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The Globalization of Technology to Developing Countries

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Abstract:

This paper examines current trends in the globalization of technology to developing countries, and the current disparities that exist. This thesis will indicate why many developing nations have limited access to new technology, and what steps must be taken for them to better their economic status. In addition, the actions and effects of both Wired International, a non-profit organization, and the Gaviotas community in Colombia will be analyzed. These two organizations represent groups helping to achieve major positive change in severely underdeveloped nations, and accordingly their impact and methods have the potential to spread endlessly worldwide.

Introduction:

I had never been thrust into a true international business setting until last summer when I worked for Competitive Technologies, a company based in Connecticut. During that internship it dawned on me how many brilliant inventors there are in the world, and how many astounding new pieces of innovation are developed and introduced every year. The most incredible device I was exposed to was a pain therapy device that uses electricity to create an artificial neuron in its patients. This artificial neuron is concentrated on the afflicted region, and reprograms the synapses delivering pain signals to the brain. As a result, the brain gets new signals indicating no existing pain. I sat there mystified as the H.R director, Deborah, taught me more about this groundbreaking machine. The pain therapy machine is used to treat chronic, visceral pain, and has shown in clinical trials in Italy to be able to completely cure most cases of such pain; pain resistant to even the highest levels of medication. Even in cases where the patient was not fully cured, they experienced drastically reduced pain, and after 3,000 clinical trials in Italy there were no discernible negative side effects.

The invention was a perfect example of the beneficial aspects of globalization. A company based in the U.S helps market a product created by an Italian scientist, and is able to manufacture thousands of machines with the help of a company in Korea. In addition, Competitive Technologies applied for and received a patent and FDA approval in the US, which allows clinical trials to be conducted on American patients experiencing unrelenting, internal pain. This device has the ability to revolutionize modern medicine, and the potential to eradicate pain medications such as morphine, which are highly addictive.

All this exposure to such a groundbreaking discovery led me to research other important inventions over the past few years. Scientists are coming up with new, remarkable products

every year, and in a global market and atmosphere these ideas and innovations can quickly spread and catch on. Soon after, I recall watching a news special on an impoverished town in Guatemala, and thought about all the inventions and breakthrough being made at all times. Despite all this new technology, there are still millions of families and children who are starving and have no access to basic technology; things most Americans take for granted every day. I wanted to know why this disparity existed and what was being done to help these regions that remain still so underdeveloped. As a result, I chose to do my thesis about the globalization of technology to developing countries. I wanted to see why some nations and regions had such limited access to technology, and what trends were currently occurring worldwide.

After completing my literature review, I wanted to focus the second part of my thesis on the organizations promoting the spread of technology, and seeking to improve the quality of life for poorer areas around the world. After some thought, I decided to divide technology into three major categories: medical technology, communications technology, and technology as a whole. I picked several organizations that apply to one or more of these categories, and analyzed their efforts over the past few years, in addition to incorporating empirical data to back up my analysis. The basic focus of the engaged thesis is to examine current efforts to help expedite the process of the globalization of technology to developing countries, and decide what must be done in the future to ensure these countries will improve in the future.

Literature Review:

Executive Summary:

Over the past few decades liberal trade views and policies have been dispersed and adopted throughout the world. These policies of free trade have spread technological ideas and inventions throughout all regions of the world, and have fostered cooperation and breakthroughs

around the globe. The problem remains, on the other hand, that a vast majority of developing and Third World countries are not benefitting fully from globalization of technology. With the exception of East Asia, Third World countries have not achieved any significant economic growth over the past decade. In addition, their access to new technology is limited. In many cases only the elites of a particular under-developed country have technological access, and the rest of the country is confined to lives of abject poverty, and lives without important necessities such as water purification.

In these decades there have been technology and innovations disseminated to these Third World countries. The problem, however, is that frequently this dissemination is conducted by private corporations seeking to expand their own personal market, or by more powerful nations who take these developing countries under their wing, so to speak. Therefore, these countries are either exploited by the private conglomerates and corporations, or inevitably become dependent on the more powerful country or countries assisting them. In order for these Third World countries to develop and grow, they must learn how to acquire new technology and create comparative advantages in the global market in a self-sufficient and sustainable way, otherwise they will simply fall back into the stagnated patterns of growth observed in the most recent decade.

Introduction:

Globalization has long been a rising phenomenon, increasing over decades and centuries without signs of slowing. With the rapid changes occurring in the world as a result of rapid globalization, many questions and debates have arisen. Many pundits are concerned about the unequal distribution of wealth and resources, and fear the gap between poverty and luxury will

only be exacerbated by the effects of globalization. Other experts argue that globalization allows for the dissemination of new ideas and technology around the globe, including to impoverished peoples desperately in need of it. The purpose of this literature review is to examine the globalization of technology and innovation in the modern world. A further focus of this review will be to illustrate why many developing countries have displaced relatively no growth, and still have restricted access to important technology. In addition, this literature review will demonstrate which factors have contributed to this overall lack of growth in Third World countries.

I. Brief History of Globalization

To understand globalization in the world today, one must be familiar with its historical origins. Henry Nau carefully identifies several underlying factors in the development of globalization in his book Perspectives on International Relations. Nau divides the birth of globalization into three categories of causation: the realist, the liberal, and the identity perspectives.

From a realist point of view, globalization sprang forth as a result of shifting power between nations and actors. Realists indicate four main periods to support their views. The first age is dubbed as the age of mercantilism, which “dominated trade in the sixteenth through eighteenth centuries. The goal of mercantilism was to increase the overall wealth of the home state by producing a surplus of domestic goods while limiting imports. Ultimately, this led to the next important period of Pax Britannica. Britain became the undisputed hegemonic power during this period. This was important in developing globalization because a “hegemonic power provides common services that allow for the intensive development of international economic

relations”.¹ Britain’s dominance influenced global trade, which naturally scattered cultural ideas and goods around the world.

Britain’s status as the sole hegemon naturally could not stay permanent. From the realist view the Interwar Period (WWI and WWII) weakened the British economy and left Europe in an economic depression. In order to compensate, “countries devalued their currencies in a self-destructive effort to lower prices for their exports and trade their way out of depression”. This of course produced a stalemate; countries wanted only to export and not to import, and the effects of these so termed “beggar thy neighbor” policies were negated. The world economy broke into several regions, and ultimately led to Pax Americana, or as Nau describes it: Globalization 3.0.

After the termination of the Second World War, the “United States finally accepted its role as the leading world economic power”.² The success of the US economy as the dominant force in the western hemisphere led to the founding of the Bretton Woods institutions. Once these institutions were established, globalization exploded across the world with the US at the center of the helm. After the collapse of the GATT (General Agreement on Tariff and Trade), other superpowers emerged, such as the Soviet Union. The Soviet Union eventually crumbled. When it did, “a single power, for the first time in history, straddled the entire globe”³.

Nau makes the strongest case for the realist perspective in his demonstration of the history of globalization. He does, however, also elaborate the beliefs of the liberal and identity perspectives. The liberal perspective, rather than focus on power, deems institutions as the causative factor in the growth of globalization. Liberal theorists, as Nau asserts, would attribute the burst of trade and exchange of intercultural ideas to policies of laissez-faire. These policies

¹ Nau, Henry. *Perspectives on International Relations*. CQ Press. Washington, D.C. 2009 pp. 279-291

² Nau 279

³ Nau, 280

promoted trade and led to the emergence of dominant hegemonic powers. This contrasts the realist explanation which states the accumulation of power by nations upset the distribution of relative power across the globe, and served as a catalyst for trade and interaction. The identity perspective, on the other hand, explained the phenomenon of globalization as a product of the ideas of different nations converging in the proper manner. For example, “classical economic liberalism introduced the idea of relative equality of the parties in a relationship”⁴, and the development of the system and ideas of Keynesian economics also facilitated and encouraged global trade and expansion.

Nau refuses to identify with any one particular perspective, although his section on realist explanations of the history of globalization is the longest of the three. While they are three distinct and separate perspectives, Nau demonstrates how each fits in with the other. For example, ideas of the importance of power lead to countries accumulating hard power, which translates into increased trade, and increased global trade calls for the necessity of governing international regulations and institutions. It is a safe conclusion to draw from Nau that no one single perspective completely explains how globalization formed and grew. Instead, the three perspectives can be used as a guide to identify important factors and historical events that promoted international relations, trade, negotiations, and interactions between overseas countries. These perspectives, as Nau shows in his book, chronicle the gradual formation and expansion of globalization, and provide a useful framework for explaining its past fluctuations and for predicting its future patterns.

II. Globalization of Technology in Developing Countries

To developing countries, the developed countries which have thrived over the course of the last two decades serve as role models in terms of setting goals for future GDP outputs,

⁴ Nau 310.

technological achievements, and successful trade interactions. The problem is that over the past two decades, regions such as Latin America and Africa have made little progress with respect to technological advancements and achievements. Some experts believe reasons for stalling progress in these regions can be attributed to “important parts of society that resist change.”⁵ Globalization has become a double-edged sword, and many informed citizens are aware of the potentially harmful consequences of forming alliances with international branches and companies. Hugo Chavez, for example, has been adamant in resisting the phenomenon of globalization, and has denounced the concept as detrimental to the country of Venezuela. He has resisted such characteristics as privatization and affiliation with conglomerates, and instead has stressed the notion of domestic strength and productivity. To some extent his policies have had success. The poverty gap in Venezuela has been reduced since Chavez has been in office, and employment has gone up. The lower classes in Venezuela have increased hope and promise, however, the proliferation of innovation and new technology in Venezuela has decreased, which could limit the potential of Venezuela to develop into a First World country.

In addition to social resistance of change, experts also point out that “late starters face larger requirements for capital and other advanced factors than those that prevailed at an earlier stage”.⁶ In other words, developing countries seeking to enter the global market now are already behind. Large amounts of cash flow and general capital are needed to establish a true presence in the global market, and many Third World nations simply have not yet generated the necessary capital and domestic conditions to be strong competitors in the current world of neoliberal trade.

The bottom line is that in order to disseminate technology and allow for countries to compete in the global market, there must first be a spreading of innovation. Technology is both

⁵ Fagerberg 1156

⁶ Fagerberg 1155

costly and time consuming to transfer from one setting or region to another. Ideas, however, are much less expensive and arguably more valuable.⁷ The possession of new technology without knowledge of how it works, how to build it, or how to market it both domestically and internationally completely negates the point of having the invention in custody at all. The hackneyed expression *knowledge is power* may be corny, but perfectly fits the explanation of why there is so much implied value attached to innovation and ideas. Innovation not only sparks new technology or explains how it functions, it also sparks new ideas for more advanced technology and applications. Even if a country simply means to manufacture their own version of a new technological aspect, this attempted technological imitation necessitates the need for strong Research and Development branches, and these branches ultimately function solely because of innovation. Empirical data has demonstrated that “innovation variables have been shown to contribute positively to the explanation of differences in growth across countries”⁸. With more innovators come more models for inventions. With the birth of new domestic technology comes the opportunity for a developing country to increase exports and alleviate malignant domestic issues.

A main argument held in current economic theory states that “if poor countries are to exploit the advantages afforded by information technology for integrating themselves more fully into the global economy, they will need to be aware of its numerous characteristics and how it will alter global competition”⁹. Understanding the global economy is not an easy task, especially for a developing country new to the ideologies and processes necessary to carry out trade and

⁷ Fagerberg 1156

⁸ Fagerberg 1168

⁹ James, Jeffrey. “Information technology, cumulative causation and patterns of globalization in the Third World”. *Review of International Political Economy*, Vol. 8 (2001) pp. 147-148

mobilize new technology. Extensive knowledge of the new technology, as discussed above, is immensely important. In addition, however, a country must comprehend the trends and influences driving demand and investment in such foreign technology. All these influences can be simplified and described without verbose jargon. Once countries, governments, and citizens have gained a general, basic understanding of economic maneuvering, their productivity in terms of investment and globalized trade procedures will improve, and this improvement will continue with the more complex applied thinking they develop.

Many developing countries have already begun to integrate themselves into the global technological economy. This new participation, on the other hand, is very unevenly distributed among Third World nations. The vast majority of the states which have made significant strides are located in East Asia. According to recent surveys, these countries have had recent success in comparison to other developing nations because they have realized the lucrative potential behind exploiting technology and information, and they have used comparative advantages to conduct business with companies and industries overseas.¹⁰

These East Asian countries have utilized four main types of modern technology to establish partnerships, alliances, and trade with participants across the globe.

a. Information technology

The first type of technology is communications technology. This includes simple technology such as e-mail, mobile phones, and fax. By taking advantage of these new technological resources, “trade is promoted by a reduction in communication costs and information perfections”. Information is now received and sent out faster, which expedites every business

¹⁰ James 154

transaction or new domestic development. Many of the nations even have “adopted digital, electronics based systems faster than advanced countries have”¹¹.

b. Industrial technologies

The next important technology which has become widely used is referred to as industrial technologies. Whether it be new assembly machines or NCMTs (numerically controlled machine tools), these new components drastically speed up productivity and competitiveness of their respective nation. This implementation of “information technology enhances comparative advantage of adopting firms and countries”.¹² More countries will want to do business for specific parts produced more efficiently in these East Asian regions in exchange for foreign goods that would be more expensive for these nations to domestically produced. These countries are able to mass produce necessary goods and technology, and charge well above the manufacturing cost. Overseas businesses and governments will still abide, because the cost of trading for these goods is significantly less than producing them.

c. Electronics

The third important form of involved technology is electronics, which consists of a wide span of items ranging from computer circuits to television equipment, With the new industrial technologies discussed, East Asian countries, especially Japan have become leading exporters of electronics. While Japan is not technically defined as a Third World country, many relatively close nations have witnessed the advantages embedded in the production of electronics, and have thus followed in Japan’s footsteps. Japan has garnered a reputation as a leading electronics distributor, and other surrounding nations have taken notice. With Japan’s success comes the

¹¹ James 154

¹² James 154

hope for developing countries to “catch up”, using the development of electronics as a key catalyst.

d. Information technology

The last form described is information technology in general. Accumulating technology so relevant to modern economies “promotes strategic alliances with multinational corporations”¹³. East Asian countries have invested in their own refined technological abilities and as a result have attracted attention and negotiation with international firms and business partners. Allying with a multinational firm opens doors to entire regions and trade markets previously unreachable. With the new ally as a middle man, these East Asian countries have acquired the privilege of full worldwide international trade. As a result, their exports have sharply increased, especially technological exports. The comparative advantage created by the other forms of technology above is now applicable everywhere. This expansion, of course, comes at a price. Multinational companies also now have the opportunity for exploitation. This exploitation is not of technology, but on the contrary of the developing nation. Corporations can easily take advantage of the inexperience of these developing nations, and often establish their own respective branches within their new “ally” with the understanding that this branch will work in collaboration, and that the two parties will share benefits in a symbiotic type relationship. The corporation will commonly charge fees for serving as a middle man to other networks and global markets, and counteract the comparative advantage originally created. It is also important to note that increased economic growth in East Asian countries has not translated into improved lives for the lower classes. In fact, “the people of many nations in Asia are still living at a primitive level”¹⁴, a perfect example of technology ending up in the hands of the

¹³ James 154

¹⁴ Muroyama, Janet H. and H. Guyford Stever. *Globalization of technology*.

elites, and not being completely dispersed among a country's population. The effects are even worse on the other developing countries not experiencing recent economic growth.

III. Modern Globalization of Technology and Innovation

Current trends in globalization and innovation cannot be attributed to any one single cause. Instead, a collaboration of conditions, institutions, and ideologies have combined to shape these trends. The importance of understanding these trends is imperative for the US, given the current state of the domestic economy. This understanding is also important for developing countries with lesser access to important technology and resources. In fact, several models of trade and production will be discussed in this section, and which have positive implications for the globalization of technology. Through comprehension of the driving forces and factors behind innovation and globalization, organizations could mobilize their causes to achieve maximum diffusion. Technology is important for several key reasons. First, it can be used through commerce to generate money and capital income for a developing country. Secondly, updated technology improves the quality of life of the inhabitants of a country, whether it is new medical operating equipment or hygiene equipment such as septic tanks. Lastly, technology allows for easier communication, for example through, computers and production of goods through new machinery. While these benefits of technology are all important, many pundits would argue technology is most important to a developing country because it raises income and capital, which allows a nation to better the general good of its citizens, including updating hospital equipment and enabling other resources such as running water and electricity.

Not surprisingly, globalization is fueled by the creation of new technologies. Technology itself is a very broad term, but for the purpose of this review can be defined as the application of science to create inventions which are then applied to commerce or industry. Technology allows

an infinite number of benefits; countries can communicate faster and easier, products and goods can be delivered quicker, and goods can be produced more efficiently, thus, the invention and emergence of new technology “gives rise to a rate of diffusion and transfer of knowledge which is vastly superior to the past”¹⁵. Experts have asserted that such dissemination of technology and knowledge gives rise to global villages, or communities of nations that work together to better the overall well being of all parties involved. These global villages are further strengthened by “international trade and direct investments, which render the national economic systems increasingly integrated with each other”¹⁶. Logically, these global villages are composed of nations and states located relatively close to one another. Two of the biggest reasons for this are that “trade diminishes dramatically with distance, and prices vary across locations, with greater differences between places farther apart”¹⁷. It is simply easier and less complicated for countries to conduct trade with other countries in their own region.

Technology cannot exist without innovation, that is, the proliferation of ideas which lead to inventions and technological development. Accordingly, globalization of innovation is directly correlated to globalization of technology. Innovations are creations sparked from new ideas and discovered knowledge. Without the knowledge of how to produce or design technology, the physical purchase of several units loses significant implied value. In fact, “during the initial phases of diffusion [of technology, recipients] are more likely to allocate more resources to the acquisition of information” about the product¹⁸. In other words, people who

¹⁵ Archibugi, Daniele and Simona Iammarina. “Globalization of Technological Innovation”.
Review of International Political Economy. Vol. 9. (March 2002). pp. 99

¹⁶ Archibugi 99.

¹⁷ Eaton, Jonathan and Samuel Kortum. “International Trade Diffusion: Theories and Measurement”.
International Economic Review, Vol. 40 (1999). pp. 1741

¹⁸ Feder, Gershon and Robert Slade. “Acquisition of Information and Adoption of New Technology”.
American Journal of Agricultural Economics, Vol. 66 (1984). pp. 320

receive new technology through diffusion want to know the specific innovations and ideas necessary to fully understand the different facets of the new technology. This illustrates the importance of the globalization of innovation, and how often accumulation of innovation supersedes the actual obtaining of the resulting technology. Without ideas of new inventions spreading across the globe, innovations and new creations would decline. There are three major categories of this globalization of innovation. These categories include “international exploitation of technology produced on a national basis, global generation of innovations, and global technological collaborations”.¹⁹ To better understand the process behind the globalization of innovation, these three categories must be elaborated upon.

International exploitation of technology:

International exploitation of technology, by definition, “includes innovators’ attempts to obtain economic advantages through exploitation of their own technological competence in markets other than the domestic one”. Knowledge is power, especially in a global economy, and knowledge of new technology can serve to be extremely profitable for a country when sold to other countries around the world. Countries are always concerned about their power relative to other states and nations. Therefore, countries wish to possess new technology flaunted by other countries, especially products that display radical advances, such as computers or nuclear power. It is during the outbreak of radical technology that the value of innovation is demonstrated. Innovations are not solely valuable in international trade markets, but also on international private markets. Often an innovator realizes that it would be much more “advantageous to sell the innovation disembodied, i.e to license it to foreign firms”.²⁰ This option is increasingly more lucrative if there are current deterrents to international trade, such as tariffs or high costs of

¹⁹ Archibugi 100

²⁰ Archibugi pp. 100-103

transportation the necessary materials or goods. Innovators would also lean towards licensing if the technology is simply too expensive for the country desiring it to offer a complete order. Lastly, innovations can be exploited through FDI, or foreign direct investment. This is only recommended, however, if the host country displays “economic and institutional stability and a sufficient level of economic development”²¹.

Global generation of innovation:

The next category, global generation of innovation, refers to innovations produced by MNEs (multinational enterprises). MNEs commonly have a network of components located throughout several countries, which results in quick and efficient dispersion of new innovations to various regions. There are three different views of a multinational enterprise. The first is dubbed the octopus view; “a single brain within the company headquarters concentrates the strategic resources and distributes resources to the tentacles, or subsidiaries, scattered across host countries”. In this view the innovation is developed within the host nation of the corporation, and then adapted and assimilated into the branches present in other countries. There is also a local for local view, in which branch or subsidiary facilitates innovation by themselves in accordance with local needs of their specific region. Once an innovation is born, it is shared with the headquarters, who then spreads it to the other branches. The final perspective is called the local for global view, and is concerned with “distributing Research and Development and technological expertise in a variety of host locations”²². In other words, different components of the innovated technology are constructed in the most conducive environment. For example, parts of a device may be manufactured in India, while the rest is made in Korea. The parts are then all shipped to a common facility and assembled to achieve the final product.

²¹ Archibugi 100-103.

²² Archibugi 103-104

Global technological collaborations:

The last category of the globalization of innovation is referred to as global technological collaborations. These collaborations take when two or more parties work together with the goal of producing technology or nurturing innovation. Such a collaboration must be formal and frequent in nature. Also, both sides must maintain separate ownership of their own firm or establishment. Finally, the collaboration must be symbiotic, with both sides sharing with and utilizing the other as a resource to benefit both parties. By unifying the two firms yet keeping them independently separate, costs of innovation are diminished and the number of people working together and drawing off the ideas of each other doubles.²³

Evidence of these three categories are abundant in the global world today. A large portion of this evidence lies in the current international trade flow present in the world today. Undoubtedly, “trade is a fundamental means for the international diffusion of innovations”, and trade has been consistently growing and expanding over the past few decades. Specifically, trade and dispersion of technology has risen drastically. For example, “high tech products, which constituted 9.5 percent of world trade in 1970, represented more than 29 percent in 1995”.²⁴ The reasoning behind these statistics is simple; countries and businesses have devoted more time and effort into technological innovation and invention over the years. As new inventions are created and introduced to the global market, competitors snatch up the opportunity to collect and purchase vital innovation and information. Developers of the new technology seek to earn a profit from their new inventions, and often exploit the global market through comparative advantage. This is best displayed by “the number of foreign patents registered abroad, which can

²³ Archibugi 105

²⁴ Archibugi 105

be considered an indicator of the will to exploit foreign markets”²⁵. It has been documented that trade does indeed allow countries to benefit from foreign innovation and technological advance. For a country to experience large benefits, however, many pundits assert that two conditions must be present: “first, the country must be near the source of the advance. Second, the country needs to be able to reallocate its labor to activities outside of manufacturing.”²⁶

Naturally, several countries are capable of simultaneously benefitting from a technological advance in a particular country. Globalization and international trade certainly do not dictate that only two nations at a time can be involved with sharing of innovation and technology. To maximize potential dissemination, however, there is a necessity for “innovative firms to extend the geographical dimensions of their market”. This means opening up information and resources on a larger scale, and making this knowledge and technology available to regions previously not reached. As a result, innovation is becoming increasingly more expensive as countries try to appeal to regions and states farther and farther away. Lately, national governments have taken larger interest in foreign research and development departments, mainly because “this allows them to know if inward foreign direct investment contributes on a par with domestic capital to the creation of national technological competence”²⁷. Smart foreign investments can prove very lucrative for a government, and, in this case, can provide easy access to cutting edge innovation and technology.

Despite these current trends in governmental investment in technological advancement and innovation, there is a clear division among technological progress and growth across the world. While some small countries, particularly in the Asian region, have shown progress, there still remain numerous developing countries evolving at a slow pace. To explain such a disparity,

²⁵ Archibugi 105

²⁶ Eaton 1172-73

²⁷ Archibugi 111-113

experts point to several key factors and trends which contribute to these international differences in growth rates.

Many proposed models explaining the differences emerging in growth rates hypothesize that the underlying factor in each case is the notion of long-run equilibrium. Every nation is attempting to reach this long term equilibrium, and over a period of time one country might experience faster growth rates than another. Specifically, poorer countries could theoretically grow faster than richer ones in an attempt to achieve long-run equilibrium. Many current data reports, however, would negate this theory. An example would be a study by Edward Denison in which he reported that “the higher growth rates obtained by most European countries than by the United States were not due in any large measure to a catching up of technique”.²⁸

The explanation of growth rate trends, therefore, must be explained by something other than the simple notion of actors striving for balance and equilibrium. Technology is clearly among the most influential characteristics of nations experiencing rapid growth. Without the diffusion of technology, or in a case of slow or sluggish diffusion, a nation would not be able to maintain an efficient pace in the global market. Successful diffusion is a necessity, and “successful diffusion requires both large investments and large markets”²⁹. This in part accounts for the diminishing rate of growth viewed in many Third World countries. The state simply does not have enough money to place in substantial investments, and also cannot compete in the large, global markets. They must rely on other nations to cooperate with them, and in many cases become semi-dependent on their larger and richer ally. Larger countries thus have the opportunity to exploit their “business partner”, and as a result we see privatization, sweatshops, and low wages surface in these Third World countries. These Third World countries now indeed

²⁸Fagerberg, Jan. “Technology and International Differences in Growth Rates”.
Journal of Economic Literature, Vol. 32 (Sep 1994) pp. 1151-1153

²⁹ Fagerberg 1152

have increased access to more new technology, but at the price of sacrificing morals and domestic dignity.

One of the most plausible ideologies for explaining differences in economic growth is termed the technology-gap approach. The theory refutes the proposal of technology as a public good, because clearly all countries do not have equal access or opportunity to benefit from new technology. In fact, “technology-gap theorists see technological differences as the prime cause for differences in GDP per capita across countries”³⁰. Technology is both expensive to produce and to transfer, and countries suffering with pecuniary issues are not capable of fully taking advantage of the globalization of cutting edge technology. Overall, new technologies can often even function as “forces of exclusion, running from exclusion within even the richest societies to the exclusion of entire continents, such as Africa”³¹. A country with breakthrough technology can pick and choose who they wish to do business with, and rationally this would exclude countries with low spending capabilities, or in other words developing countries.

IV. Explanations of Technology Gaps Present in Third World Countries.

Without question, developing countries have not been able to fully reap the potential benefits available through globalization. This has left them much less subjected to some of the downsides of globalization, such as sweatshops and pollution, but also has severe consequences. For example, undeveloped countries cut off from globalization have widespread poverty and high death tolls from treatable diseases. As concluded previously, the looming reason for this inequality lies with the uneven distribution of technology and innovation. The cause of this uneven distribution lies mostly with incomplete or insufficient technology transfer between countries. In these cases, when a “development gap is large it is well possible that technology

³⁰ Fagerberg 1155

³¹ Amin, Samir and David Luckin. “The Challenge of Globalization”.
Review of International Political Economy, Vol. 3 (1996) pp. 252

transfers give rise to adverse effects on the host economy, while at the same time transmitting only partial or outdated knowledge”.³² There are many causative factors behind the problem of incomplete technology transfer, and these factors often exacerbate economic issues and can be very detrimental to developing countries hoping to expand their technological and trade capacities.

Foreign direct investment, or FDI, is commonly overlooked when discussing the advancement of less developed countries. FDI, however, has shown a trend to affect developing countries in a malignant way. Practically, FDI would appear to foster growth and positive outcomes in less developed countries. Many experts reason in its defense that “FDI produces positive direct and indirect effects through technology transfer, which fosters economic expansion”. In addition, pundits point out that foreign direct investment can improve competition present in global markets, and is capable of closing “the gap between domestic savings and investment, and can give rise to channelling notable new technologies from abroad”.³³

Multiple empirical studies, on the contrary, reject these assertions. Many reports have demonstrated no relation between increased FDI and increased growth. Other studies have even displayed a negative correlation between the two variables. For example, “in a number of developing and east European countries, negative productivity spillovers were reported in five out of six papers focusing on transitional countries”³⁴. In order for foreign investment to enable a positive effect on growth, results indicate there must be foreign ownership existing in the host country. Otherwise, multi national corporations will be “scarcely willing to transfer technology

Ghosh, B.N and Halil M. Guven. *Globalization and the third world*.
Palgrave MacMillan: New York, NY (2006) pp. 200-210

³³ Ghosh 202

³⁴ Ghosh 202

in the absence of strong institutional warranties which protect their competitive advantages”³⁵.

Companies first and foremost wish to preserve their own prospective financial capital. Therefore, companies seldom take investment risks in developing countries without first analyzing what return on their investment can be guaranteed. High technological advantages are sources of extreme power for nations and corporations, and allow for “an ace up the sleeve” in bargaining circumstances, and not surprisingly, the developing country ultimately forfeits privileges or capital as a result of this bargain.

Neoliberalism, an ideology propagated by many economic and social experts in today’s time, has thus come under attack in relation to its effects on Third World countries. Free trade and open borders offers the opportunity for such countries to be either fully exploited by corporations, or to be left out of the market completely. The main foundation supporting neoliberalism stresses that comparative advantages allow countries to all benefit and grow together. Each country specializes in specific goods and services, and free international trade allows this specialization to be used for the benefit of the host country. The problem, on the other hand, is that this theory makes a dangerous assumption. Neoliberalism hypothesizes that every country is capable of specializing in an area or product on their own, and will profit from this specialization. In reality it is evident that this is simply not true. In fact, “unfettered flows of capital and free trade tend to favor the richer and more prosperous regions at the expense of the poor”³⁶. Some nations cannot create a comparative advantage on their own, and are locked out of the global market. In order to compensate, they must form strategic alliances, which facilitates dependence on other larger, more successful countries, and opens up the opportunity for their own exploitation. The principle ideas of neoliberalism are sound, but when put into actual effect

³⁵ Ghosh 202

³⁶ James 155

“neoliberalism has left the world a social Humpty Dumpty all in bits”³⁷, with some countries thriving and others thrashing and struggling for life.

Another important fact to consider is that simply because technology has diffused to a developing country does not mean that the country has complete control over it. Corporations often retain control over their product, and have either restricted access to its components or withheld knowledge about its composition or production. In this way corporations can maintain complete advantage through their product by preventing leakage of its specific details. This is a common reason why incomplete technology transfer occurs. It is a common practice of corporations and companies to “shield their most advanced innovations from imitations processes”³⁸, which thereby guarantees their maximum profit from a specific technology. This technology may indeed be present and even manufactured in a developing country, but this does not mean the country has completely been allowed power of the product or control over its distribution. It is true that “technology diffusion by multinational corporations to local suppliers often enables the latter to enter export markets as well”³⁹, but this statement must be put into perspective. A company may allow the Third World host of its branch to sell some of its technology, but this comes at the price of cheap labor, incomplete technology transfer, and a percentage of profit must go towards the company. In addition, commonly the corporation will license less sophisticated technology and retain complete control over more advanced inventions. The strategic alliances formed with these multi-national corporations in truth have greater benefits for the corporations than for the Third World host country.

³⁷ Craig, David and Doug Porter. “The Third Way and the Third World: Poverty Reduction and Social Inclusion in the rise of Inclusive Liberalism”. *Review of International Political Economy*, Vol. 11 (May 2004) pp. 418

³⁸ Ghosh 206

³⁹ James 158

The consequences of incomplete technology transfer show the true differences in mindsets behind the multi-national corporations and the developing country involved. This “unbalanced technology transfer reflects a strong conflict of interest”⁴⁰; the multinational corporation frequently enters into the alliance not seeking to improve circumstances and growth in the developing state, but rather to expand and extend their own resources for profit. As mentioned earlier, these corporations often conceal new cutting edge technology and innovation from the host country in order to maintain a specific competitive advantage. From the other side, “domestic firms and governments have an interest in upgrading local technology and absorbing more sophisticated technology”⁴¹. This spurns a battle between the two actors; corporations do not wish to divulge vital new information about technological, and the domestic country is seeking to elicit it. This stand-off eventually leads to the bargaining phase discussed earlier, and while both sides ultimately reach a compromise, the Third World country normally ends up with the shorter end of the economic stick, mostly because they do not attain access to the new technological information which would enable them to manufacture a possible comparative advantage.⁴² These conflicts of interest and “accompanying backwash effects of the expansion of trade and foreign investment”⁴³ are perfect examples of global problems etched into the core principles of both neoliberalism as well as corporate globalization.

Methodology:

The results discussed in this thesis were attained through interviews with a representative of Wired International, and through my own independent gathering of existing empirical data,

⁴⁰ Ghosh 209

⁴¹ Ghosh 209

⁴² Vonortas, N and S. Safioleas. “Strategic alliances in information technology and developing country firms: recent evidence”. *World Development*, Vol. 25 (1997) pp. 657-80

⁴³ James 160

especially with regards to the medical data used in my analysis. Certain categories of data are taken from polls conducted before 2000, and thus may be obsolete. The general trends of all collected data, however, all match in correlation and therefore should not be completely discredited. For the most part all graphs, numbers, and empirical statistics are taken from polls no later than 2005. Conclusions were ultimately based on the empirical data gathered, interviews and opinions expressed from representatives of the organizations, and my overall processing of the information. The specific immunizations picked were all selected because they are easily treatable diseases that have almost been completely eradicated from First World countries. Choosing these specific diseases, therefore, makes it easier to compare worldwide results and establish a correlation of progress or decline.

Findings:

The first category discussed is medical technology. While this is still a fairly broad term, it is important to note that the term medical technology does not apply solely to complex machinery such as CAT scan booths or X-ray machines. The term can also be applied to simple instruments such as a new surgical tool or scalpel, and as a result it is difficult to measure the overall quantity of new medical technologies developed over the past few years. Instead, the impact should be measured by the overall increase or decrease in the quality of human life over the past few years. It was decided that the most suitable data categories to inspect in order to determine this are infant mortality rates and immunization rates. Life expectancy rates take long periods of time to demonstrate signs of improvement, thus it was decided that such a variable would not be a strong representation of the effects of technology in the medical field. BCG, or tuberculosis, was the first disease analyzed. Current worldwide coverage of tuberculosis was

80% ten years ago and is now close to 90%. Both the Africa and Southeast Asia regions reported the lowest overall reported vaccination coverage at 82%, but this number has risen from 62% in Africa and 75% in Southeast Asia ten years ago. Only the West Pacific region showed a slight downward trend in recent years.⁴⁴

The other immunizations analyzed were diphtheria, hepatitis, polio, and tetanus. All results were similar to the tuberculosis data in terms of trend. Africa as a region had the lowest percentage of coverage for each immunization except for hepatitis (Southeast Asia). Each region, however, demonstrated positive progress over the past six years in all cases, establishing a general upward trend. This trend is demonstrated through WHO survey graphs viewable in the appendix section. Global coverage as a whole has also increased steadily over the past six years, displaying an encouraging overall progress concerning availability of necessary medical technology and treatment.

Recent trends in infant mortality rates have also produced optimistic results. The countries listed were examined, and their respective rates were compared to statistics from 5 years ago. In many of the Third World countries scrutinized, for example, Albania, El Salvador, and Kuwait, infant deaths have substantially decreased over the past 5 years. In some countries, however, such as Singapore, Trinidad and Tobago, Serbia and Haiti, the number of infant deaths has remained the same. What is even more alarming is that in South Africa infant deaths have jumped from 11,000 in 1996 to over 40,000 in 2005.⁴⁵ Part of this can be attributed to exponential population growth, but the increase is still striking.

This summarized analysis seeks to obtain insight into overall progress in various countries, and supports the theory that infant mortality rates are decreasing in many countries

⁴⁴<http://www.who.int/research/en/>

⁴⁵<http://www.who.int/research/en/>

globally, but asserts that many countries still are not improving. This lack of improvement could be linked to inaccessibility to medical technology and also inadequate treatment facilities. It is also deterring to note that in several countries, infant deaths have actually increased drastically, which indicates that they mandate specific attention from organizations in order to be helped gain access to the necessary equipment and service necessary.

The impact of Wired International:

Progress in the globalization of medical technology has grown and been positively affected over recent years mainly by the action and dedication of non-profit and grassroots organizations. These groups actively facilitate the delivery of technology to nations that otherwise would have limited or no opportunity of attaining vital medical equipment. One organization that has been making a huge impact is Wired International. Founded in 1997, Wired International has enabled an abundance of medical equipment and training to be transported and established in Third World countries across the world.

Professor Gary Selnow began Wired's work shortly after serving as a volunteer in Croatia after the Balkan War. He was moved to found the organization after witnessing "the war's impact on the region's children, who were without adequate educational resources and had no access to basic computer technologies". Dr. Selnow managed to attain a small grant from USAID, and founded Wired International, "inspired by the idea that access to the Internet could help end the children's isolation and enhance their education"⁴⁶. Since then Wired International has been an enormous factor in the spread of the three major categories of technology mentioned; medical, communications, and technology in general. It uses a network to carry out a variety of beneficial tasks across the globe. Wired has the ability to "connect doctors to doctors virtually anywhere, and [their] mission statement is to provide medical and healthcare

⁴⁶ http://www.publichealthheroes.org/past_heroes/2009/wired.html

information, education, and communications in developing and war-affected regions”.⁴⁷ Wired also helps other grassroots organizations with similar goals by linking them to pertinent health information. Wired provides a valuable database for an incredibly large range of people. It is used by both inhabitants of developing countries and also by medical professionals. In general, “improving the information available to healthcare professionals via technology has been an efficient and effective way to improve the quality of life in many areas of the world”⁴⁸ (Kate Mayer).

Promoting medical and communications technology:

Wired International’s heavy involvement in both the medical and communications categories of technological development in developing nations merits a hybrid classification of the firm. Instead of merely sending important medical items to struggling countries with no instructions, Wired sends volunteers and workers to ensure proper training is administered. In addition, Wired sets up a priceless resource in every area it helps; medical information centers which can be connected to medical databases and doctors around the globe. These centers make Wired’s efforts extremely sustainable, since the people being helped can learn valuable medical knowledge themselves and both communicate with and educate others. To this date, “Wired has set up nearly 100 health information centers in twelve countries on four different continents”. Wired’s technicians have the ability to set up a communication center in as little as twenty four hours, and the center created is able to reach contacts anywhere in the world. Wired’s remarkable engineers and technicians have even set up these centers in “some places so remote [they] must use solar panels to power the equipment [they] provide”⁴⁹.

⁴⁷ <http://www.wiredinternational.org>

⁴⁸ Mayer, Kate. Online INTERVIEW. 8 January 2009.

⁴⁹ <http://www.wiredinternational.org>

Wired does not only provide access to important information, they foster learning and collaboration between doctors all over the world. In many of the impoverished regions focused on by Wired, the local doctors have limited training and knowledge of particular illnesses. Wired has provided the capacity to “link the world’s neediest doctors with the world’s best trained and equipped medical professionals”⁵⁰. The opportunity to learn from and receive the highest caliber of training is an essential and vital component of Wired’s desire to better world health. To better aid their cause, “Wired coordinated formation of the International Telemedicine Network, a consortium of 13 leading research centers, medical schools, technology non-profits, and global non-governmental organizations”⁵¹. This network allows for additional medical education through interactive electronic resources and databases. The databases are simple enough for even children to understand, and recently “an eleven year old boy in Kenya was actually able to identify that his aunt had AIDS, and as a result was able to save his whole family”⁵². These remarkable resources have helped millions of disadvantaged people across the world drastically improve the health of themselves and those around them.

Wired has also organized many key programs at the grassroots level in all of the countries the firm has reached so far. Most recently “over one million Kenyans have viewed and heard HIV/AIDS prevention messages in remote locations thanks to Wired”⁵³. These grassroots programs in turn inevitably spread to neighboring villages and towns, often by educators who travel to the information centers then return to preach medical knowledge to local schools. By establishing these programs and information centers around the world in remote villages, Wired International creates snowball effects of knowledge. News of the medical information center and

⁵⁰ <http://www.wiredinternational.org>

⁵¹ <http://www.wiredinternational.org>

⁵² Mayer, Kate. Online INTERVIEW. 21 January 2009.

⁵³ Mayer, Kate. Online INTERVIEW. 21 January 2009.

databases spreads to nearby villages, and as word of the new information whirls through other settlements, so does medical knowledge and training. Putting such a resource in even a small village “creates a ripple effect that helps communities”⁵⁴, and this ripple effect has the potential and capability to reach millions of underprivileged inhabitants of Third World countries. To this date the hundred different medical information centers are disseminated throughout Iraq, Kenya, Albania, Montenegro, Kosovo, Serbia, Bosnia, Croatia, Sierre Leone, Nicaragua, El Salvador, and Honduras.

On March 17, 2009, Wired International’s commendable efforts over the past 12 years earned the firm a Public Health Hero Award from the University of California, Berkeley School of Public Health. The award recognized “Wired International’s mission to ensure equal access to information that saves lives”⁵⁵. Other recipients who received Public Health Hero awards were Dr. John E. Wennberg, Betty Moore, and Dr. Paul Farmer. Wired International has also recently been approved for several large grants to continue their charitable work throughout the world. Wired International is the ideal model for all organizations seeking to make a difference in the sphere of medical and technological disparity between poor and wealthy regions in the world. Wired’s brilliant programs both instruct the afflicted persons of illnesses and guarantee them proper treatment. In addition, their efforts are provenly sustainable, as all recipients of medical information centers and equipment can easily educate themselves and pass this newly acquired knowledge on to others.

Technology as a whole: The Gaviotas Community

⁵⁴ Mayer, Kate. Online INTERVIEW. 8 January 2009.

⁵⁵http://www.publichealthheroes.org/past_heroes/2009/wired.html

Technology as a whole describes all technology working together to benefit a developing country, and no organization or group better demonstrates this facet than the Gaviotas community in Colombia.⁵⁶ The community was founded about thirty years ago by Paolo Lugari, who had a vision of constructing a self-sufficient civilization in the barren deserts east of the Andes in Colombia. The community has been rapidly growing and updating its inventions, and has produced a remarkable small civilization which is entirely economically friendly and autonomous. In a recent conference “the United Nations named the village a model of sustainability”⁵⁷.

Lugari founded the community after witnessing all the pollution and wasteful ecological activities occurring in the world around him. With the human population growing at an exponential rate, Lugari wanted to express the dangers of such mindless environmental destruction, and provide an example of an ideal sustainable community. He chose such an arid, infertile area to prove in addition that technological and cooperation could produce remarkable results in even the most dire conditions. The settlers in the Gaviotas community range from scientists, doctors, and engineers to simple masonry workers, and have all combined their specific skills and determination to create previously unthinkable technology and results.

The various environmentally friendly innovations developed in Gaviotas are nothing short of extraordinary, and now are being used throughout Colombia. In fact, “solar water heating systems developed at Gaviotas now heat water in the president’s palace in Bogota”. What is most surprising is that the Gaviotas community, which now is home to about 200 inhabitants, was started completely independently. Although Colombia is notorious for its violent guerrilla factions and gangs, Gaviotas has had no problem maintaining peace and

⁵⁶ Direct contact with the Gaviotas community was attempted, but no response was ever attained, so all data had to be gathered by individual research.

⁵⁷ <http://www.mariposagrouporg/gaviotas.htm>

tranquility, and on the contrary “ a need for police, jail, or door locks has never arisen”⁵⁸. Unlike other environmental endeavors, Gaviotas was started “with virtually no funding, no well-endowed university backing, no incubators or venture capitalists, and no access to a national power grid”⁵⁹. This lack of funding in turn has produced inventions that will impact the world in an enormously positive way, and these inventions are meant to be shared with the world. Gaviotas members refuse to patent their new inventions so that other scientists around the world can learn from them and emulate their work.

The Gaviotas community derives all of its electricity through both a series of custom windmills built for the region and also from solar panels set up across the landscape, which is no longer barren at all. Water power is also harnessed from a local stream, and “the trees planted more than compensate for any greenhouse gases emitted”⁶⁰. The Gaviotans have even built their own hospital, the only one for a twelve mile radius, which treats a variety of patients both from within the community and outside. It uses solar panels on its roof to boil and sterilize water, and is powered by state of the art solar photovoltaic cells.

In addition to environmental friendly living, the Gaviotas community has a goal of reforesting the barren area they inhabit. In its first 24 years of existence, “Gaviotas planted 1.6 million Caribbean pines after finding that no indigenous tree would grow on the prairie”. The results of this reforestation have been staggering. Underneath this replanted pine forest, other vegetation has sprouted and transformed the desert landscape into a verdant forest. According to a recent tally, “biologists have counted 40 species of indigenous trees have sprouted, sheltered by

⁵⁸ “Colombia’s Model City”. <http://contect.org/ICBLIB/IC42/Colombia.htm>.
Fall 1995. Online.

⁵⁹ Kaihla, Paul. “The village that could save the planet”.
http://money.cnn.com/2007/09/26/technology/village_saving_planet.biz2/. Sept 27, 2007. Online

⁶⁰ <http://contect.org/ICBLIB/IC42/Colombia.htm>.

the tall pine trees”⁶¹. These biologists hypothesize that if these reforestation efforts continue the llanos, or plains, which the Gaviotas inhabit could become an extension of the Amazon rainforest. While the rest of the world is destroying precious rain forests, the Gaviotas community is literally growing their own.

After receiving grants over the past decade from numerous organizations, Gaviotas has been able to gather the resources necessary to produce truly astounding feats of technological innovation. The community is now protected by a “remote control zeppelin that uses video cameras to spot forest fires”⁶², and its system of solar panels and hydroelectric turbines has grown larger and more efficient. Inventors have also created a way to tap the resin of the pine trees without hurting the trees themselves. This resin can then be sold to neighboring villages or serve a variety of uses in the community, such as being used as an adhesive.

Lugari’s vision does not stop with the one Gaviotas community, however. He is already in the process of establishing a second community, Gaviotas II, located 250 miles away from the original settlement. It is here that Lugari hopes to construct a massive community of more than five million people, all living a completely sustainable and environmentally friendly lifestyle while meanwhile reforesting the massive treeless acres of land. With the clear success and results of the first community, there is no doubt that Gaviotas II will also be an enormous success, and send an important message out to the surrounding world. These communities live in absolute peace and tranquility and are the source of brand new, sophisticated technological inventions that have the potential to drastically change the world we live in. Ideally, these communities would continue to pop up around the world, creating a chain of environmentally friendly communities

⁶¹ <http://contect.org/ICBLIB/IC42/Colombia.htm>.

⁶² http://money.cnn.com/2007/09/26/technology/village_saving_planet.biz2/

inspired by the heroic efforts of the brilliant and devoted individuals who made the original Gaviotas community such a success.

Conclusions:

Many countries are indeed making significant progress and growth through free trade and the diffusion of technology. These countries, however, are almost all located in East Asia, and an abundance of countries in Africa as well as Latin and South America have demonstrated characteristics of sputtering growth. There is no simple solution to aiding these countries. In order for these countries to compete in the global market, there is a necessity for them to establish a comparative advantage. Many of these nations, however, cannot create this advantage or attain new technologies without assistance. Neoliberal theories allow for this assistance to be rendered, but more often than not it leads to both exploitation by more powerful nations or multinational corporations, and dependency on these actors. This does not mean that the future is hopeless; there exist many businesses seeking to collaborate with, but not exploit, developing countries. Technology is still spreading throughout the world, and this means better healthcare, more jobs, and a higher standard of living for many. This spreading needs to be increased to areas that need it the most, and it must be done in a manner that promotes self-sufficiency and sustainability.

There exist many people in the world who want to make a difference, and as a result many organizations have been instituted looking to aid the spread of technology around the world to developing regions. The hope for the future exists in these organizations as they continue to grow and expand in numbers as well as impact. In addition, these organizations, such as Wired International, specifically target impoverished regions of countries to donate technology and training to. In addition, while many corporations are corrupt, there are many

organizations simply looking to conduct business with developing nations through a symbiotic relationship where neither party is exploited. The growth of such organizations and symbiotic relationships must be facilitated and encouraged in order to bring about positive change and growth in developing countries.

Wired International's success in aiding developing countries has been extensive and well documented. Their efforts to help countries not only provides technology and training to the nations, but the information centers they build provide a permanent priceless resource to not just one village, but can enable information to be carried across entire countries and regions. Organizations such as Wired International and Doctors Across Borders are major reasons why health and quality of life in Third World nations has been steadily improving globally. The growth of such firms is the key to worldwide progress in the dispersion of medical technology and knowledge.

Technology in general has increased overall in developing countries, and this improvement can be attributed to other non-profit organizations such as Engineers without Borders who strive to make a difference through devotion of time, work, and intellect to better the world around them. Most inspiring is the chronicled development of the Gaviotas community, the environmentally friendly town initially started from scratch in a barren, infertile desert. Organizations like these and the individuals who lend their skills to them are the major factors in the global improvement of developing countries. It is important to note that all these organizations started out small, and branched out as they grew in size to affect more and more countries and citizens of the world. The need for change is grandiose, but the most effective approach starts at a small, specific level and then grows. As the years add up, this growth

produces resounding results across the globe which in turn better the lives of those who need help the most.

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Appendix A: Tuberculosis

Immunization Coverage

Source:

http://www.who.int/immunization/documents/WHO_IVB_2007/en/index.html

Global and regional summary (AFR-African region, AMR- Americas region, EMR- Eastern Mediterranean Region, SEAR-Southeast Asian region, WPR- West Pacific region)

2004

Regional and global summaries of reported, UNICEF estimates of, vaccination coverage (%), BCG < 1 year of age: 1980, 1990, 1997-2006.

and WHO/UNICEF estimates of,

	1980	1990	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Year % of coverage
AFR	11	71	63	60	63	66	67	76	75	77	78	80 (46)	
AMR	54	81	96	95	96	97	96	96	96	97	96	99 (27)	
EMR	24	87	87	88	90	86	87	82	82	85	86	90 (17)	
EUR	40	53	88	89	90	90	91	91	90	90	91	93 (32)	
SEAR	18	97	99	92	98	99	77	83	92	92	98	99 (11)	
WPR	7	96	95	94	95	85	75	95	94	96	88	92 (22)	
Global	19	88	88	85	88	87	78	85	88	89	89	92	

% population 58 98 98 97 93 99 95 99 95 100 99 99

N° countries 77 126 152 146 150 148 152 153 153 157 156 155

Numbers in parenthesis (last column) indicate the number of countries reporting in 2006. The expected number of reporting countries is 46 for AFR, 27 for AMR, 18 for EMR, 36 for EUR, 11 for SEAR and 23 for WPR.

Appendix B: Diphtheria

Immunization Coverage

Source:

http://www.who.int/immunization/documents/WHO_IVB_2007/en/index.html

**Regional and global summaries of reported, UNICEF estimates of, vaccination coverage (%),
DTP3 < 1 year of age: 1980, 1990, 1997-2006.**
and WHO/UNICEF estimates of,

	1980	1990	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Year
AFR	6	55	52	48	51	56	56	61	65	68	72	82	% coverage
AMR	50	76	87	88	90	92	91	91	92	94	94	94	
EMR	22	80	80	81	82	81	81	78	77	80	86	87	
EUR	27	85	91	90	92	92	93	93	92	94	95	95	
SEAR	38	94	93	88	89	89	67	72	82	86	88	92	
WPR	11	93	93	94	85	85	78	93	94	96	88	93	
Global	26	83	83	81	81	81	73	78	82	85	86	90	
% population	55	95	98	96	90	99	95	95	96	100	95	94	
N° countries	95	155	183	170	171	181	179	177					

Appendix C: Polio Immunization Coverage

Source:

http://www.who.int/immunization/documents/WHO_IVB_2007/en/index.html

Regional and global summaries of reported, UNICEF estimates of, vaccination coverage (%),
Polio3 < 1 year of age: 1980, 1990, 1997-2006.
and WHO/UNICEF estimates of,

	1980	1990	1997	1998	1999	2000	2001	2002	2004	2003	2005	2006	Year
AFR	8	56	52	48	51	55	54	60	65	67	70	80	% coverage
AMR	66	79	88	89	90	90	91	91	93	93	92	94	
EMR	24	80	80	81	82	80	80	79	78	80	86	87	
EUR	32	89	92	93	94	94	94	94	92	95	96	96	
SEAR	30	94	93	89	90	90	73	72	82	88	89	92	
WPR	8	94	95	95	85	89	81	94	94	95	88	93	
Global	26	84	84	82	81	82	75	79	83	85	85	90	
% population	55	96	98	96	90	98	95	95	96	100	95	95	
N° countries	94	154	182	171	171	179	178	176	180	185	186	182	