

IMPEDIMENTS TO INTERNATIONAL TRANSFER OF TECHNOLOGY – A DEVELOPING COUNTRY PERSPECTIVE

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Introduction

The differences in political and economic scenario over the centuries have given rise to vast differences in technological capabilities among nations. These technological differences constitute a serious hurdle in the pursuit of globalization. The global production process is fast changing and is now getting increasingly dispersed to make use of the efficient global resources. In such process, reducing the technological gap between the nations becomes very crucial. This is also an opportunity to remedy the reckless and imbalanced economic growth resulted due to the unplanned industrialization in the previous century.

As a part of globalization process, the world community has attempted in many ways to transfer better technologies and build the technological capabilities in resource poor nations. The decades of experience in providing for technology transfers has revealed many difficult situations. In response, many national, regional and international measures have been initiated. However, in the absence of a guiding international frame work, these measures working in piecemeal fashion, have failed in the effectively transferring technologies to the resource poor nations. Here, it is important to note the failure of the world community to agree on an international code for regulating the transfer of technologies. The same is considered in detail, later in the paper.

Considering the importance of the efficient usage of natural resources, intact in the developing nations, transfers of eco-friendly technologies for better management of natural resources is crucial. In fact, it is an opportunity to ameliorate the global environmental conditions by transferring the environmentally safe technologies and support the sustainable development in developing nations. Many international environmental instruments have provided for the same.

However, due to the increased commoditization of the environmental factors (to motivate private participation in sustainable development) the transfers of clean technologies are also moved with the commercial considerations. Hence, except for special funds established by these instruments the transfers of clean technologies are equated with the other types of commercial technology transfers.

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The literature in this regard has so far been devoted to the analysis of the process of technology transfers in specific sectors, that too only for few developing nations. Also, one can find the research materials analyzing only few economic factors, individually affecting the transfer of technologies. A holistic assessment of the interaction of international instruments (providing for technology transfers) with the market conditions reflects important deficiencies at policy levels and helps in framing policies to re-direct the markets towards balanced global development. Such an assessment of interaction of both policy and market conditions for transfer of technologies is still lacking, both at academic and at institutional levels. This paper is an attempt to highlight the gap and work towards filling the same.

In this paper, an attempt is made to consider “*the non-incentive international legal regime for technology transfers coupled with the market impediments as a cost escalating factor*” which is depriving the resource poor nations to afford for the safe technologies and preventing the commercially motivated private parties to invest on the same.

Structure of the paper

The first Part of the paper attempts to trace the basis for the conflicting growth models in technology trade among developing and developed nations and the resultant failure of global community to reach consensus in regulating and providing incentives for important global economic factors to support balanced and sustainable development in the world. The second part deals with two different stages of technology transfers and the prevailing market environment in developing nations with the view of assessing the challenges faced and the costs added to the technology transfers. And, lastly some generalized conclusions are derived highlighting with an emphasis on the crucial factor impeding the technology transfers to developing nations.

I. The Non-incentive International Legal Regime for Technology Transfers

The conflict in growth models among the developing and developed nations has resulted in failure of global community to reach consensus in regulating and providing incentives for global economic factors to support balanced and sustainable development in the world.

Regional and the time specific economic and political features of the world have given rise to different economic growth models. Considering the reflection of these different models in international negotiations and instruments, broadly, I am considering these

different models under two heads. They are: ‘Developing growth model’ and ‘Competitive growth model’. Under the Developing growth model, developing nations claim that, it is ‘Just’ to protect their individual traders against the strong players in global markets and also seek assistance in the process of their development from developed nations. Under the Competitive growth model, the developed nations are demanding to cut-down the protectionism followed by the developing world and open their markets for global competition. A reflection of these claims in technology trade, reads as follows:

- Under the conditions of Developing growth model, prevailing in developing countries, protecting the developing economies against the powerful economic giants (be it firms, corporations or other States) of the industrialized world and instituting a preferential market for technologies in developing countries is considered essential to end the North-South differences.
- From the stand point of the competitive growth model; the problem is not to start the redistribution of material values, but to begin a distribution of personal values. Making everyone the holder of the subjective rights and duties, and creating markets under the ‘rule of law’ is more important than giving preferential access to the technologies.

Liberalization claims of Developed countries in technology market.

Technology developers who to date reside overwhelmingly in developed countries are interested in reducing the costs, uncertainties and protecting their rights to make profits in technology transactions. Hence, their decision as to transfer their new technologies and new production processes to firms in developing countries is based on *effective protection of their rights to make profits* and *policy supports for technology trade*.

Theoretically, it seems logical to assume that the availability of IPR protection would be the prerequisite for the international transfer of new technologies, at least those (technologies) that can be easily copied. One would expect knowledge owning companies to be reluctant to lose control over their technologies, which may have cost them millions of dollars to develop, especially to those countries where domestic firms could adopt the technologies and produce goods that would compete with those of technology owners.¹

¹ Technologies cannot necessarily be easily be copied. Moreover, with technologies that can be copied, not all developing countries have the capacity to do so or make use of them. India and Brazil are much better placed than, say, a least developed country to copy advanced foreign technologies. See also, “Technology Transfer and Intellectual Property Rights: The Korean Experience” by Linsu Kim, Pub. Jointly by - ICTSD

The effective protection of IPR alone is not the only decisive factor for technology trade. By definition the effective transfer of technology² refers to a complicated process of interplay between market and policy structures of both transferor and transferee including the absorption capabilities of transferee. Therefore, along with the IPR protection, the *absorptive capacity of recipient* and *the market for the resultant output* are also determinant factors for technology transfers from transferor's stand point.

Also, technology owners, are willing to play safe, and prefer formal modes for technology transfers, so that in case of any breach in contractual obligations they can have effective legal remedies. The preferred formalized means for transferring technologies are; Foreign Direct Investments (FDI), Joint ventures, wholly owned subsidiaries, licensing, technical-service arrangements, joint research and development (R&D) arrangements, training, information exchanges, sales contracts and management contracts.³ Again, these formal modes of technology transfer require favorable market policies like the protection of IPRs on par with the standards of TRIPS,⁴ limited role of government in monitoring technology license contracts,⁵ good infrastructure, transparency and stability of governance, supportive institutional mechanism, industry supporting labour policies, supporting taxation policies⁶ and reduced price control regulations.⁷

Thus, the technology developers argue, with some justification, that the effective protection of their rights to make profits and policy supports for formal modes of

and UNCTAD, 2003. – Japanese company refused to transfer to a Korean chemical firm polyester film production technology for fear of losing its product market in Korea.

²“Encouraging International Technology Transfer”- by Keith E. Maskus, Pub. Jointly by – International Center for Trade and Sustainable development (ICTSD) United Nations Conference on Trade and Development (UNCTAD) - Issue paper No.7, May 2004.

³ “Technology transfer and the Biodiversity Convention: issues of conservation and sustainable use”- By Mugabe, J and Clark, N in *Science, Technology and Development* 14 (3), 1996: 1-31.

⁴ Vishwarao, S, “Intellectual property rights and the mode of technology transfer”, *Journal of Development Economics* 44, 1994: 381-402: Better IPR protection will promote licensing over FDI and joint venture modes. Also she suggests that the possibilities of gains for developing countries from lack of IPR protection would be “offset by strategic behavior by Northern firms who opt for technology transfer via subsidiary or monopoly production”

⁵ Supra Note No.3.

⁶ Taxation and Technology Transfer: Key Issues –UNCTAD/ITE/IPC/2005/9: favourable Taxation policies will promote movement of technical and managerial personnel.

⁷ In business terms, Price Controls Regulations are also considered as hindrance to foreign factor participation, even though such controls are in interest of general public specific to demographic features.

technology transfers are necessary to increase the willingness of innovative firms to provide knowledge of their production process to the firms in developing countries.

Claims from Developing nations

Developing nations, eager to attain the optimum level of growth are tracing the foot steps of developed nations. The basis for their conflicting claims are the fundamental differences in the path which developed nations followed to reach the current status of development and the path they are now demanding developing nations follow. Further, the claim of developed nations that “the process of trade liberalization will lead to development and technological independence” is also not substantiated by statistical data or facts to convince developing nations to follow whole heartedly the liberalization process.⁸

The drive for wholesale trade liberalization from developed nations rests on “the assertion that the best way to rise global living standards is to maximize free trade”⁹ and “no protection is the best protection and that all economic decisions are best left to the market”.¹⁰ This assertion means in practice the lowering of tariff and non-tariff barriers and the reduction or elimination of subsidies; adherence to WTO rules on intellectual property rights, customs procedures, sanitary standards, treatment of foreign investors, and various tax reforms, labour market reforms, and policy reforms designed to provide social support for displaced workers and technological support for displaced business.¹¹

However, it is evident that developing nations are not completely convinced about adopting whole heartedly ‘the open market policies’. The basis for their skepticism is also supported by the empirical studies. Most of the empirical results do not support the claim that trade liberalization fosters development, lead towards technological independence. Such sentiments have begun to show up even in principal agencies advocating the dominant agenda. Most recently, even the IMF has conceded that, contrary to the rosy

⁸ “A Compendium of Inequality” The Human Development Report 2005, Jens Martens FES Briefing Paper October 2005, The HDR accuses governments from the North of “hypocrisy and double standards” (Cit.p.113). On the one hand, it says, they lose no opportunity to demand that developing countries should open markets and liberalize trade, while on the other they continue to protect their own economies through tariffs and high export subsidies. According to the UNDP’s calculations, developing countries’ economies suffer income losses of around \$72 billion per year just through agricultural subsidies in industrialized countries. This figure represents nearly as much as the global ODA in 2004. As particularly bad examples of this, the HDR names the EU and the USA subsidization of sugar, rice and cotton.

⁹“Trade and growth: New Dilemmas in Trade Policy – An Over view”- by Agosin, Manuel R. and Diana Tussie, 1993 at pp. 5,10

¹⁰ Ibid. at p. 25.

¹¹ Ibid. at p. 24.

predictions of its theoretical models, a systematic examination of the empirical evidence leads to the conclusion that “there is no proof in the data that financial globalization has benefited growth” in developing countries.¹²

‘The Protection of Intellectual property rights’ which, is considered as an integral part of liberalization process, is demanded as a prerequisite for technology transfers, the analysis of South Korea’s experience in its path of development in the recent past reveals some important conclusions *against* such claims. *First*, the strong IPR protection will hinder rather than facilitate technology transfer and indigenous learning in the early stage of industrialization when learning takes place through reverse engineering and duplicative imitation of mature foreign products. *Second*, only after countries have accumulated sufficient indigenous capabilities with extensive science and technology infrastructure to undertake creative imitation does IPR protection become an important element in technology transfer and industrial activities.¹³ Here, it seems logical for developed nations to demand for open market access and protection of intellectual property rights, as liberalization process. Since, they are now in a position to reap the benefits of trade liberalization in most aspects of the world trade.

It is also interesting to note that when they (now the developed nations) were climbing the ladder of success, they assiduously avoided such policies of open competition and relied heavily on protectionism and interventionism.¹⁴ The Britain and the US were the champion of trade protection and subsidies in their process of development. Netherlands, for example abolished its 1817 patent law in 1869 on the ground that patents are

¹² “Effects of Financial Globalization on Developing Countries: Some Empirical Evidence” by Eswar Prasad, Kenneth Rogoff, Shang-Jin Wei, and M.Ayhan Kose, IMF (International Monetary Fund) March 17, 2002.

¹³ “Technology Transfer and Intellectual Property Rights: The Korean Experience” – by Linsu Kim, Pub International Center for Trade and Sustainable Development (ICTSD) and United Nations Conference on Trade and Development (UNCTAD), 2003.

¹⁴“Kicking Away the Ladder”, - by Chang, Ha-Joon, ‘post –autistic economics review’ - Issue No. 15, 1st September 4, 2002, Article 3; Britain and the USA relied heavily on trade protection and subsidies in their process of development. Britain, in the initial days of development i.e. during 1700s and 1800s, used trade and industrial policies similar to those subsequently used by Japan in late 19th and 20th centuries, and South Korea in recent past. Britain re-directed its leading industry, the manufacture of woolen goods, which initially was a leading exporter of raw wool. Henry VII, tried to change this by taxing exports of raw wool to its competitors. Indeed, even as Britain was preaching free trade after 1860, the United States “was literally the most heavily protected economy in the world”, and remained so until the end of the World War II. Criticizing the British preaching of free trade to his country, Ulysses Grant, the Civil War hero and the US President, 1868-1876, retorted that “within 200 years, when America has gotten out of protection all that it can offer, it too will adopt free trade”. Similarly Friedrich List, the leading German economist of mid -19th century, said “Britain preaching free trade to less advanced countries like Germany and the USA was like someone trying to kick away the ladder” with which they had climbed to the top

politically-created monopolies inconsistent with its free-market principles – a position that seems to elude most of today’s free-market economists – and did not introduce another patent law until 1912. Similarly, Switzerland did not have patent law until 1907.¹⁵ Thus, all the, now Developed nations used tariff protection, subsidies and lax in intellectual property protection, flying directly against today’s free trade orthodoxy.

Thus, lack of empirical, historical or factual proof that the process of liberalization in technology trade lead to development and technological independence, has left the developing nations are in deep crisis in making choices for growth model. On one side, as said, developed nations having dominant position in technology trade are forcing liberalization on developing nations and on the other, developing nations in view of the said reasons are not whole heartedly ready to accept liberalization as a growth model in technology development.

The underlying idea of the developing nations for technology transfers has been the idea of “Universal Human Heritage”. According to this argument, ‘technology is regarded as being a treasure, which is to be commonly owned by the whole world, but for historical reasons or under some view – for reasons of imperialism and expropriation – concentrated in small number western developed countries.’ Therefore, developing nations regard “access” to the technology of developed nations as an important decisive factor in their reach to cultural and technological independence.¹⁶

However, a major shift in the stands of developing nations towards attaining technological independence can be observed from IV Ministerial meeting of G-77, Arusha Conference¹⁷ and V-UNCTAD in Manila, 1979. Now, developing nations stress on self reliance rather than completely depending on the assistance of developed nations. They (developing nations) now acknowledge and recognize the importance of systematic collection of knowledge and studying, learning and adoption of sophisticated activity in addition to the claim for remedying the irregular distribution of technological capabilities through preferential access.

¹⁵ Supra Note No. 14

¹⁶ The Draft International Code of Conduct on the Transfer of Technology- A Study in Third World Development” - by Wolfgang Fikentscher., Studies in Industrial Property and Copy Right Law vol.4, Pub. Max Plank Institute for Foreign and International Patent Copy Right, and Competition Law, Munich, 1980.at p. 7

¹⁷ To prepare itself for UCTAD V at Manila, the G-77 developed the Arusha Programme for collective Self-Reliance and framework for negotiations adopted at Arusha on February 15, 1979 quoted in the UNCTAD documents as TD/CODE TOT/CRP.1 of March 1,1979.

Nevertheless, the dominant argument of developing countries in achieving the development and technological independence are:

- To bring to an end the unjust status of developed countries enjoyed by industrialized nations and to spread the wealth (especially technological development) among all countries.
- Technology is “key” to the progress of mankind and that all people have the right to benefit from the advances and developments in science and technology.
- Developing nations should be assisted in overcoming their lag behind the industrialized states, especially in the field of technology. Then there shall be a common growth to the world economy in all its parts.

Reflection of the conflicting growth claims in International agreements

The fundamental differences in growth model pursued by developing and developed nations have reflected in many international negotiations and agreements. The resultant of such negotiations is documents compromising their stands. The ambiguity creped-in in accommodating the different stands have given opportunities to escape from the objectives with which the negotiations were initiated. *The non-effectiveness of these compromise documents and the lack of willingness of the parties to enforce the agreed provisions is what I consider as non-incentive international legal regime not supporting the international transfers of technology.* Here, I refer few international negotiations and documents providing for international technology transfers. The attempt is to highlight the reflection of the conflicting claims and the resultant compromise provisions or failures in these negotiations to achieve the objectives with which the negotiations were initiated.

Initially it was the UN general assembly, which adopted these demands of the developing nations for “new and just economic order” through various resolutions. Important one among them is “The Charter of Economic Rights and Duties of States”.¹⁸This Charter established the double standards of morality in international trade, based on equity. It recognized the different rights and duties for different states depending on their socio-economic and ecological needs. It is this concept of ‘Equity’ which combines the principle of “International co-operation for development” of Chapter I (n) with the rejection of any reciprocity in the Charter.¹⁹

¹⁸ Adopted by United Nations General Assemble, via, UNGA Res. 3281(xxix),UN GAOR, 29th Sess., Suppl.No.31(1974)50.

¹⁹ Article 18 of “Charter of the Economic Rights and Duties of the States”: “Developed countries should extend, improve and enlarge the system of generalized non-reciprocal and non-discriminatory tariff

Further, under Chapter II Article 13(1) the Charter recognizes the right of every state to benefit from the advances and development in science and technology for the acceleration of its economic and social development. And under article 13 (2) and (3)²⁰ the charter recognizes the duties of states in facilitating development by providing access to the development in science and technology and assisting in the creation of indigenous technology for the benefit of developing nations.

However, the unenforceable nature of this resolution and the different levels of political acceptability²¹ of its obligations continue to disregard the requirement of new technologies for sustaining development in the developing world. Consequently, developing nations are demanding binding mechanisms in the form of an international code for transfer of technology.

This brings us to the question of international negotiations for regulating technology transfers. The negotiations reflect various conflicting interests and are so strongly divided that the world community has failed to achieve a consensus on the subject even after

preferences to the developing countries consistent with the relevant agreed conclusions and relevant decisions as adopted on this subject, in the framework of the competent international organizations. Developed countries should also give serious consideration to the adoption of other differential measures, in areas where this is feasible and appropriate and in ways which will provide special and more favorable treatment, in order to meet the trade and development needs of the developing countries. In the conduct of international economic relations the developed countries should endeavor to avoid measures having a negative effect on the development of the national economies of the developing countries, as promoted by generalized tariff preferences and other generally agreed differential measures in their favor”.

Article 19: “With a view to accelerating the economic growth of developing countries and bridging the economic gap between developed and developing countries, developed countries should grant generalized preferential, non-reciprocal and non-discriminatory treatment to developing countries in those fields of international economic co-operation where it may be feasible”.

²⁰ Article 13 (2): “All States should promote international scientific and technological co-operation and the transfer of technology, with proper regard for all legitimate interests including, *inter alia*, the rights and duties of holders, suppliers and recipients of technology. In particular, all States should facilitate the access of developing countries to the achievements of modern science and technology, the transfer of technology and the creation of indigenous technology for the benefit of the developing countries in forms and in accordance with procedures which are suited to their economies and their needs”.

Article 13 (3): “Accordingly, developed countries should co-operate with the developing countries in the establishment, strengthening and development of their scientific and technological infrastructures and their scientific research and technological activities so as to help to expand and transform the economies of developing countries”.

²¹ 120 states voted in favor of the Charter. Ten countries (Austria, Canada, France, Ireland, Israel, Italy, Japan, Netherlands, Norway and Spain) abstained. Six countries voted against the Charter (Belgium, Denmark, Federal Republic of Germany, Luxemburg, U.K. and USA).

some three and half decades of negotiating efforts. Since 1960s the World community has attempted to draft a regulatory code for international transfer of technologies. However, it was only in the UNCTAD III General Assembly at Santiago de Chile that the Secretary General of UNCTAD officially was entrusted with investigating the possibilities of a ‘new international regulation of the transfer of patented and non-patented technology to developing countries’. Since then many international meetings have been convened to try to agree upon a draft code. Apart from certain crucial aspects the negotiators succeeded in achieving some consensus among them.²² Here, references are made to some important conflicting interests among the different groups of nations that are preventing the achievement of a code.

One of the major differences that persist among the nations is the legal character of the code. A reference to Para (13) of Preamble in the proposed draft code (as it stands to date)²³ reveals that the Group – of 77 (developing nations) are insisting on a binding nature of code while, the Group -B countries (developed nations) taking a stand against the binding nature of code are insisting instead that the code serve as mutually acceptable ‘set of guidelines’ or ‘standards of behavior’. The guideline nature for the code is also supported by Group -D (Socialist Group of nations).

Regarding the definition of the term “technology acquiring country”²⁴ one can observe the philosophical differences in approach towards growth among different groups of nations. Developing nations and Socialist countries deem it necessary to define “technology acquiring country” but Developed nations argue and view that the phrase “country of the acquiring party” should be used through out the code and it is not necessary to define this term. This reflects the developed country perspective that empowering individuals with rights and responsibilities is important, whereas developing nations and socialist group of countries think in terms of “Countries”, “States” or “Society”.

²² This highlights the differences in the objectives of different nations and lack of political will in compromising their interests in the larger and longer global interests.

²³ “[The Contracting Parties]/ [the Participating Countries]

[Agree on the adoption of this internationally legally binding code of conduct on the transfer of technology] – Group - 77

[Hereby set forth the following code of conduct consisting of guidelines for the international transfer of technology] – Group – B

[This universally applicable Code of Conduct on the international transfer of technology is established.] – Group – D.

²⁴ Chapter 1 definitions and scope of application: 1. for the purpose of the present code of conduct: [(d) “technology acquiring country” means the country where the technology provided by the supplying party is to be utilized.]

One of the basic aims of the code is to eliminate restrictive and unfair practices affecting technology transactions. This is recognized in Para (ix) in Chapter Two on “Objectives and Principles” of the proposed draft code.²⁵ Conflict in this regard is evident in Chapter Five of the proposed code that deals with Restrictive Business Practices²⁶ (conflict regarding the title of this chapter is referred in the following portion of the paper). The chapter on RBP has two parts. Section A deals with the basic norm outlawing restrictive practices. Section B contains a list of restrictive practices altogether numbering 20 (initially developing countries proposed around 40 restrictive practices to be listed, whereas developed nations proposed around 8 restrictive practices to be listed). This list is simply attached to condemnation of such of restrictive practices.

The conflicting interests among different groups of nations can be observed in the formulation of section ‘A’. In the Third Meeting experts provided a text aimed “preventing” restrictive practices. However the text submitted to Sixth Experts Meeting by the G - 77 proposed that transfer of technology transactions “*shall not include*” practices or arrangements which impose restrictions that directly or indirectly have or may have adverse effects on the national economy of the receiving country and, or impose restrictions or limitation on the development of technological capabilities of the receiving country parties. The text added that the transfer of technology transactions “shall not make use” *inter alia* of the following practices and arrangements whether written or not. However, the outline presented by experts on behalf of G-B (developed nations) used the term “*should refrain from the following practices*”.²⁷ This drafting means that the question whether the code is based on a prohibition principle (where restrictive business practices are basically prohibited, subject to modifications, provisions or exceptions and the like) or on an abuse control principle (meaning the restrictive practice is permitted as such but that a judicial or administrative body, upon investigation into the matter, may issue a mandate declaring illegal and the practice as an abuse of the liberty to act or to contract) is in conflict.

Therefore, Chairman of the diplomatic conference of March 1979 proposed that:

²⁵ Restrictive [business] practices: (the paragraph under consideration) draft provision elaborated at the third session of the intergovernmental group of experts: “to [eliminate] [avoid] restrictive[business] / practices, [as defined in chapter V below] which [arise out of or] [adversely] affect the transfer of technology” at the fifth session of Intergovernmental Group of Experts, the Chairman of the Working Group I suggested the following alternative formulation: “To specify restrictive [business] practices from which parties to transfer of technology transactions should refrain”.

²⁶ For convenience here in after it is referred as ‘RBP’

²⁷ Supra Note No. 16.

“in furtherance of the objectives of this code, particularly to avoid practices which unjustifiably restrain trade or adversely affect the international flow of technology, particularly as such practices hinder the economic and technological development of acquiring countries, parties to technology transfer transactions [shall] [should] refrain from the following or equivalent practices in such transactions”. Leaving open the alternative of whether it shall be formulated “shall refrain from the following practices” or “should refrain from the following practices”.

Of lesser importance is the discussion of whether the chapter and the practices regulated in it should be referred to as “Restrictive Practices” or “Restrictive Business Practices”. This reflects major doubts as to the nature of the code itself. Is the code an international antitrust instrument regulating competition and the market? Or is it an anti market interventionist, development aid device? Those who favor market idea prefer to say ‘RBP’.²⁸ It should be noted that since the international transfer of technology transaction is considered to be of commercial nature, the argument as to maintaining ‘Restrictive Practices’ title depicting an anti-market interventionist development is weak.²⁹

As said earlier, here the references made to the various conflicting interests preventing the completion of a code are only illustrative and not exhaustive. Further, it should be noted that changed international circumstances in the process of globalization under the WTO regime and growing global environmental consciousness reflected through many international binding environmental instruments have failed to influence the world community to draw a consensus on some form of regulation for technology transfers.

The failure in bringing this code in to reality has left the technology trade devoid of any regulation. The legal nature of the code and the chapter on restrictive business practices, in particular (if accepted on) would have institutionalized the technology trade under one legal framework.

However, besides the efforts in negotiating for a code to regulate for the international technology transfers, the World community has negotiated many other Regional, Bilateral and Multilateral international documents. These instruments are working individually with a narrow scope of applicability in terms of different sectors, modes for transfer and the regions for transfers. Logically, such attempts are welcomed. These instruments are working at functional level in facilitating technology transfers to specific regions and to specific sectors. A reference is made to few selected instruments having

²⁸ Supra Note No. 27

²⁹ Ibid.

direct effect on technology transfers. Again, the attempt is to assess the impact of the conflicting claims. In selecting the instruments for assessment, I have relied on the categorization (of international instruments providing for technology transfers) recognized by “The Compendium on International Arrangements on Transfer of Technology: Selected Instruments”³⁰ developed by UNCTAD.

The “Compendium” has listed over 80 international instruments along with many regional and bilateral instruments containing provisions for facilitating transfer of technologies. It has recognized the two broad and overlapping categories among these instruments. The *First category*, includes “*Standard setting Instruments*” attempting to provide a balance between rights and obligations of the creators and potential users of technology. This category also includes standard setting instruments concluded at the regional level, for example, NAFTA, European Union, Andean Group and ASEAN. The *Second category* focuses more on *direct measures for transfer of technologies to developing nations and building their technological capabilities*, in particular in least developed countries (LDCs). These instruments deal more with the transfer of specific technologies, e.g. technologies for the protection of human health and environment, technologies for the conservation of biodiversity and technologies for the exploration and exploitation of marine resources etc.

The importance given to the international trade as a means for transfer of technology can be observed in the instruments categorized in the **first part of the compendium**. These instruments in general provide for the protection for proprietary rights of the knowledge-owner and the interests of the intended users. This reiterates the importance of trade in international transfer of technologies. Thus, the increased world trade has direct and positive effect on the international flow of technologies. Hence, the success in the extent of bargain in international trade negotiations facilitated by WTO towards the developing nations, determines the amount of international technology flowing from technology haves to have-nots.

The object of WTO is to increase the trade and provide more choices to the consumers in developing nations and to improve their living standards. Having these as its basic objectives, it has given a platform to negotiate many trade agreements among its member nations. The important agreements relevant to international technology transfers are: Trade Related Intellectual Property Rights (TRIPS), General Agreement on Trade in Services (GATS), the Agreement on Trade-Related Investment Measures (TRIMS), the Agreement on Sanitary and Phytosanitary Measures (SPS), the Agreement on Technical

³⁰“Compendium on International Arrangements on Transfer of Technology: Selected Instruments” UNCTAD/ITE/IPC/Misc.5. <http://www.unctad.org/en/docs/psiteipcm5.en.pdf>.

Barriers to Trade (TBT), and the Government Procurement Agreement. Among these, TRIPS agreement is considered to have most direct relevance to the international technology trade. Since, As discussed earlier, developed nations claim stronger protection of intellectual property as an important precondition for transfer of technologies.³¹ Here, I refer some important provisions of TRIPS agreement having direct relevance to international technology transfers in order to assess whether the conflicting interests referred are in any way reflected.

The Preamble of the TRIPS Agreement suggests that every member nation (with out regard to the level of development) may structure its intellectual property regime in ways that enhance technology acquisition and diffusion.³² In light of this objective a positive obligation is agreed upon by all member nations under Article 7 which reads as:

“The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.”

Cumulatively these provisions suggest that ‘in adopting TRIPS-consistent protection, countries should expect the systems they implement will enhance both the transfer and dissemination of technologies’. However owing to the advantages of each nation *This provisions are interpreted in two ways*; the members demanding for maximum protection of their intellectual property meant it to ***cover formal or market-based means of transfer and subsequent dissemination***. In this view, informal means of learning through imitation and copying does not constitute permissible transfers under the Agreement. However, empirical studies show that maximum number of technology transferred, is through informal modes than formal the modes.³³ And also, the market life of technologies in the present Knowledge based industry is much less than the monopoly rights protected by TRIPS (patent monopoly rights under Article 33 is for i.e. 20 years from the filing date). There is no point in waiting for the expiry of the monopoly rights to access these technologies freely. Hence, it is advantageous for resource poor nations (if in

³¹“Encouraging International Technology Transfer” by Keith E. Maskus, Pub. ICTSD - UNCTAD Project on IPRs and Sustainable Development.: IPRs are only one of the factors that influence ITT. [Other] important factors include the investment climate, efficient governance, market size and growth, proximity to suppliers and demanders and infrastructure.

³² TRIPS Agreement, Preamble: *“Recognizing* the underlying policy objectives of national systems for the protection of intellectual property, including developmental and technological objectives;

³³ “Technology transfer and the Biodiversity Convention: issues of conservation and sustainable use”- By Mugabe, J and Clark, N in *Science, Technology and Development* 14 (3), 1996: 1-31.

their capabilities) to break the technology code through reverse engineering than paying excessive price for production and marketing rights or wait for expiry of monopoly rights. Therefore, technology importing nations have preferred the interpretation of the same, to mean, that their own Intellectual Property systems should encourage a broader view of technology transfers while remaining consistent with the TRIPS.

This conflicting possibility of interpretation has prevented the technology owners to transfer their knowledge to those countries where they find potential threat to their monopoly rights. Alternatively they attach rigorous grant back conditions or costs for transfers of knowledge which are considered as restrictive practices and unacceptable costs respectively under some legal jurisdictions (example Andean pact).

Another important part of TRIPS that provides for preferential access to technology is enshrined again in the preamble and under Article 66.2. It is important to assess the effectiveness of the same here.

“Recognizing also the needs of the least-developed country Members in respect of maximum flexibility in the domestic implementation of laws and regulations in order to enable them to create a sound and viable technological base;”

Article: 66.2 "Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base."

Again, a positive obligation is placed on developed nations to provide incentive to their enterprises and institutions to promote and encourage technology transfers to LDC members. In reality, majority of new technologies are under control of private firms or corporations and they are moved by better markets, and profit making opportunities, than on some limited government sponsored incentives. It is understood that the markets for technology and products in LDCs are not so well developed and hence private investments in technology transfers to LDCs are also not favored. Moreover, governments also cannot coerce the private firms to act upon the incentives to transfer technologies. Thus, the effectiveness of the provision provided in Article 66.2 in accordance to the preamble depends much upon the abilities of LDCs to absorb foreign technologies. Therefore, this provision on its own is not likely to achieve the significant increase in technology transfers to LDCs.

Further, it is an obvious observation from the above provisions that TRIPS is recognizing the preferential rights only for LDCs. Apart from Article 67,³⁴ the TRIPS agreement does not provide for any preferential rights for developing countries. Here also, it should be noted that there is no mention of technology transfer as part of an obligation for co-operation from developed nations to the developing world.

Thus, the possibilities for conflicting interpretations and the lack of mechanisms to operationalize the aid provisions implies serious conflicts among knowledge owners and barrowers. At its extreme, there seems to be conflicts, right from the conception of monopolizing the knowledge and its use in international technology transfer.³⁵ Therefore, again the thrust is laid on market factors to transfer technologies and in markets the dominant position of technology owners dictate the terms and continue to hold domination.

³⁴ TRIPS Agreement, Article 67: "In order to facilitate the implementation of this Agreement, developed country Members shall provide, on request and on mutually agreed terms and conditions, technical and financial cooperation in favour of developing and least-developed country Members. Such cooperation shall include assistance in the preparation of laws and regulations on the protection and enforcement of intellectual property rights as well as on the prevention of their abuse, and shall include support regarding the establishment or reinforcement of domestic offices and agencies relevant to these matters, including the training of personnel."

³⁵ *International patents and technology transfer to less developed countries: the case of Ghana and Nigeria* by George Sipa-Adjah Yankey Pub. Avebury Gower Publishing Company limited. The patent system was conceived to stimulate domestic inventive activity, particularly to encourage the individuals who were involved in this activity. It is now the case that big corporate firms are increasingly taking over inventive activity from lone inventors. By virtue of their capital they are able to 'buy' the best brains and other resources for undertaking unlimited research and development. Through this process, as well as consolidation, patent pools, and the regulated patent production through systematic industrial R& D corporation have been able to concentrate patents under their domain and thus expand their 'monopoly of monopolies'.

In most cases they are able to dominate a given industry and this creates the very condition for its perpetual control. In such situations they control the "main stream of inventive thought" in that industry and can clog any further developments without their consent.

Thus, through the patent system industrial corporations are able to dominate and use this dominance to regulate competition which, instead of encouraging inventions has the maximization of profit as its motive. Such dominance has adverse affect on developing world. Majority of foreign patents in developing world (especially in LDCs) which , are accounted for by corporate firms are not worked and instead used as import monopoly in these countries, particularly in the industries to which the patent grant relates.

In addition, this monopoly over imports excludes competition over the importation of the patented products unless of-course, there exists non-patent infringing substitutes. This could result in increased payments for imports than would the case of there existed competition.

Finally, patent monopoly is also used by corporates as 'scarecrows' to ward off any potential local competitors from penetrating into the relevant fields. Thus, the national patent system instead of encouraging domestic inventive activity has the opposite effect.

In the *second category of instruments* referred in the Compendium³⁶ the Dominant objective reflected is the ‘capacity building of developing nations’ (especially those of Least Developed Nations). In general, these instruments have provided for international co-operation for transfer of technologies, financial assistance for obtaining technologies and also for complying with the international standards and obligations and differential responsibilities in favor of developing nations.

Here, the **differential responsibilities** recognized in complying with the international standards, especially with that of ‘emission standards’ (directly affecting the economic growth) provided by various international environmental instruments, is one important factor causing conflicts among nations. Conflicts and non-acceptability of the responsibilities here means, disincentive to reduce the emission levels at national and global levels and absence of incentives to transfer environmentally safe technologies to developing nations under various mechanism adopted by these instruments. To highlight the conflicts in this regard, I am referring some important instruments providing for differential responsibilities.

Initially, sustainable development was identified as a common responsibility of all nations in United Nations Conference on the Human Environment of 1972. However, the Conference also recognized the need for financial and technical assistance to end underdevelopment in developing nations and to preserve and improve the environmental conditions.³⁷ It also provides for the flow of updated scientific information and transfer of experience to support scientific research and development in developing countries.³⁸

³⁶“Compendium on International Arrangements on Transfer of Technology: Selected Instruments” UNCTAD/ITE/IPC/Misc.5. <http://www.unctad.org/en/docs/psiteipcm5.en.pdf>.

³⁷ Principle 9: environmental deficiencies generated by the conditions of underdevelopment and natural disasters pose grave problems and can be best be remedied by accelerated development through the transfer if substantial quantities of financial and technological assistance as supplement to the domestic effort of the developing countries and such timely assistance as may be required.

Principle 12: Resources should be made available to preserve and improve the environment, taking in to account the circumstances and particular requirements of developing countries and costs which may emanate from their incorporating environmental safeguards in to their development planning and the need for making available to them, upon their request, additional international technical and financial assistance for this purpose.

³⁸ Principle 20: Scientific research and development in the context of environmental problems, both national and multinational, must be promoted in all countries, especially the developing countries. In this connection, the free flow of up-to-date scientific information and transfer of experience must be supported and assisted, to facilitate the solution of environmental problems; environmental technologies should be made avail be to developing countries on terms which would encourage their wide dissemination without constituting an economic burden on the developing countries.

Similarly, the 1985 – Vienna Convention for the Protection of Ozone Layer also took in to account the circumstances and the requirements of developing nations and provided for the positive obligations on parties to co-operate with developing countries to promote development and transfer of clean technologies.³⁹ Based on this framework convention the Montreal protocol of 1987 obligated all member nations to phase out ozone depleting substances. However, owing to the specific situations, it provided 10 years additional time to developing nations to comply with the control measures setout in this Protocol.⁴⁰ Importantly, the compliance of developing nation’s obligations was conditioned on the fulfillment of the obligations by developed nations regarding the financial co-operation and technology transfers under Articles 5, 10 and 10A.⁴¹ It is here, for the first time, that the real differentiation in obligations of developed and developing nations was adopted. Still, it is noteworthy that all member nations were obligated to phase out the ozone depleting substances. The differentiation was only with regarding to the time period in compliance with the obligations.

³⁹ The Parties shall co-operate, consistent with their national laws, regulations and practices and taking into account in particular the needs of the developing countries, in promoting, directly or through competent international bodies, the development and transfer of technology and knowledge. Such co-operation shall be carried out particularly through: (a) Facilitation of the acquisition of alternative technologies by other Parties; (b) Provision of information on alternative technologies and equipment, and supply of special manuals or guides to them; (c) The supply of necessary equipment and facilities for research and systematic observations; (d) Appropriate training of scientific and technical personnel.

⁴⁰ Article 5: “.....Developing nations whose, annual calculated level of consumption of the controlled substances (in Annex A) is less than 0.3 kilograms per capita on the date of entry in to force of this protocol or any time thereafter until 1 January 1999”.

⁴¹ Article 5(5): “Developing the capacity to fulfill the obligations of the Parties operating under paragraph 1 of this Article to comply with the control measures set out in Articles 2A to 2E and Article 2I, and any control measures in Articles 2F to 2H that are decided pursuant to paragraph 1 *bis* of this Article, and their implementation by those same Parties will depend upon the effective implementation of the financial co-operation as provided by Article 10 and the transfer of technology as provided by Article 10A”.

Article 5(6): “Any Party operating under paragraph 1 of this Article may, at any time, notify the Secretariat in writing that, having taken all practicable steps it is unable to implement any or all of the obligations laid down in Articles 2A to 2E and Article 2I, or any or all obligations in Articles 2F to 2H that are decided pursuant to paragraph 1 *bis* of this Article, due to the inadequate implementation of Articles 10 and 10A. The Secretariat shall forthwith transmit a copy of the notification to the Parties, which shall consider the matter at their next Meeting, giving due recognition to paragraph 5 of this Article and shall decide upon appropriate action to be taken”.

Later, in United Nations Conference on Environment and Development of 1972 broader framework and clearer differential obligations in favor of developing nations were declared to be adopted.⁴² In furtherance of this, a framework convention on climate change 1992(UNFCCC) has provided similar provisions as in the Montreal Protocol.⁴³ Based on this the Kyoto Protocol was signed in 1997 which, came in to force only in February 16, 2005 with Russia ratifying the protocol on November, 18 2004. Contrary to all prior global environmental agreements, Kyoto provides no regulatory obligations for developing nations, now or in the future. This agreement under Article 3 provide for a binding provision under which only industrialized countries (listed in Annex I) are obligated to reduce their collective emissions of greenhouse gases by 5.2 % compared to the year 1990 (compared to the emissions levels that would be expected by 2010 without the Protocol this target represents a 29% cut in the emission levels).⁴⁴

Compared to all other global environmental instruments, this instrument gave rise to number of controversies. Beginning with scientific uncertainties as to global warming and continuing to no obligations for developing nations, the effects on economic growth and political conflicts (with US not ratifying) were discussed and debated virtually by every community. The US senate voted 95-0 to reject any climate treaty that failed to engage meaningful participation by major developing countries or to achieve the reasonable balance of costs and benefits.⁴⁵ Further, critics argued that imposing

⁴² Principle 7: “States shall co-operate in a spirit a global partnership to conserve, protect and restore the health and integrity of the earth’s ecosystem. In view of the different contributions to global environmental degradation, states have common but differential responsibilities. The developed countries acknowledge the responsibilities that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and the technologies and financial resources they command”.

⁴³ Article 4 (7): the extent to which developing country parties will effectively implement their commitments under the convention will depend on the effective implementation by developed country parties of their commitments under the convention related to financial resources and transfer of technology and will take fully into account that economic and social development of poverty eradication are the first and overriding priorities of the developing country parties.

⁴⁴ National targets range from 8% reductions for European Union and some other to 7% for the US, 6% for Japan, 0% for Russia and permitted increases of 8% for Australia and 10% for Iceland.

⁴⁵ “Issues in Science & Technology” by Climate Policy Pragmatism: A New Approach Richard B. Stewart and Jonathan B. Wiener: The reason quoted for as reason for U. S senate’s Unanimous vote not to ratify- “Developing country participation in a global limitations effort is essential on both environmental and economic grounds. Developing countries’ emissions are growing rapidly and they will soon emit more GHGs than industrialized countries (currently China is the second largest GHG emitter after US) Moreover, restricting emissions only in some countries will induce emitting activities to shift or "leak" to unrestricted countries, thereby accelerating the growth in the latter's emissions (offsetting or even reversing the gains in restricted countries). Over time, such leakage would also make recipient countries even more reluctant to join the climate regime, as their economies become more dependent on emitting activities. In the near

restrictions on US, Japan and Europe, while China, India and other developing countries face no such limitation, could lead to significant leakage of emitting activities to developing nations.

With US and other major developed countries not ratifying the Kyoto means, no participation in reducing the GHG emissions, by those nations which share a major contribution to global GHG emissions and also no incentives (provided by those nations who are leaders in technology development and investments) for transfer of clean technologies to developing nations through the Clean Development Mechanism (CDM) of the protocol.

Interestingly, unlike all other instruments, this instrument caused conflicts among developed nations itself. Several issues which were opened to be decided later by Conference of Parties (COP) could not be resolved in its meeting in the Hague in late 2000. Due to the disputes between the European Union on the one hand (which favoured a much stricter agreement) and the United States, Canada, Japan and Australia on the other (which wanted the agreement to be less demanding and more flexible).⁴⁶ The conflicting interests' reflected in disagreeing to the differential responsibilities can be considered as impeding factor in adopting CDM provisions to provide incentive to transfer environmentally safe technologies.

To sum-up, a general observation can be derived from this part that the differences in growth models supporting different commercial interests of different nations, have reflected in one way or the other in negotiating international agreements, especially, in negotiating technology transfers. Failure of the nearly unanimous adoption of the UN General Assembly resolutions, failure of the world community to come-up with a technology transfer code recognizing the rights and duties of nations, the ineffectiveness of the provisions adopted in commercial instruments in facilitating transfer of technologies to developing countries and the failure of world community to influence some nations to accept and adopt differential obligations in reducing technological differences (or facilitating technology transfers) stands as mirror for conflicting commercial claims. It can be seen that these reflections has seriously affected the process of developing an effective international legal regime to provide incentives and support the international technology transfers in favour of developing nations. Thus leaving market forces to balance the technology differences.

term, the mere fear of such leakage inhibits participation by countries contemplating emissions limitations; this was the main motivation for the U.S. Senate's unanimous vote not to ratify any climate treaty that does not ensure meaningful participation by developing countries.”

⁴⁶ <http://en.wikipedia.org/wiki/column-one#column-one>

At markets, purely driven by commercial considerations, it is perfectly logical for developed nations to favor generation and (export) transfer of technologies to earn revenue. Similarly, for developing nations, it is important to favor import of better technologies for better management of resources, to capitalize on competitive advantage of cheap labour and local resources and to improve local innovation process. However the fact that the majority of technology trade is still concentrated between developed nations clearly reflects the market deficiencies in developing nations. Deficiencies in technology markets that too, in the backdrop of non-incentive international legal regime is a serious impediment to transfer of technologies. In the following part of the paper an attempt is made to assess the market deficiencies in developing nations causing hurdles to technology flow.

II. Effective transfer of technologies to Developing Nations

Transfer of technologies to the developing nations involves two stages. *First* is the voluntary inflow of foreign technologies (through various modes; trade in goods and services or Foreign Direct Investment (FDI) or Foreign Licenses (FL) or access to the technology available in Public Domain). *Second* the effective absorption and diffusion of the acquired technologies into local production process. In this part market deficiencies in these two stages are considered to assess the impact on technology transfers.

A. Inflow of foreign technology

The assessment of various factors escalating the costs for international technology transactions is considered by analyzing the effect of ‘**geographical proximity factor**’ (encompassing many general market features) to both input (e.g., Capital goods) suppliers and customers. The Geographical distance is not only a hurdle to the in-flow of foreign technologies in the first stage but also, is a factor impeding the effective absorption of technology later in the second stage. It infuses additional trade costs in physically moving the knowledge embedded products (between distant locations) and in effective transfer of all information, monitoring and policy matters associated with the technology transfers. Additionally, firms in remote locations pay greater costs on both their sales to final markets and their purchases of imported intermediate inputs, thus, they have less value added available to remunerate the domestic factors of production.⁴⁷ Therefore, negating the effect of geographical distance factor in international technology trade is a crucial aspect in facilitating international technology trade.

⁴⁷ Distance, Skill Deepening Development: Will Peripheral Countries Ever Get Rich? - Discussion Paper Series No. 3739 February 2003, by Redding, Stephen and Peter Schott. – Center for Economic Policy Research- [www. Cepr.org/pubs/dps/DP3739.asp](http://www.Cepr.org/pubs/dps/DP3739.asp)

It is obvious that the countries cannot be moved physically closer to the global economic and technological centers but, with international co-operation it is possible to induce global economic activities to expand and include peripheral economies in to its ambit in purely commercial interests. Also, dispersing the global economic activities in a well developed global commercial network will add in negating the geographical distance factor. From a developing country perspective, **Increasing the size of domestic market for technology trade** (to allure international trade in goods and services along with FDIs and FLs) and **Reducing the local trade cost**, will disburse the costs and commercially attract the technology trade. However, expanding the domestic markets and reducing the local trade costs is not free from challenges in resource poor nations.

The challenges to increase the size of domestic market

Increasing the size of domestic market means; enhancing the number of participants in the market and market permeability for global products. To enhance the number of participants in the market is to transform maximum number of individuals into global consumers. Equipping the individuals with the accurate and timely information as to competitive options in global products and services will enable them to participate in the global trade. Therefore, in international technology trade *enhanced and efficient dissemination of information forms the basis for building the market*. Having a dynamic and broad based database on internationally available technologies and market opportunities to access the same will induce the local traders to take part in international trade which in-turn, will be complimented by expansion of domestic market.

However, accessing and adopting the internationally available technological information is one of the main challenges faced by developing nations. Many developing economies lack proper institutional and infrastructure to collect and disseminate the information. In the present knowledge driven world and with the poor infrastructure to support timely information flow, the information is an expensive commodity to bargain by the resource poor nations. Therefore, strategic investments in developing infrastructure and institutions to support information accessibility will be 'key' in the process of technological development.

There are several sources other than FDI and Foreign licensing (FL) (which proves to be costly sources) through which, a resource poor nation can access new technological information with minimum costs. Here, referring South Korea's model of technological development is important. Initially, the Korean government encouraged brain drain of technical people to advanced countries, when there were no sufficient infrastructure to support their technical development at home. Later, they successfully allured the foreign trained nationals to come back and take up the development activities in their home

country.⁴⁸ Even, the temporary migration of students, scientists and managerial and technical personnel to universities, laboratories and conferences located mainly in developed nations can form a potential media for transfer of new knowledge.

Similarly, a resource poor developing nation can access the new technological information provided in patent applications. As “Disclosure” is the central element of patent system, a nation is called to capitalize on the information provided in these patent applications. However, this depends on two factors; *One* is, a strong in-house R&D to decipher and adopt the new technological information in local production. *Two*, the extent of patent filings is dependant on the extent patent protection accorded to the foreign inventors. It is obvious that the ‘stronger the protection greater will be the number of foreign patent filings’, without considering the fact that, stronger protection implies greater costs for technology transfer, the patent specifications provided in the patent applications forms one of the major source for new technological information. Also, it is logical that, a strong in-house R&D brings in number of foreign patent filings to reserve their monopoly rights. Because, strong-in-house - R&D forms a potential threat to the patent monopoly and markets as they can successfully decipher the embedded knowledge in the marketed products.⁴⁹

but, how effective is the transfer of knowledge from patent specifications depend on how detailed are the specifications provided in the patent applications. Usually, the patent specification furnished for patents are unlikely to be sufficient to the extent that a person skilled in the art could make use of it in his process of production. A similar situation applies with respect to the technologies available in the public domain.⁵⁰ Again, here

⁴⁸ “Technology Transfer and IPRs : The Korean Experience” by Linsu Kim – pub ICSTD and UNCTAD, 2003 Project on IPRs and Sustainable Development: The Korean government took a relatively liberal policy with regard to the brain drain at the mature technology stage. As of 1967, 96.7 percent of Korean scientists and 87.7 percent of engineers educated abroad remained there, mainly in the U.S. When industrialization progressed rapidly in the 1970s, the Korean government made systematic efforts to repatriate Korean scientists and engineers from abroad. The nature of state involvement was very “directive” rather than “promotional” in orientation by offering a highly attractive compensation package;.See also Yoon, Bang-Soon L. (1992), “Reverse Brain Drain in South Korea: State-led Model,” *Studies in Comparative international Development*, 27, 1, 4-26.

⁴⁹ A strong R&D helps in breaking the technological code hidden in new technology through reverse-engineering and creating a competition to the new technology and threaten the market share of the original innovator.

⁵⁰ According to Stuart Macdonald of Sheffield University, “Legal fiction maintains that all the information needed to re-create the invention is contained in the patent specification. The fact is that the specification is forced to refer again and again to other information, information that is in the public domain, which means that it is available somewhere but must be acquired from these sources before the information in the specification can be used. Much of this information will be tacit and un-codified information [i.e. know-

also, a strong in-house R&D base will be of help in decrypting the technological information and helping in effective diffusion of useful information.

Yet another fact that stands in way of the information and dissemination process is the information technology deficiencies in many developing nations. The use of technology in the present knowledge based industries is fast changing. Accurate and timely information is itself, a source of economy. Markets in developing nations deprived of these are deprived of fair opportunities. Most developing countries do not have the necessary infrastructure to be able to take part as equal partners in the world wide enterprise of knowledge production and dissemination. According to Bruce Girard, former director of Latin America's Community Radio Pulsar, 95% of [total] computers all over the world are in the developed nations and have three quarters of world's telephone lines.⁵¹ With this limited ability to get themselves in to the loop of World-Wide-Web of information the 'information' is also fast changing as a commodity, to be bargained by the resource poor nations.

Thus, providing access to information and identifying the most suitable technology from several alternatives and multiple sources of technologies is a major challenge for developing nations, especially in those areas where technologies are changing rapidly.

The challenges faced in reducing the local trade costs;

The geographical distance from the technological source will naturally increase the costs in importing and adopting the technologies. As said earlier, not just the physical movement of goods, but also transferring all information relating to technical and managerial aspects and the tariff costs at all stages of movement in goods and services will add to the total costs of the trade. Such appreciation in the costs of inputs will reduce the net profits realized, resulting in reduction of further investments in development. Additionally, the geographical distance adds to the already existing time lag in technology going in to production process. It is common to understand that, in the present competitive markets a single day of delay is also considered to depreciate the value of technology. Apart from this, the poor supply chain at market levels and the protective foreign policies (Excessive government intervention in technology trade) further extends the time lag and reduce the productivity of the technology. Although as considered earlier, physically reducing geographical distance is not possible, but providing efficient transportation system and infrastructure and supportive policies including favorable tariff structures will reduce the time lag and costs involved in technology transfers. Here, the

how].” Referred in chapter 5 “Technology Transfer” in intellectual property rights: implication for development” pub UNCTAD and ICTSD Project on IPRs and Sustainable development.

⁵¹ Referred by Subbiah Arunachalam in “how the internet is *failing the developing world*”.....

challenges faced in providing for efficient transportation infrastructure and favorable tax policies to reduce the costs on technology trade are considered.

Transportation infrastructure

A country's efficiency in transportation system in facilitating the local market to interact with regional and global market depends on the basic infrastructure like roads, ports, transparent and supportive administrative setup in customs clearance and regional co-operation in movement of goods through borders of neighboring nations. This is still more so, in landlocked countries or regions and in increasingly fragmented markets. A reference to a study conducted by World Bank: "Forging Sub-regional Links in Transportation and Logistics in South Asia"⁵² is made here. This study highlights the crucial factors causing delay in transportation and adding to the costs of international trade 'in and from' South Asian region. The sub-region consists of Bangladesh, Bhutan, and Eastern and Northeastern India. Nepal and Bhutan are land locked countries as are the seven North-eastern Indian states. In fact, the North-eastern region of India is connected to rest of the country by a land corridor (of 22 kilometers) between Bangladesh and Nepal. Transportation Co-operation among these countries is crucial to make use of the opportunities for economic growth and well being of the people in that region (more than half the population lives on less than US\$1 a day). Unfortunately, the regional collaboration in South Asia is complicated by distrust among countries and political agendas that focus on domestic issues.⁵³ In addition to these, lack of infrastructure and logistics constraints are getting reflected in higher trade costs. Most importantly, these factors have serious implications for the credibility and position of these countries in international markets.

Also, the policy impediments like 'no foreign vehicle allowed on Bangladeshi roads' necessitates all products transported by road to Bangladesh from the neighboring countries to be transferred onto Bangladeshi trucks at the border which further exacerbates the costs and delay in trade. Similarly, Nepalese trucks are allowed access only on dedicated routes within India, and the Indian trucks that enter Nepal must be depart within 72 hours are other few restrictive transportation policies highlighted in the study

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⁵³ The trade delay caused due to the lack of transportation arrangements among the nations has been illustrated with this factual estimate; "It takes 45 days to transport a container from Delhi, India to Dhaka, Bangladesh, because the container moves to Tughlakabad, then to Mumbai, India, and Singapore. From Singapore the container is shipped to Chittagong Port, and then to Dhaka. The distance of 2000 Kilometers between Delhi to Dhaka could have been covered in two to three days by rail. But this does not happen due to the lack of proper agreement regarding container traffic between India and Bangladesh."

Inefficiencies at border crossings due to combination of factors pose another major source of constraints in this sub-region. The procedural inefficiencies for customs clearances and physical infrastructure constraints (such as poorly designed warehouses and narrow access roads) are adding to the costs and delays in movement of goods. Most importantly due to such inefficiency in ‘ports’ traders cannot guarantee ‘just in time deliveries’ in the global market and hence loosing their markets. Perhaps, more problematic than the total time is uncertainty of the actual time of the shipments due to the unreliability of the system.

With these many deficiencies in transportation systems, not only there is appreciation in the costs of trade and delay in technology trade, but also hinder the effective absorption of the imported technologies.

Tariff structure and Income tax policies adding to the costs of ITT

It is a general understanding that the tax on international technology trade adds to the costs and thereby it is considered as an impeding factor for technology trade. However, the studies have expressed mixed opinion as to ‘tax’ being as an impediment to International technology trade”. In analyzing whether tax liabilities on technology trade is a factor impeding the inflow of technologies a study conducted by UNCTAD- “Taxation and Technology Transfer: Key Issues” is referred⁵⁴.

It is obvious that, the tax policy regarding the importation of technology involves balancing conflicting objectives. On one hand, the countries wish to facilitate the acquisition of technologies and on the other, they wish to derive a fair share of the profits that accrue to the foreign owner in the form of tax revenue. These taxes will affect technology imports in two ways: one is by increasing the cost of the actual transfer and two is by reducing the subsequent return to the transferor. Even though it can be said that tax liabilities constitute obstacles to TOT, as most of these provisions are standard features of modern tax system, they are not considered major impediments. Investors are mostly influenced in their decisions by market and political factors rather than the tax policies.⁵⁵

⁵⁴ “Taxation and Technology Transfer: Key Issues -UNCTAD/ITE/IPC/2005/9

⁵⁵ "How tax policy and incentives affect foreign direct investment: A review." – by Morisset, J., and N. Pirnia (2001) -*FIAS Occasional Pape.*

However, if the **FDI is export oriented then the host country's tax policy is considered as determinant factor** for investment.⁵⁶ Similarly if the taxes are imposed at **unusually high rates** or in a way that is especially unfavorable to TOT then also tax on transfer of technologies is considered as hurdle. Such special obstacles might take in the form of **excessive import duties** or **taxation of capital contributions** or **restrictions on deductions** or **high withholding taxes** or, **excessive taxation of expatriate employees**.⁵⁷

Even, the absence of tax treaties is also considered to exacerbate the costs in technology trade. Since, the execution of international technology trade involves two or more tax jurisdictions. It is obvious that the international technology transactions are subjected to tax incidence of both technology exporting countries (TEC) and technology importing countries (TIC). Such double taxation is sometimes, but usually not entirely eliminated unilaterally by the TEC through 'Foreign tax credit mechanism'.⁵⁸ However, the mechanism of 'foreign tax credit' is also not very effective when the double taxation results from dual residence or different interpretations of 'source' or different classification of income. The different interpretation as to the 'source of income' is particularly considered as problematic in international technology trade. Therefore, tax treaties attempt to eliminate double taxation by adopting common jurisdictional rules and definitions.

⁵⁶ "Corporate Income Tax and Foreign Direct Investment in central and Eastern Europe".- by Mintz, J., and T. Tsiopoulos (1992).- Washington, D.C.: Foreign Investment Advisory Service.

⁵⁷ For example, In India, the sale of technology may be subject to a capital gains tax (sometimes at rates as high as 55 per cent) if the sale or receipt takes place in India. A number of other countries impose restrictions on the contribution of assets to a company's capital. In Argentina, such a contribution is permitted but must be approved by a special agency established to monitor and register all technology transfer agreements, a similar rule apply in Brazil. Regarding withholding of taxes on royalty payments Latin American countries in particular tend to impose unusually high rates of withholding tax – 25 per cent in Brazil, 33 per cent in Argentina and as much as 42 per cent in Colombia.

⁵⁸ Van der Bruggen, E. (2001). "Source taxation of consideration for technical services and know-how"- *Asia Pacific Tax Bulletin* 7 (March 1) - Referred in "Taxation and Technology Transfer: Key Issues - UNCTAD/ITE/IPC/2005/9 at p. 8. In determining how the various payments are to be taxed, it is first necessary to establish whether the TEC is considered to be carrying on business in the TIC. Many countries have adopted very broad definition of what constitutes conduct of business, so that very little physical presence is considered to be sufficient in order to render a non-resident liable to tax on business profits derived out of transfer of technology. However, where a tax treaty is applicable, the right of the importing country to tax business profits is usually restricted to cases in which the non-resident (TEC) has a *permanent establishment* (PE) in that country, and is restricted to the profits that are attributable to that PE.

B. Effective absorption and adoption of technology in to local production

The second integral part in international technology transfer is the effective diffusion of technology in to recipient economies. The effective and speedier absorption of technology is crucial considering the fact that even a single factor of delay in technology going in to successful production causes huge loss in the market share, unless exclusive production and marketing rights are also contracted. Again, delay in the present ‘*open market*’ trading and ‘*fast changing technologies and markets*’ means depreciation in the value of technology acquired. Also, the cost of acquisition of a technology depends upon the ability to adopt the technologies. The poor infrastructure and lack of skilled human resource not only causes delay and loss in market share but also, increases the cost of technology acquisition. Thus, absorption and adoption of technologies involves two overlapping aspects: one, ‘the capacity for effective adoption of technologies’ and the two, ‘the costs at which these technologies are absorbed’ in to the local production.⁵⁹ Considerable one-time investments in the following basic infrastructure are considered necessary to reduce the recurring costs in effective adoption of technologies.

An important determinant factor for the ability of domestic firms to absorb foreign-technologies is the existence of an in-house R&D capacity. R&D forms the basic infrastructure to capitalize on the technology externalities. If not foreign technology infusion in an industry might increase competition and encroach on the productivity and market share of other domestic firms with the rise in competition. Thus having an in-house R&D is not only necessary to develop competition in the domestic market for foreign technology, but also is essential to prevent negative externalities from the infused technologies. Also, empirically the studies have shown that having strong R&D will give better bargaining power in acquisition of new technologies.⁶⁰ The Korean model in developing R&D base is a good example to acquire and adopt good technologies at cheaper rate.⁶¹

⁵⁹ "Do Domestic Firms Benefit from Direct Foreign Investment?" – by Aitken, Brian and Ann E. Harrison (1999) - *America Economic Review* 89: 605-618; See also Djankov, Simeon and Bernard Hoekman (1998), "Avenues of Technology Transfer: Foreign Investment and Productivity Change in the Czech Republic," World Bank, manuscript: FDI with in an industry tended to reduce productivity in domestic firms in the Czech Republic; See also Dougherty, Sean M. (1997), "The Role of Foreign Technology in Improving Chinese Productivity," MIT Science and Technology Initiative, manuscript.

⁶⁰ "Technology Transfer and Intellectual Property Rights: the Korean Experience". By Linsu Kim-Pub. Jointly by ICTSD and UNCTAD- 2003: The joint venture efforts of Korean institute of science and technology and the other three Major television producers brought down the royalty rate significantly.

⁶¹ "Technology Transfer and Intellectual Property Rights: the Korean Experience". By Linsu Kim-Pub. Jointly by ICTSD and UNCTAD- 2003: Initially Korean government played a major role in R&D by establishing Korean Institute of Science and Technology (KIST). It successfully attracted and recruited

Also, adequate supply of skilled human resource is another major determinant factor in technology absorption. Hence, providing for a well balanced expansion of education at all levels and disciplines forms the basis for knowledge acquisition and further developments. Again, following the Korea's model in developing Human resource is a good example. Education was one of the most conspicuous efforts Korea made in the process of industrialization.⁶²

To sum-up, at the first level, to expand the domestic markets in developing nations, free and effective flow of technological information is necessary to equip the market players to participate in global markets and lure the global market to expand and include the peripheral economies. Here, the poor resources and the lack of expertise in using technological information in developing nations is a potential hurdle in the process of expansion of markets. To reduce the domestic trade costs, lack of regional co-operation and lack of transportation logistics coupled with the excessive taxation and administrative checks on technology trade is adding to the costs and most importantly causing delays in technology transfer transactions. At the second level lack of financial and technical resources to develop a broad R&D base and human resources to absorb and adopt the new technologies are again adding to the costs and delay.

Reflection on the current approach of international arrangements

In response to these markets deficiencies many trade arrangements among developing nations and arrangements towards regional trade preferences also involving developed nations (often referred as WTO –plus Agreements) are considered as solutions to the challenges mentioned above. Also, these arrangements are considered to address the regional and sectoral specific aspects of technology transfers in a better way. But, the fragmented approach in the absence of guiding framework providing for rights and remedies for anticompetitive provisions is giving way for technology owners to consolidate their dominance in technology markets. Adding to it, these (WTO-plus) agreements and many environmental instruments are providing for private participation

overseas-trained Korean scientists and engineers. Also, KIST worked in partnership with private industries to successfully adopt technology and improve the domestic production process.

⁶² The UNDP report excellently describes the consequences of discrimination and social inequality for the national health system in the USA. 45 million Americans had no basic health insurance in 2003. 21% of Afro-Americans and 34% of Hispanic Americans were included in this number, but of white Americans only 13% had no health insurance. Consequently the infant mortality rate among Afro-Americans was twice as high as among white US citizens. According to the UNDP summary, the USA had access to the newest medical technology and most up-to-date forms of therapy, yet social inequality significantly limited the scope of medical progress..

in bridging the technological gap. These private parties fueled by competition and profit motives, seldom transfer their technologies, so that the recipient can adopt the same and develop innovative skills. Thus, requiring the appropriate policy back-up and government intervention to negate such anti-competitive arrangements between parties which are once again considered as impediments to transfer of technologies.

Conclusion

Impediments to transfer of technologies are many. In this paper I have attempted to highlight only one factor as impediment to transfer of technologies and hope this paper further opens the study in this area in analyzing and highlighting other factors impeding technology transfers. Here in this paper my attempt was to consider both policy and market aspects to trace the translation of conflicting claims of developed and developing nations in to trade costs and impede the flow of technology.

The list of reflections from the discussion presented above for further review:

The reflection of the conflicting claims have resulted in failure of world community to provide for risks or deficiencies involved in transferring technologies to developing nations.

Developing nations lack capacity to provide for competitive markets for international technology trade. Broadly, the technology markets in developing nations are characterized by the features of Lack of information, lack of infrastructure and lack of skilled human resources. Infusion of foreign technology in to these markets (through various development aid programs) is causing threat to the local production and its market share. Hence there seems to be a reason for resisting technology change or infusion.

In the process of globalization, developing markets are required to compete equally at global levels hence, there seems to be no option but to import technologies to meet the global standards. The claims for relaxation from the required competitive levels or global standards are seen as threat to the dominant position of market leaders and hence are not conceded.

In general the international legal regime has failed in providing for effective transfer of technologies for resource poor nations. And the market factors dictating the technology trade are furthering the technological gap between nations.