic, Mexico, Puerto Rico, Costa Rica and Panama especially favorably positioned among the competing nations being used here for comparative purposes.

Other positive attributes of the Dominican call center workforce can also be stressed when marketing the country to call center operators. Call centers in developed countries are often plagued by high staff turnover[80], due in great part to the perceived low status of call center work in wealthier nations; any data showing lower turnover in the Dominican Republic would be highly useful. Again, placing emphasis on a Dominican cultural tendency towards sympathy and a desire to help people with problems would

[78] *2003 American Community Survey* <www.census.gov/acs/www/Products/Profiles/Single/2003/ACS/Tabular/010/01000US1.htm>
[79] *"Gracias por Llamar" (Thank You for Calling)* <www.callcentermagazine.com/showArticle.jhtml?articleID=15201442>
[80] *Call Centers Thriving Worldwide* <www.kinesis-cem.com/Insights/call_centers_worldwide.html>

point out that the country is producing workers with a natural orientation towards a "customer service culture" [81].

B2. Back-office services. Back-office processes are at the core of daily business operations, and successful and innovative providers of back-office services from developing countries have a chance to integrate themselves into the daily operations of large international clients in a way that is not possible in the front-office market. Although successful competition in this niche will not necessarily transform a developing country – even India, the global leader in this area, remains a country in which the overwhelming majority of the population is poor and poorly educated[82] – there is no doubt that ignoring chances to penetrate this area would be an enormous strategic mistake, since even the earliest stages of pursuing these opportunities will help developing countries to position themselves for effective integration into the foundations of global business operations.

Focusing on the provision of back office services with very low worker skill requirements is often seen as a logical starting point for less developed countries wishing to enter into the offshoring marketplace[83], but we stress once again that any entry into a low-margin, low-skilled market segment only makes strategic sense for the Dominican Republic if it is treated as a first step towards the penetration of market segments which require more skilled workers who will be paid higher salaries.

Several Caribbean initiatives in the 1980s attempted to position data entry (the classic low-skilled back office service) as an entry point into telecommunications-enabled commerce[84], resulting in the initial attraction of companies with ICT-related needs to facilities such as Jamaica's Digiport International; later evidence seems to indicate that this strategy has led to the attraction of further businesses with more sophisticated ICT requirements, and the employment of more well-educated Jamaicans at higher salaries[85].

As we have already seen in the case of telemarketing and customer service, remaining trapped at the lowest levels of a services sector has a number of drawbacks. Just as low-cost telemarketing can breed unsatisfactory working conditions for call center agents, cost-based competition for commodity data entry services can produce "data entry sweatshops"[86], and just as automated call answering systems threaten more routine customer service activities, new technologies threaten the continued existence of data entry and document processing providers. As more applicants, claimants, and office workers in developed countries enter data directly into on-site computers and terminals, or into Web site forms, rather than filling out paper-based documents, the

[81] *Locating Call Centers Closer to Home* <www.callcentermagazine.com/article/ CM2002082 3S0012/2>
[82] *What India's Upset Vote Reveals: The High Tech Is Skin Deep* <www.nytimes.com/2004/05/15/ international/asia/15indi.html>
[83] *Doing Well by Doing Good* <www.technologyreview.com/articles/03/07/durant0703.asp?p=1>
[84] *Telecommunications and economic development in the Caribbean* <www.findarticles.com/p/articles/ mi_m1079/is_n2144_v89/ai_7537749/pg_2>
[85] *World Investment Report 2004: The Shift Towards Services* <www.unctad.org/en/docs/wir2004_en.pdf>
[86] *What Women Know about the Impact of the New Trade Agenda* <www.xs4all.nl/~tni/asem-seoul/ 008hale.htm>

need for unskilled labor to transcribe written data drops; as optical character recognition (OCR) programs become more efficient, information that is recorded on paper will require less human transcription; even specialized niches in document processing such as legally-mandated scanning of copies of checks and other financial documents are threatened by the increasing use of digital forms of payment in developed countries[87].

Given these trends, basic data entry and document processing do not seem likely to survive as industries by themselves, but will increasingly tend to be auxiliary offerings of larger companies which offer a wide range of outsourced services. The captive facilities of the multinational ACS (www.acs-inc.com) in the San Isidro Free Zone provide an excellent Dominican example of this strategy, which is repeated in many other companies throughout the Caribbean area; these types of companies offer as a bare minimum additional services to create and manage the database systems within which the entered data is stored.

A higher level of user skills are required for the performance of routine technical and clerical "information work" in areas such as ICT administration, finance and accounting, human resource management and payroll administration, sales, marketing, supply procurement, and inventory management. The two most important attributes of these types of work from the point of view of their potential to be outsourced are that their results can be digitalized and delivered over telecommunications networks, and that they are often based on highly *standardized* activities that do not vary significantly between developed and developing countries – something which is absolutely necessary if a foreign company is to take advantage of existing developing-country skills without extensive employee re-training or education that would, if offered, cancel out the cost advantages of offshoring this work in the first place.

The popularity of ICT-related back-office outsourcing is due in great part to the fact that the global ICT sector has its foundations in a very few standard hardware and software platforms; likewise, the fact that most programming makes use of a very few programming languages and standard logical models for program and database structures contributes to its popularity as an offshoring option. Given previous discussion, they need no further comment here.

One non-ICT office work area in which U.S. businesses have enthusiastically adopted outsourcing is that of Human Resources (HR) management[88], in which third parties are responsible for management of payrolls, pensions and health benefits, retiree administration, staffing and recruiting, and other traditional HR tasks. While the activities involved in carrying out these tasks may be mostly similar between different countries, there are certain legal and procedural details that certainly are not – a full-service outsourced HR provider would have to have a good working knowledge of 401(k)

[87] *Signed, Sealed, Delivered* <www.latimes.com/news/nationworld/nation/la-na-freightdogs11jan11,0, 6526374.story?coll=la-home-headlines>
[88] *Human Resources Outsourcing Goes Global* <www.outsourcing-international.com/hr2004.html>; *End-to-end HR outsourcing begins to catch on* <www.ebusinessforum.com/index.asp?layout=rich_story&doc_id= 6225>; *One with Everything* <www.cfo.com/printable/article.cfm/3006978>

retirement savings plans, for instance, and understand details of compliance with occupational safety (OSHA) regulations, all of which are particular to the U.S.

A Dominican company with experience in local HR management could learn the details necessary to manage U.S. clients' HR activities, or could partner or ally itself with a U.S. organization that had this expertise, or could try to attract Dominicans living in the U.S. with HR experience to return to the country to participate in HR outsourcing. At the other extreme, a multinational corporation with substantial HR experience in the U.S. could set up a captive facility in the Dominican Republic, use low-priced local workers to manage the most generic HR information management and analysis tasks, and depend on workers in the U.S., or U.S. employees stationed in the Dominican Republic, or specially-trained Dominican employees to handle the details which most Dominican workers would not be familiar with.

In either of these two extreme cases, as well as in any intermediate case, the presence in the Dominican Republic of skilled and experienced HR administrators would be a great benefit for the country's ability to participate in international service economies. Since offshore HR administration would involve the movement of confidential personal data from the U.S. to the Dominican Republic, it would be absolutely vital for the Dominican Republic to have strong legal protection for data confidentiality and personal privacy, and forceful prosecution of those who violate this privacy and confidentiality.

Another extremely popular area for outsourcing of office work in developing countries is that of accounting, payroll management, and other relatively low-level financial services[89]. While there are, once again, a number of country-specific legal and procedural details involved in financial services that form obstacles to their frictionless outsourcing to developing countries, the basic activities involved are remarkably similar from one country to the next – a fact which long ago led to the creation and growth of the various ancestors of the "Big Four" international accounting firms (PWC, KPMG, Deloitte, and Ernst & Young).

As was the case with HR outsourcing, offshore providers of these services could be either local providers who employed local accountants, financial planners, and other relevant types of local workers, or foreign companies who establish captive facilities in the Dominican Republic and employ the same type of local labor that local providers would be using. In either case, the presence of a large number of Dominican residents skilled in accounting and financial services would assume a new significance in the face of a new, far larger, and higher-paying international clientele. In this context, it is extremely interesting to remember that accounting led the list of most popular specializations as measured by enrollment in higher education in the year 1999 (see Page 15).

[89] *Deciding what to outsource to achieve high performance: Understanding a CFO's challenge* <www.accenture.com/xdoc/en/ideas/outlook/pov/deciding_usltr.pdf>; *Businesses Find Success Outsourcing Finance And Accounting* <www.informationweek.com/shared/printableArticle.jhtml?articleID=10700305>

The financial services sector is also particularly rich in smaller niche opportunities, not all of which require substantial backgrounds in finance or accounting. The collection of debts below certain amounts in developed countries, for instance, is made uneconomical by the salaries that must be paid to developed-country workers; if local workers in call centers in developing countries are substituted, smaller debtors can be economically tracked by telephone calls and online database searches, and contacted telephonically[90]. Several Dominican call center operators mentioned this area as one that they are now, or will soon be, operating in.

The greatest opportunities for the Dominican Republic to provide back-office services to developed countries undoubtedly lie in the type of routine "white-collar" office work discussed in the last few paragraphs. The problems with emphasizing low-skilled, low-paid labor have been discussed previously; the problems with aiming at providing services that require very highly-skilled and highly-paid workers include not only the small size of the relevant labor pool, but also the fact that the most highly-qualified professionals are often limited in offering the full range of their services by legal restrictions and barriers created by powerful foreign professional associations – doctors cannot prescribe treatments and medicines without being certified by local medical boards, just as lawyers cannot submit evidence or opinions without being certified by local bar associations, and construction cannot take place based only on plans drafted by architects who are not appropriately certified by local authorities.

Although a number of useful sources are available to learn more about the full range of mid-level office skills which are now being outsourced internationally[91], and we know that HR management and financial skills are among those most in demand at a global level, the question of which back-office service areas are particularly appropriate for the Dominican Republic to emphasize as strategic priorities is difficult to answer without the information provided by a national survey of skills and numbers of workers, which was recommended previously (see Page 16). Once that kind of information is available, the public, private, and academic sectors will have a base for addressing issues of training, attraction of services providers and foreign investment, investigation of markets and implementation of marketing efforts, and all of the other aspects of building a successful national back-office services sector.

[90] *And now, outsourcing of debt collection* <sify.com/finance/fullstory.php?id=13624739>
[91] E.g., *Digital Delivery of Business Services* <www.oecd.org/dataoecd/8/8/31787438.pdf>; *Global Services Sourcing: Issues of Cost and Quality* <www.earthinstitute.columbia.edu/cgsd/documents/bajpai_outsour cing_005.pdf>; *World Investment Report 2004: The Shift Towards Services* <www.unctad.org/en/docs/ wir2004_en.pdf>, etc.

SECTION IV
SUMMARY AND RECOMMENDATIONS

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A) Foundations - Human Resources, Infrastructure, and Laws

The Dominican Republic is competing in a global marketplace for many of the resources that it needs to maintain and improve the quality of life of its inhabitants. Wealth in this new economic regime is increasingly based on skillfully providing intangible services, in collecting and analyzing information, and in taking informed actions based on that analysis. The basic foundations upon which effective participation in this kind of "information economy" is built are often lacking in some way or another in developing countries, and the Dominican Republic is no exception.

This is nowhere more apparent than in the area of skilled human resource availability. *The single most important thing that the country will need in order to prosper in the future is a large, well-educated workforce,* but the formal educational system does not educate a high percentage of Dominicans past the level of primary education, and the country is not so large that having a small percentage of the population well-educated still implies having hundreds of thousands or millions of highly-educated people – a critical mass of workers to attract foreign investment, and to permit the modernization of Dominican businesses. The government must make the investments necessary to substantially improve graduation rates for secondary and university education, or the country will not prosper as it hopes to, regardless of the amount of computers and telecommunications networks that are installed, or the number of foreign businesses attracted that are content to use unskilled local labor.

As has been repeatedly mentioned here, the skills that the new workforce will need are not necessarily focused directly on technology – on computer hardware, software, networks, and engineering. Skills in areas such as business administration, accounting, inventory control, marketing and customer service not only continue to be necessary for Dominican businesses, but are coming to be products that can have the potential to be sold to businesses in other countries with the same degree of success as technical skills such as computer programming.

It is of course vital that a great part of the workforce know how to *use* ICTs. Since relatively few households have computers and Internet connections to provide that experience to youngsters, it is necessary that formal education include basic experience with the use of computers, common software, and the Internet – not to a small minority of students, but to the great majority of them. This is a task whose successful completion would require a huge increase in the number of computer laboratories (and computing teachers) in schools, the development of truly effective distance education, and other strategies yet to be thought of – again, an enormous challenge, but one that must be met.

Other, more specialized types of training will also be necessary. On the ICT side, this will involve the training of technicians to install, configure, and maintain hardware, software, and networks, and the training of higher-level specialists to design and create new technology and information systems – a responsibility shared by a range of schools from large and small technical training institutions to the country's best universities. In addition, industries which the government regards as especially important, such as call centers, will require specialized training that the state may help to provide: in the case of call centers, this currently involves English-language immersion courses and centers for call center excellence. Full attention must be constantly given to the improvement of technical and strategic non-technical education if the Dominican Republic is to establish itself as a successful competitor in the international services provision market,

One of the greatest problems with planning the expansion of educational coverage is a lack of information about the number of Dominicans with different levels and types of education and experience, the capacity of learning institutions to generate graduates in different areas, and the number of Dominicans working in different areas which may prove to be strategic as globalization unfolds and technology evolves to enable new types of services-base commerce. A national educational and skills inventory would be an enormous aid in any national initiative to improve the competitiveness of the country.

The ICT infrastructure of the country – the sum of all devices and programs that are used to store, process, and transmit information – is also less than ideal. The country enjoys a competitive telecommunications market, excellent international connectivity, and a rapidly growing penetration of cellular telephony, but the national electrical system is notoriously deficient, and must be greatly improved, and penetration of computers and Internet connectivity remain far lower than in many other countries in the World. Initial steps towards subsidizing the purchase of computers (for teachers) have already been taken, but these kinds of programs should address a far wider audience in the future, as have similar efforts in other countries. The extension of regular telephony and Internet connectivity through the use of new long-range wireless connection technology in metropolitan and rural areas should likewise be seriously considered. The government telecommunications regulator should be especially efficient in the regulation of the electromagnetic spectrum used to carry these wireless transmissions, to avoid the conflicts and inefficiencies in the use of the spectrum often seen in other developing countries.

The lack of widespread Internet connectivity and frequent failures of the national electrical grid (which also negatively affects the penetration of computers) make it likely that ICT and ICT-enabled businesses which carry out international commerce will for the foreseeable future have to be concentrated in especially well-connected areas such as the country's Free Zones.

In an economy in which success depends more and more on being well-informed, the value of information increases greatly. As a result, a number of new types of crime related to the unauthorized interception, modification, and use of information – and digital goods in general – become increasingly common, including the theft of

intellectual property and personal data. Any theft of this sort within the Dominican Republic will have increasingly negative local effects as the success of the nation's businesses comes to depend more and more on the possession of valuable confidential or proprietary information.

Extremely importantly, an international reputation for being a nation in which intellectual property and personal information are not safe will be a disaster for any hopes that the country has of participating strongly in international trade in information products, or the growth of industry segments that require the importation and exportation of confidential information. Thus, the Dominican Republic must not only have laws and sign treaties that protect intellectual property and personal data, it must also enforce them strictly, and be internationally *seen* to be doing so if it is to have reasonable hopes of participating fully in some of the most promising areas of international information-based economies. In the short and medium term, the country must pass an effective version of the *Ley de Delitos Electrónicos*, develop and implement effective means of prosecuting "information crimes", and make a strong point of publicizing the results of this enforcement to the international community.

B) Sector Analysis and Actions

We have discussed the commercial potential to the Dominican Republic of various market sectors in which ICTs have a part – either as products in themselves, or as the focus of associated services, or as facilitators that allow new and especially promising types of non-ICT products and services to be offered to international clients.

Manufacture of hardware *products* essentially means manufacture of specialized components. The manufacture of such components, especially integrated circuits, requires very large fabrication facilities and a support environment with dependable sources of electricity and highly-trained workers; the Dominican Republic does not appear to be especially competitive in these terms. The country could compete more effectively as a location for the assembly of components into computers, but this is a low-paid, low-profit-margin market segment in which there do not appear to be clear opportunities for local workers and businesses to rise into more highly-paid, higher-profit activities in the hardware industry through time. In sum, the hardware products industry does not appear to represent an attractive future for the Dominican Republic.

In a world economy based increasingly on services, it is reasonable to ask if there are *services* that are closely related to hardware that businesses in the country might offer. We considered the example of remote data center services – essentially, networked leasing of hardware and associated technical maintenance services – and found a far more attractive situation than was the case with hardware manufacture and assembly.

Large local businesses such as Verizon are already considering creating shared data centers. Smaller businesses in other countries in the region are already succeeding in the area, and there is a clear path for data center operators who can satisfy their clients with the quality and reliability other than their basic services to sell these clients

increasingly sophisticated and profitable additional services. Since the services must be extremely reliable, providers would almost inevitably be forced to locate themselves in Free Zones or other selected areas with extremely reliable electrical supplies and Internet connectivity.

While the hardware-related services sector is clearly more attractive than the hardware manufacture and assembly sectors, the software and outsourced office services sectors appear to have a greater potential for positive impacts on the national economy, and should accordingly receive the majority of attention devoted to the strengthening of Dominican competitiveness in sectors related to ICTs. We begin the discussion of these two sectors with a consideration of certain activities that can benefit both of them.

Both the software and outsourced office services sectors can involve either local companies, or foreign companies that are attracted to the country to carry out their operations. In the early stages of their operations, *local* businesses almost inevitably face serious problems in finding adequate financial resources and in obtaining information about foreign markets and competitors, have serious problems in making their offerings known to an international audience, and have equally serious problems convincing that audience to have confidence in their products and services. The following actions should therefore be taken:

- **Financing** – the national government should do whatever it can to make financial resources and financial mechanisms accessible for local companies. This can include providing grants or subsides for companies in strategic areas, having state banks extend credit to these companies on a portfolio basis (to distribute the risks of investing in startup businesses), helping to find local or foreign investors, and stimulating the formation of local venture capital funds, whose own portfolio-based approach helps private sector investors to overcome their reluctance to invest in startups.
- **Investigation of markets and competition** – both the government and local businesses should search out international trade data, and data on the internal demand for software and outsourced office services in the countries of potential clients. They should also investigate the products, services, prices, and marketing strategies of their competition in developed and developing countries.
- **International marketing and relationship formation –** local businesses should undertake international marketing programs and searches for possible partners in foreign countries. The Dominican government can help to introduce local companies and their products and services to potential foreign clients and partners through the standard mechanisms of trade fair sponsorship, help with visits of potential clients to the country, trade missions, and consular activities.
- **Confidence** – local businesses should make all possible efforts to evaluate and implement internationally-recognized quality certification methodologies (e.g., Carnegie-Mellon CMM and ISO standards for

software, Customer Operations Performance Center [COPC] for call centers), to have workers qualify for various professional certifications (e.g., Microsoft, Cisco, and Oracle certifications), and to publicize their qualifications in the international marketplace. The government should stimulate and strongly support quality control efforts in strategic sectors.

There are at least two extremely important types of activities that can assist in most or all of the areas mentioned above:

- **Form professional associations** – the high costs of international market research and marketing, and the implementation of quality certification methodologies, can be shared among the members of a strategic sector through the formation of sector-specific professional associations. Participation in such associations can also benefit their members by giving them increased influence in lobbying for favorable legislation, and benefit the government by giving it a single source to talk to when considering new legislation.
- **Mobilization of the diaspora** – the government and private sector associations should cooperate to identify, contact and organize members of the Dominican community living abroad who might be especially disposed towards contributing financial support, technology, entrepreneurship, and market intelligence, and who might, in some cases, actually be clients for the local products and services offered.

In the case of *foreign* businesses, the problem is a familiar one of providing attractive incentives, an area in which the Dominican government has already acted strongly and productively – most notably in its Free Trade Zones regime. Standard incentives include selective tax reductions, economical telecommunications, loose restrictions on foreign ownership, repatriation of earnings, manpower training initiatives, assistance with locating and renting appropriate facilities, preferential customs clearance procedures, and labor laws that do not unduly favor local workers at the cost of foreign business owners.

When we moved to a discussion of the software industry earlier, a distinction was made between software products and software services. Speaking of producing commercial software *products*, we noted that local attempts to find mass-market or regional-market success with generic office applications running under Microsoft operating systems were unlikely to succeed, and recommended that local software vendors instead consider providing software for less crowded niches, such as generic office applications running under open-source operating systems, or narrowly-focused applications based on areas of local knowledge and expertise that had little or no competition on any operating system platform.

When considering the area of software *services*, we focused on the area of providing outsourced services to foreign clients, and chose as an example outsourced

programming – the most common and commonly-discussed type of outsourced software service provision. Analysis of this option led to several interesting conclusions:

- Providing local labor for Dominican offices of MNCs is not likely to lead directly to the formation of new local software companies, as the Irish once hoped; nonetheless, the indirect benefits of the presence of such companies lead us to recommend that efforts be made to attract captive operations of MNCs.
- While the largest international clients for offshore programming are likely to choose either the "captive provider" approach or outsourcing to very large and well-established programming providers, a new trend in towards use of outsourced programming by smaller businesses in developed countries offers an interesting opportunity for independent Dominican programming services providers, as might provision of such services to the Dominican diaspora – leading to the recommendation that special attention be paid to these market segments when investigating foreign markets and marketing strategies.
- A consideration of the factors that influence the perceived attractiveness of the various countries in our group of competing nations, including programmer salaries, leads to the conclusion that the Dominican Republic should be promoted as a reasonably-priced "nearshoring" option, stressing its geographical closeness to the U.S., as well as its familiarity with U.S. culture and society, and the familiarity of U.S. tourists with the country.

The final recommendation that was made regarding the promotion of the software industry was that strong efforts be made to compile information about the number and orientation of Dominican software companies, and the number and skills of Dominican programmers, software project managers, and other critical types of software company personnel, in order to provide a firm basis for estimating the current capacity of Dominican businesses to satisfy demand for outsource programming services, and the efforts that will have to be made to produce a larger and better-trained body of workers for the software sector.

After considering the "ICT" sectors of hardware and software products and services, the discussion turned to the opportunities available in "ICT-enabled" sectors – specifically, the provision of outsourced front-office (telemarketing and customer service) and back-office services (data entry, human resources and financial clerical work, etc.).

Outsourced telemarketing is often regarded as especially promising for developing countries due to a perception that it can provide substantial employment for relatively low-skilled workers. Our investigation showed a number of problems with this idea. In the first place, many developing countries stress the high level of education and training of their agent workforces, so that any attempt to use less-skilled labor would result in a substantial loss of competitiveness in a brutally competitive marketplace. Secondly, it seems that those low-skilled positions that actually are available in this sector are often

not highly desirable options, since the continued presence of low-end telemarketing providers depends heavily on the ability to carry out operations as cheaply as possible – a situation which can lead to low salaries, low investment in call center agent training, and generally unsatisfactory working conditions, as well as the flight of providers to other countries whenever lower-cost options become available. Finally, the relatively simple activities that are carried out at the low end of telemarketing are increasingly subject to replacement by automation, threatening the continued existence of employment opportunities at even the lowest salaries.

This situation leads to the conclusion that it is the best interests of the Dominican Republic to not only prepare as many highly-skilled call center workers as possible (as it is doing with the ITLA Call Center Excellence program and the new English Immersion program, for instance) to remain competitive, but also to make efforts to attract or support the kinds of call center operators that are willing to pay relatively well for that skill, and to train their agents intensively in areas that will serve them well in the future. The government could, for example, view a strong customer-service orientation especially favorably when attempting to attract call center operators, since customer service generally requires more extensive training (and higher salaries) than simple telemarketing.

When comparing Dominican call center workers to those of competing countries, it was concluded that the country should again emphasize the reasonably-priced “nearshore” image discussed previously, as well as Spanish-English bilingualism (for serving the Latino/Hispanic segment of the U.S. population), and a naturally sympathetic “customer-service-oriented” cultural orientation.

The back-office services sector also has a low end and a high end. As was the case for low-end telemarketing, provision of very basic back-office services such as data entry can, in some cases, result in low salaries and unsatisfactory working conditions. The particular case of data entry is also unusually highly threatened by the substitution of automation for human labor, due to technological advances such as improved Optical Character Recognition software. In the case of back-office services, the “step up” that provides more job stability, better pay, and better training is that of moving towards the outsourced provision of relatively routine office work, in areas such as human resources administration and financial and accounting services. Once again, we recommend that the Dominican government show preference towards attracting or supporting those businesses which provide this higher-level type of service. A more precise definition of the areas of mid-level office outsourcing which are most likely to be successfully provided by the Dominican workforce would be enormously assisted by the results of a national skills survey, an activity which was recommended previously.
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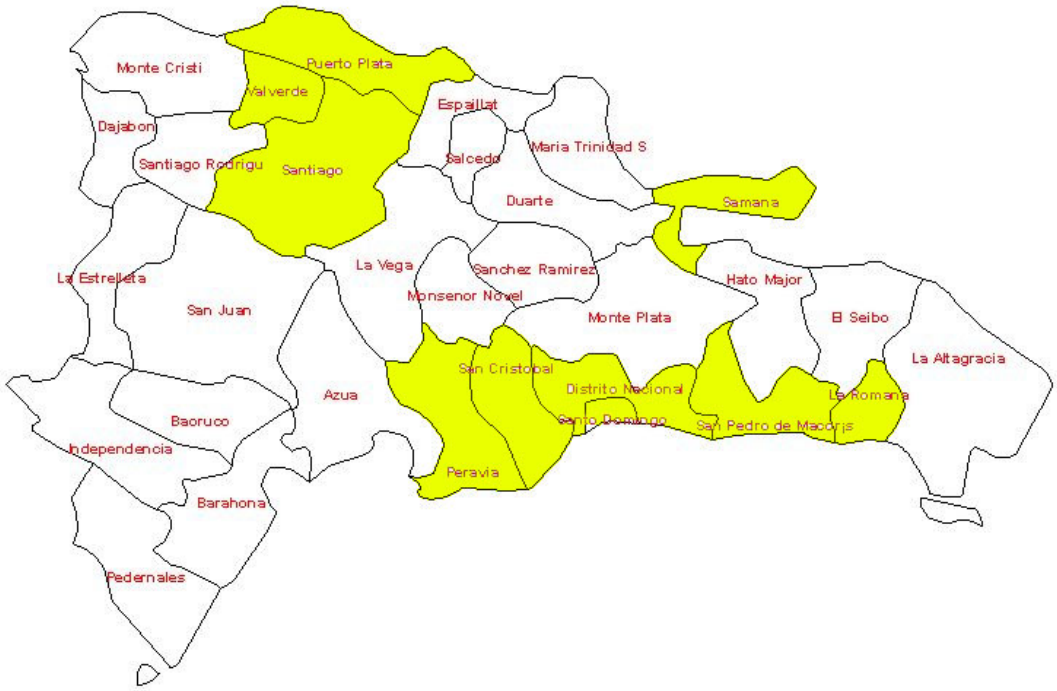
ANNEX A

PROVINCES WITH MUNICIPALITIES WITH HIGHEST HOUSEHOLD ICT PENETRATION

ANNEX A

PROVINCES WITH MUNICIPALITIES WITH HIGHEST HOUSEHOLD ICT PENETRATION

(see Table 2, page 8)



ANNEX B

PERSONS CONTACTED

ANNEX B

PERSONS CONTACTED

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Madeleine Capellán	United Nearshore Operations
David Carruthers	Bet On Sports.com
Juan Casilla Benzant	INFOTEP
Miguel Angel Cid	Infonovación
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ANNEX C

TERMS OF REFERENCE

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United Status Agency for International Development (USAID)
Dominican Republic

Chemonics International, Contract No. PCE-1-830-98-00015-0

Scope of Work
Export Competitiveness Study on Information and Communication Technology (ICT)

This Scope of Work (SOW) provides the background and specific tasks required to contract a consultant to prepare a strategic report on the ICT sector in the Dominican Republic (DR), examining the opportunities for and constraints on the Dominican Republic's competitiveness in the ICT industry, and recommending a strategy with specific initiatives to resolve near-term barriers to growth and set the stage for accelerating industry export development.

BACKGROUND

The export sector has been an important source of growth for the DR. Over the 1990-2000 decade, DR exports increased from US$850 million to US$4.8 billion. Three important factors influencing the grow in exports were the proximity to the US market, the Free Trade Zones that provided incentives for investment in the DR, and the textile and apparel quota system that provided market advantage to the DR.

The Central America, United States (US), DR Free Trade Agreement (CAFTA-DR) was signed on August 5, 2004, and will probably be ratified by all the legislative bodies in every country during 2005. This provides duty free entry to the US market, subject to some constraints. The Agreement is likely to significantly enhance trade between the participating nations, creating new opportunities, as well as possible threats for specific sectors.

The Free Trade Zone (FTZ) system will change significantly. Under current WTO rules, FTZ benefits are considered export subsidies and must be phased out by 2009 for all countries with a per capita income greater than $1,000 (a formula has been established to adjust the threshold income level, originally set in 1994, to account for inflation), including the DR.

The DR export sector must prepare for these challenges. The Export and Investment Center of the DR (CEI-RD), the Dominican Association of Free Trade Zones (ADOZON), the National Competitiveness Council (NCC) Secretariat and USAID/DR have been engaged in discussions on how USAID/DR can assist them in meeting the challenges facing the sector.

The activity described below will assist the above organizations to collaborate in the development and implementation of strategies to address these challenges. The objective is to analyze the potential of the ICT export sub-sector to increase production and exports and become a leading growth sector for the DR economy. As part of the analysis of export growth potential, the Consultant will identify the constraints, domestic or foreign, that must be addressed for the sub-sector to fulfill that role, and recommend actions to be taken to address the constraints. These recommendations will be utilized by CEI-RD, ADOZONA and the NCC Secretariat to implement export development strategies necessary to accelerate export growth in the ICT sub-sector and to address the constraints to accelerated growth in the sector. They may also be used to develop and conceptualize assistance – both donor and public sector – to the industry.

As sectors that have served as traditional sources of growth in the Dominican economy mature, there is a need for the identification and promotion of new growth sectors that will serve as growth poles. The DR is fortunate to have several sectors which appear to have rapid growth potential. What is required is an analysis of their growth prospects, the sources of competition and the policy or other constraints that could limit that growth.

The global market for knowledge-based services, such as software development, programming and maintenance, customer service and technical support call centers, multimedia and computer graphics operations and processing of scanned document images is growing rapidly and has a foothold in the DR. Competitive pressures, aggravated by the recent economic downturn in North America and Europe, are driving international companies to seek high-quality, cost-effective new sources of these services- and they are increasingly establishing operations in offshore sites to preserve or expand market share.

Although Dominican firms are engaged in these services, counterparts in India, Israel, Mexico, Central America and other countries are already competing in the information industries markets for software and tele-services. The market is estimated at between US$120-200 billion and growing. Public sector and industry leaders in the sector believe that with the right mix of industry coordination, support from academia and establishment of a policy environment conducive to ICT growth, the sector has promise become a driver of future growth.

OBJECTIVE

The objective of this study is to prepare a strategic report on the ICT sector in the DR, in the form of a SWOT analysis (strengths, weaknesses, opportunities, and threats) that will present to public sector and industry leaders a clear picture of where the DR is positioned at this time to compete in the global ICT market place (including niches, competitors in these niches). The consultant will outline steps required to enhance this competition at both a macro level but also concrete steps that can be taken over the short run. In effect, the consultant will recommend a strategy with specific initiatives to resolve near-term barriers to growth and set the stage for accelerating industry export development.

TASKS

The Consultant will perform the following tasks:

- Interview key stakeholders in the DR, such as the CNC, ADOZONA, CEI-RD, and ICT companies operating in the DR.
- Analyze the potential of the ICT export sub-sectors (niches) to increase production and exports and become a leading growth sector for the DR economy.
- Based on available data and the consultant's knowledge of the industry provide benchmarking background on leading competitors, including their own strengths and weaknesses, for example, known incentives provided by countries to attract foreign direct investment (FDI) in the industry.
- Describe the role that FDI plays in the industry of leading competitors. If FDI is essential to building a successful industry (e.g., the Irish model), what steps must the DR take to generate it.
- Identify the constraints and threats, domestic or foreign that must be addressed for the sub-sector to fulfill that role, and recommend actions to be taken to address the constraints.
- Present an outline of the report within 10 days of the assignment.
- Present a draft report to the Competitiveness and Policy Program (CPP).
- Incorporate observations made by report reviewers.
- Make a formal presentation to a wide audience of stakeholders in the ICT sector in the DR.

DELIVERABLES AND OUTCOMES

The Consultant will deliver to USAID/DR:

a) A strategic report/SWOT analysis on the ICT sector in the DR examining the opportunities for and constraints on the Dominican Republic's competitiveness in the ICT industry, and recommending a strategy with specific initiatives to resolve near-term barriers to growth, provide a long-term vision, and set the stage for accelerating industry export development.

b) The report will be delivered in Microsoft Word (Times New Roman 12) in digital form and hardcopy (25 copies). English is acceptable.

c) A Power Point presentation of the major findings of the report.

Intellectual property rights of the reports, presentations, research, data and work produced by the consultant is of Chemonics. All the drafts and materials obtained during the consultancy must be delivered to Chemonics upon completion. The consultant agrees not to publish or make any other use of the materials without previous written approval from Chemonics and USAID.

IMPLEMENTATION OF THE TECHNICAL ASSISTANCE

The consultant will be contracted by Chemonics International under a task order from USAID, and will work directly with the CPP. Lic. Elka Scheker from the CNC will coordinate and supervise the work of the Consultant; and Dr. Rubén D. Núñez will have the same responsibility from the CPP.

LEVEL OF EFFORT

The level of effort is estimated in 23 person days and two trips to the DR. Time in and out of the country will be agreed upon between the consultant and Chemonics.

REQUIRED QUALIFICATIONS

The Consultant will have the following qualifications:

- Proven, excellent, first hand knowledge of the ICT markets, mainly what is produced in FTZs around the world and market niches where the DR competes.
- A minimum of 10 years related industry experience in academia, private industry (ICT) and, preferably, a combination of both.
- Knowledge of the DR ICT industry (highly preferred)
- Good oral communication in Spanish.
- Excellent oral communications skills and ability to conceptualize and identify market opportunities.
- Excellent writing skills and ability to produce a good written report and a power point presentation.