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Transferring the Technology via Foreign Direct Investment: Does this Approach Escalate the Competitiveness of the Economy for the Developing Country?

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Abstract

Accentuate on trade liberalization and disseminating the advancement of inter-dependence and inter-regional relationship with the incorporate of globalization facilitating the transferring technology assists to explore the resources and proliferate the market opportunities and ensure sustainable competitive advantages for the international organization. Considerable amount of foreign direct investment, promote multifarious innovation and gripping capacity building, transborder scientific and technological affinity and collaboration formulate and arrange by the transnational corporation for transferring and transmitting know-how accelerate the adroitness and capacity to build a superiority in the host country. Evidence exhibits that globalization of production and globalization of technology expanded the market coverage for the multinational firm in the developing country but ultimately economic propagation and acceleration is remain stable or decelerate in the developing country because of insufficiency of capacity on inclusion of modern technology, fragmented and unsubstantial procedures, inadvertent infrastructure and business environment and also pitiable intra-organizational network make a multitudinous predicament for enhancement of economic and socio-economic

phenomenon. For ensuring unremitting economic advancement and acquiring the affirmative feedback from the foreign direct investment developing country need to codify and accomplish the substantial tasks like determining the way to engage in the bilateral and multilateral mechanisms for technology transfer with the advance country, to establish a conceptual framework for capacity building and institutional arrangement, promote private participation and collaboration for swelling the efficiency in the national level, formulate the congruous contrivance for identifying the barriers and opportunities of the mechanisms for exploring and diffusion of technology that optimistically alleviate the gap of exploring the new technology and utilization of knowledge for ensuring the aptitude and compete with the advance country.

Key words: Trade liberalization, Globalization of technology, Globalization of production, Capacity building, Bilateral and multilateral mechanisms, Multinational firm, Transnational corporation]

1. Introduction

Technology has always been an important element for escalating and amplifying economic progress and facilitating economic integration with the assistance of congruous policy initiative at the national, local, regional and multilateral levels. With the assistance of globalization there is an urgency of interdependence and integration of the world economy and also competitiveness, wealth maximization, capital accumulation and power and that is why international transmission of know-how, knowledge and technological acumen is rapidly growing.

The transfer of technology to developing countries has been one of the most important subject matter in today's competitive world and also a mechanism for pursuing the international economic relations. Transition of the economic system from planned economy to market base economy in the international market and reducing the formal and informal trade barriers can assists to attract the Foreign direct investment form the develop and advance country to developing country and FDI is facilitated an enormous amount of technological evolution including capital arranging (positive effect on balance of payment for host country) and labor productivity. FDI make positive consequence over enhancing diffusion of knowledge about production method, product design and new organizational managerial techniques along with the enhancement of the productivity of domestic R&D (Research and Development) activities.

Foreign direct investments (FDI) that provide probably the most important and cheapest channel of direct technology transfer as well as indirect, intra-industry knowledge spillovers to developing countries (Blomström and Kokko 1997). Foreign ownership often provides local firms with efficient corporate governance, as they, mainly privatized to insiders, do not have incentives to restructure (Blanchard 1997). FDI may also be the cheapest means of technology transfer, as the recipient firm normally does not have to finance the acquisition of new technology. And it tends to transfer newer technology more quickly than licensing agreements and international trade (Mansfield and Romeo 1980). And since it has a more direct effect on the efficiency of firms, it also has the potential to create positive spillover effects to local firms.

“Technology transfer” is the process by which commercial technology is disseminated. This takes the form of a technology transfer transaction, which may or may not be covered by a legally binding contract but which involves the communication, by the transferor, of the relevant knowledge to the recipient.

From the Empirical evidence (Kokko 1994, Borensztein, De Gregorio and Lee 1998, and Kinoshita 2000) demonstrate that FDI can contribute to overall domestic productivity growth only when technology gap between domestic and foreign firms is not too large and when a sufficient absorptive capacity is available in domestic firms. In other words, technology spillovers from MNCs tend to occur more frequently when the social capabilities of the host country and the absorptive capacity of the firms in the economy are high. While relatively backward countries have a certain advantage in catching-up, it becomes increasingly more difficult for the country to build the necessary social capabilities and absorptive capacities that allow firms to take advantage of the technology spillovers that are available in the economy. Research & Development can be thought of as having two complementary effects on firm's productivity growth (Cohen and Levinthal 1989). First, R&D directly expands firm's technology level by new innovations, which is called innovation effect. On the

other hand, it increases firm's absorptive capacity - ability to identify, assimilate and exploit outside knowledge, which is usually called learning or absorption effect. These two important effects have to be included into a serious investigation of spillovers through FDI.

Technological knowledge is encompassing both the technical knowledge on which the end product is based, and the organizational capacity to convert the inputs into the finished product. "Technology" includes not only "knowledge or methods that are necessary to carry on or to improve the existing production and distribution of goods and services" or indeed to develop entire new products or processes, but also "entrepreneurial expertise and professional know-how" (Santikarn, 1981, p. 4.).

Transferring the technology spillover the growth of the developing country and enhance the competitiveness of the local firms and proliferate the competition that facilitate upgrade the productivity and R&D. By analyzing the Estonian manufacturing sector (Jones and Mygind, 1999) they determine that the spillovers depend on the recipient firm's size, its ownership structure and its trade orientation. Domestic firms benefit from competition from both foreign and other domestic firms because such competition forces them to upgrade their productivity. Furthermore, although human capital increases the local firm's growth of sales, its potential migration to foreign firms reduces significantly this effect. Finally, we find that technology spillovers are significantly larger for outsider-owned firms, which contributes to the ongoing debate over the relative merits of different ownership forms in transition economies (Estrin and Wright, 1999). MNCs concentrate to make invest in the developing countries hope to generate technology spillovers because FDI transfer intangible assets to the affiliate, which may then diffuse to local firms (Blomström and Kokko, 1996).

Transferring technology transpire manifold ways like multifarious contractual agreement like licensing or joint venture or strategic alliance or different bilateral, and multilateral agreement. Over analysis of India Kathuria (2001) finds that local firms do not benefit from a foreign presence, if this presence is measured as a share of sales, but they do benefit from having foreign capital stock available.

The focal points of the research work are to determining that transferring technology via FDI assist the enhancement of the competitiveness and escalate the economic growth of the developing country

In conclusion, transferring of technology through the FDI have a positive or negative consequence on the productivity of local firms depending on the competitiveness, absorbing capacity, skills of the employees and the positive effect of backward and forward linkages. The empirical literature demonstrates the multifarious results about the transferring of technology in the developing country.

2. Objectives of the Study

Main objectives of this research are as follows:

- a) To explore the current issues related to technology transfer through FDI.
- b) To find out the evidence of developing countries engagement in the globalization of technology.
- c) Finally, to recommend strategies needed to be undertaken by the developing countries for enhancement of technological superiority.

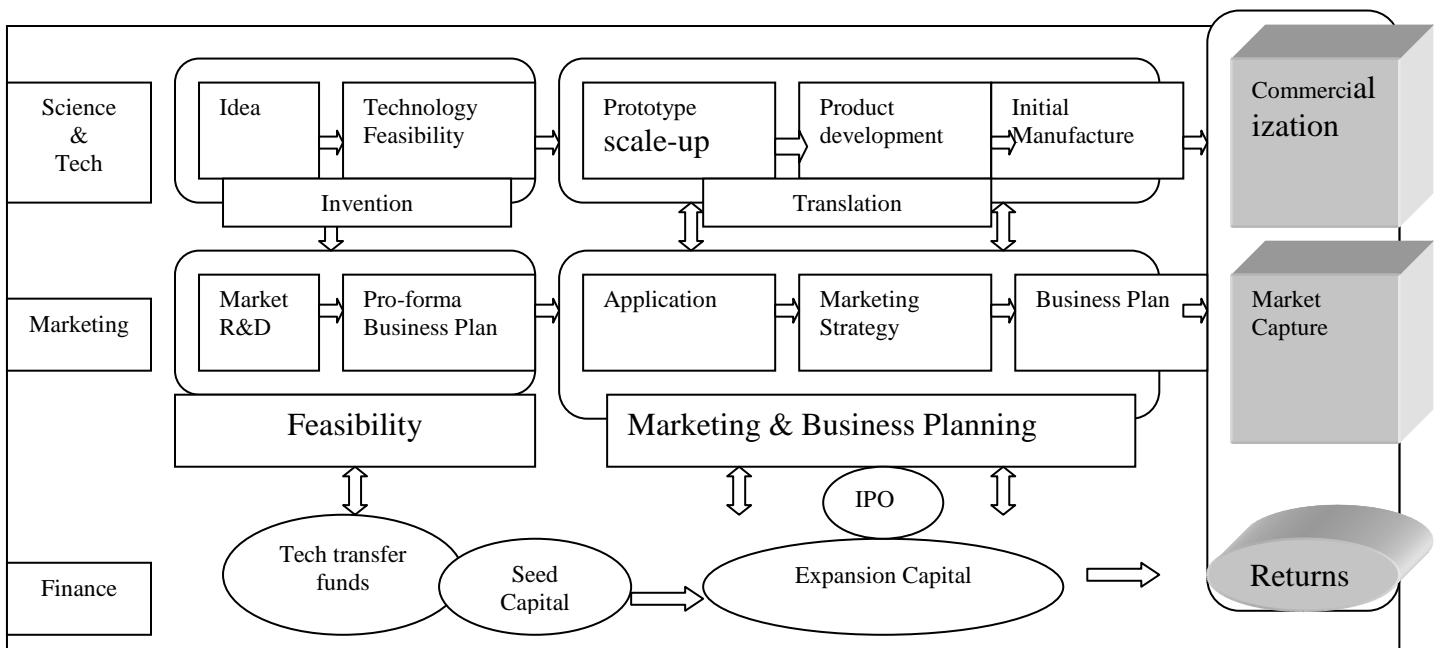
3. Research Methodology

This work is mainly encompasses with multifarious secondary sources by observing manifold articles and relevant research work accomplished by the prodigious academician. The research work is mainly incorporate with to determining the transferring technology via FDI enhances the competitiveness of the economic superiority in the developing country and also recognizes that transferring technology assists to enhancing the absorbing capacity of the technology in the developing country.

3.1. Transfer of Technology

Technology transfer (TT) is an area of interest not just to business, economists, and technologists but also to other disciplines such as anthropology and sociology (Zhao and Reisman, 1992). The term technology transfer can be defined as the process of movement of technology from one entity to another (Souder *et al.* 1990; Ramanathan 1994). The transfer may be said to be successful if the receiving entity, the transferee, can effectively utilise the technology transferred and eventually assimilate it (Ramanathan, 1994). The movement may involve physical assets, know-how, and technical knowledge (Bozeman, 2000). Technology transfer in some situations may be confined to relocating and exchanging of personnel (Osman-Gani 1999) or the movement of a specific set of capabilities (Lundquist 2003). Technology transfer has also been used to refer to movements of technology from the laboratory to industry, developed to developing countries, or from one application to another domain (Philips 2002).

Figure-1. Technology Transfer process



3.2. Foreign Direct Investment

Historically most of the FDI has been directed at the developed nations of the world as firms based in advance countries invested in the others market. FDI can take place in Greenfield investment or by mergers and acquisitions.

According to the UNCTAD, Foreign direct investment (FDI) is coming in the year of 2012 is around \$1.6 trillion. UNCTAD projections for the medium term based on macroeconomic fundamentals continue to show FDI flows increasing at a moderate but steady pace, reaching \$1.8 trillion in 2013 and \$1.9 trillion in 2014, barring any macroeconomic shocks and approximately 75% of FDI are coming from the advance and develop country.

4. Evidence of Developing Countries Engagement in the Globalization of Technology

National and local economic proliferation is now a days large extent rely on the bases of the essence of globalization because it leads to trade liberalization by reducing the trade barriers and develop country rapidly transferring their technology in a developing country for the purpose of expansion of the production and market coverage but still the developing country having lack of learning superiority and absorbing capacity leads a negative impact over local economic development.

- ❑ First of all, the LDCs' and developing country are still far away from the generation of new technologies and innovation. The production of knowledge is heavily accentuated on the advance countries along with the scientific and technological R&D is encompasses with the advance country. Advance country applies to more formalized form of knowledge creation.
- ❑ Developing countries have only marginally increased their participation to the scientific community. The number of scientific papers per million population shows much more clear evidence that generation of new dimensional knowledge is mainly concentrate in the North and there are very small proportion contribution of the South. Some exception are there the East Asian Tigers (South Korea, Taiwan, Hong Kong and Singapore) this country have generate a substantial amount of output compare to some OECD countries.
- ❑ In the advance country having a congruous and substantial framework for Intellectual Property (IP) act (copy right, patent, trademark). USA is the largest market for invention and innovation certainly there is urgency for having structure frameworks for patent. Patents are assigned to countries on the ground of the home address of the invention. Although according to the TRIPS (trade related intellectual property rights) the developing country make a significant progress about the IP related provision, but it is clearly notify that legally protected inventions and innovation are still mainly generated in the North, if we exclude the East Asian tigers it is lucid matter that the developing countries are not bridging the scientific and technological gap with the developed countries.
- ❑ The contribution of talent coming from developing country to develop country is enormously increased in recent past; they contributed themselves for engaging in the multifarious scientific and technological activities in the North. This labor forces would have provided a large contribution to the knowledge base of their country if they had the congenial and appreciating professional opportunities at home. In many developing countries the impediment is not the lack of the individual scientific and technological talents but the lack of appropriate institution and infrastructure.
- ❑ In the technology-intensive product, the developing countries export raw materials and low skill product and extensively rely on advance countries to import high-tech product. Due to the globalization of production the multinational firms dispersing their production facility all over the world especially Malaysia, Thailand, Mexico, China, India, Taiwan and South Korea, this country enhance their competitive capabilities in domestic enterprise and establish their own international network and make a significant progress in the technological know how capacity.
- ❑ Technology agreements have an inseparable channel for exploiting the source of knowledge transmission. Because of small amount of resources developing country are also marginal in technological collaboration. In the strategic technology partnering (STP) the western country are significantly well ahead because of technological know-how, knowledge know-how, learning skill, experiences and capital arrangement. The East Asian country makes an affinity and collaboration with the western community and dramatically increasing the superiority in the technological invention. The UNDP reports some significant cases of research activities which have been generated in the South and for the South: Thailand's drug to fight malaria, Cuba's meningitis vaccine, Bangladesh oral rehydration therapy, Brazil's basic computer, India's wireless Internet access are some of the examples reported. The scientific and technological innovations developed in the South are still negligible compared to those developed in the North. So far, they have not led to increasing South-South cooperation, exchange of know-how, diffusion of expertise and best practice methods.

Table-1. Factors associating of Impediments of the technological competitiveness in developing country

Technology import	<ul style="list-style-type: none"> ❑ Small number of develop countries provide most of the technological product ❑ Most of the developing countries having unavailability of substantial amount of capability of innovation and adaptation ❑ Lack of competence to create globally competitive technology ❑ Inaccessibility of information about the new technology and innovation
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Technology infrastructure	<ul style="list-style-type: none"> ❑ Insignificant amount of collaborative research ❑ R&D institute and testing facility in developing country are unorganized and inadvertent. ❑ Lack of communication and segregation from industrial and education linkup.
Availability of skilled manpower	<ul style="list-style-type: none"> ❑ Lack of trained personal ❑ Lack of continuous capability development of manpower in technical dimension ❑ Lack of propensity of adaptation of modern technology because of lack of skill workforces.
Technology acquisition	<ul style="list-style-type: none"> ❑ Unit level technology absorption is low ❑ Lack of ready access to capital ❑ Relatively high transaction cost ❑ Improper incentive, direction and capability to upgrade the existing technology
Unit level intervention	<ul style="list-style-type: none"> ❑ Lack of participation in network of organization and institution ❑ Lack of accumulation of fund because of shortage of capital specially small firms ❑ Lack of coordination the requisite level of technological activity

The evidence for success of East Asian country in the case of absorbing capacity and enhancement of technological capabilities, the certain reason are illustrate here

- ❑ **Communication Technology:** Telecommunication creates global audiences and transportation creates the global villages. Communication technology is incorporate with e-mail, mobile phone and fax. New technological resources promoted trade by promoted by a reduction in communication costs and information.
- ❑ **Industrial Technology:** New industrial assembling machine or numerically controlled machine drastically speeds up the productivity and competitiveness. Advance countries 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.
- ❑ **Electronic technology:** Because of Japanese competitiveness in the electronics items the others neighboring country are accentuate on the competitiveness of the electronics items. Japanese successes in the electronics items facilitate and induce to make production of the electronics items of other countries and follow the footstep of the Japanese.
- ❑ **Information Technology:** Rapidly transition of the capabilities of the East Asian country attracts the advance country to make allies for promoting strategic alliances with multinational corporations". International firm have the propensity for establishing the branches in the developing country for the purpose of exploitation of the opportunities.

5. Evidence from Developing Country: Bangladesh: Transferring Technology via FDI makes a Revolution in the Telecommunication Industry

The liberalization of Bangladesh's telecommunications sector began with small steps in 1989 with the issuance of a license to a private operator for the provision of inter alia cellular mobile services to compete with the previous monopoly provider of telecommunications services the Bangladesh Telegraph and Telephone Board (BTTB). Significant changes in the number of fixed and mobile services deployed in Bangladesh occurred in the late 1990s and the number of services in operation has subsequently grown exponentially in the past five years. Due to the liberalization Telecommunication sector received the highest amount of FDI followed by textiles, banking, power, gas and petroleum. Telecommunication and textiles together accounted for more than half of the total FDI in 2012, according to UNCTAD.

In Bangladesh there is 106,000,000 people use mobile phone out of 148,090,000 people. Because of the amplifying of FDI from 2003 to 2012 telecommunication industry in Bangladesh rapidly transforming and exploring manifold opportunities, like:

- ❖ **Expand Valued Added Services (VAS):** While the mobile VAS market has been growing, a number of initiatives still need to be undertaken to fully developing this market. The VAS contribution to revenue is upwards of 20% in emerging markets such as China, even without introduction of 3G, as compared to sub 10% in India. For Bangladesh it is key to encourage the development of a robust VAS ecosystem in areas such as Agricultural VAS, Mobile Banking, M-Health and M/E-Commerce.
- ❖ **Convergence will become more important:** If service providers build service converged networks, then financial services, public services, and entertainment converged applications will be able to reach a far larger portion of the population. This is likely to have major implications for BD Telecom companies and may lead them to invest in ISPs but also in IPTV, Video and Media and also game development as well as domestic web content.
- ❖ **Infrastructure Sharing:** One of the major new initiatives in 2010 has been infrastructure-sharing agreement between GP & Banglalink and Robi & Banglalink. We expect this trend to continue partly enforced by the regulator but also as a matter of practical necessity.
- ❖ **Public Private Partnerships (PPPs):** There is an opportunities for Telcos to partner up with the Government of Bangladesh (GoB) in service delivery across the areas of e education, e-health and e-governance.
- ❖ **Lower Broadband Costs:** There is a strong case for GoB to substantially reduce broadband wholesale prices further to also accelerate broadband access to a broader range of the public. This might be done in conjunction with the installation of a second submarine broadband cable.
- ❖ **Digital Bangladesh:** Push to develop ITES and Outsourcing presents new business opportunities/diversification by the Telecom companies. We have already seen such a strategy being adopted by market leader GP who have established GP IT as a separate company and one that is already the largest IT company in Bangladesh with around 300 employees.
- ❖ **Possible Tax Cuts:** The GoB might enact more Telecom friendly regulatory or fiscal reforms such as cuts in the SIM tax to encourage faster mobile phone penetration to catalyze access to information and hence the Digital Bangladesh push.

6. Strategies need to Undertaking for Enhancement of Technological Superiority of the Developing Country

Commensurate and apropos strategies necessary to undertake for the purpose of amplifying the competence and capabilities of the absorbing of technology in the developing country and indubitable this appreciating strategies induce and promote the superiority and decelerate the gap of the capabilities of new innovation and invention between the develop country and developing country:

Categories	Target	Instrument
International exploitation of national innovations	<ul style="list-style-type: none"> ❑ Achieve lower foreign dependency and fill technology gaps ❑ Obtaining IPRs at fair conditions ❑ Increase learning relevant to national industry ❑ Obtaining competitive supply prices of technology-intensive 	<ul style="list-style-type: none"> ❑ Promoting collaboration between national firms and leading firms in the field. ❑ Incentives to selected FDI in the country and to their learning-enhancing modes of operation. ❑ Negotiations on imports with foreign firms. ❑ Multilateral agreements on IPRs and licenses.
Global generation of innovations by TNCs	<ul style="list-style-type: none"> ❑ Use TNCs to enhance national technological capability ❑ Benefits from local technological activities of TNCs ❑ Disseminate TNCs expertise locally 	<ul style="list-style-type: none"> ❑ Providing real incentives to the location of new innovative activities with foreign capital ❑ Upgrading S&T infrastructure and institutions ❑ Supply qualified workforces ❑ Monitoring the technological strategies and location choice of TNCs ❑ Associate the TNCs centers to hubs of specific knowledge and industrial firms located in developing countries
Global techno-scientific collaboration	<ul style="list-style-type: none"> ❑ Use the foreign academic community to upgrade the scientific competence of the nation ❑ Allow the country to become a junction of technical and industrial information 	<ul style="list-style-type: none"> ❑ Scientific exchange program ❑ Student flow to develop country ❑ Incentive to international scientific project ❑ Participation to international S&T organization ❑ Development of infrastructure for techno-collaboration ❑ Promoting industry linkage and their international

		<p>reach</p> <ul style="list-style-type: none"> ❑ Participating to international organization for technical and industrial collaboration.
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8. Findings

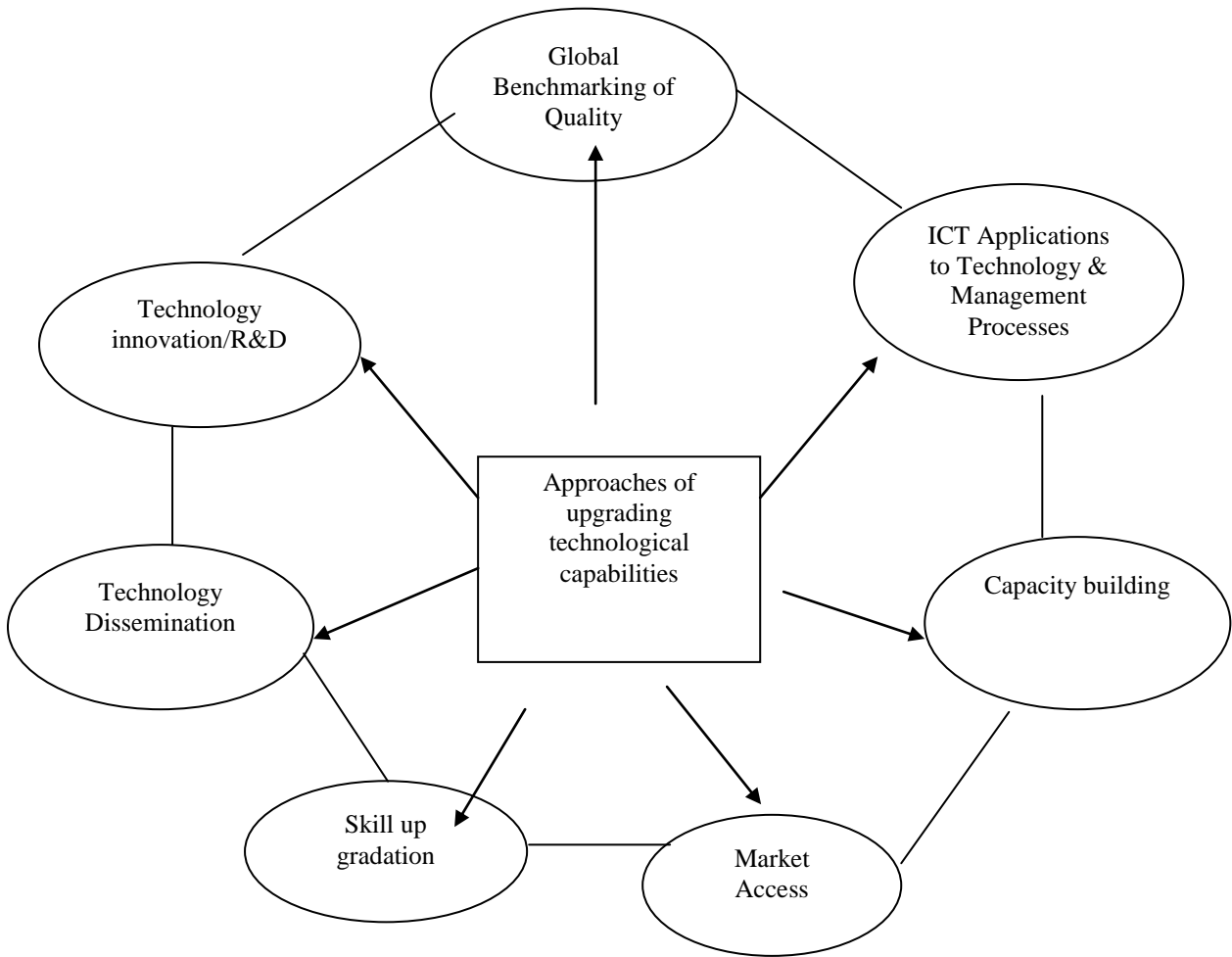
- ❑ Inadvertent and inappropriate technological capabilities provide the unstructured and volatile economic enhancement in the developing country and also lack of absorbing capacity and learning competence creates obstructive situation in the developing country.
- ❑ Improper and incongruous research infrastructure facility along with the lack of availability of skill labor forces causes catastrophe situation and that is why developing country are unable to deplete the gap of the innovation and invention capacity of the develop country and developing country.
- ❑ Lack of intensification of scientific and knowledge base collaboration with the western world that is why developing country are unable to exploiting the resources that arise from the globalization
- ❑ Poor and unsubstantial policy and lack of lucid assumption about the globalization along with ramshackle intellectual property (IP) act make a obstacle for the developing country to attract the technological base of FDI from the develop country.

9. Recommendation

- ❑ Developing country should undertake requisite investments in further developing their stocks of human capital, enhancing domestic R&D capacities, and providing stimulating macroeconomic, regulatory, and institutional environments. Developing country should concentrate on Establishment of International Technology Centres for the purpose of enhancing capabilities development and also make encourage application of technologies at the enterprise level through rapid build up of awareness of need, diagnosis of economical requirements, technology transfer management etc.
- ❑ Developing countries should give a high priority to channeling FDI flows into the sectors of high and/or needed technologies, and to attracting foreign investors offering the transfer of such technologies. Developing country should concentrate on adopting driven approach and focusing on specific industrial sector and implementing of technology driven program for ensuring the increasing the competence and capabilities and also for flourishing international innovation and invention related technological activities.
- ❑ Establishment of cooperative and collaborative partnerships between key stakeholders and facilitating supportive policy for transferring knowledge and technology make an assistance for ensuring amplifying absorbing capacity and promoting competitive advantages and through this collaboration developing country are able to formulate and arrange the procedure of designing and implementing of technology transfer plans and specific actions.
- ❑ Strengthen the IP and associate policy and establishing the system that minimizing the contractual and legal risks along with establishing decision support tools that promote disseminating reliable and relevant information about the global technology and also creating the global network.

Here is the model that assists the developing country for escalating and enhancing the absorbing capacity and accelerating the competence of technological innovation and invention.

Figure. Approaches of upgrading technological capabilities for developing country



7. Conclusions

Globalization always accelerates the economic propagation along with knowledge dissemination and generates multidimensional opportunities. Technological superiority and ascendancy provides the opportunities for exploring the benefits from the globalization especially for develop countries but because of inadvertent and unsubstantial policies and procedure leads developing country are automatically excluded from this enforceable advantages. Developing country can exploring the relevant benefits by designing and implementing policies and enhancing the learning scope and acceleration of the access of appreciating knowledge exploration and congruous structure for advancing technological avenue. Continuous cooperation with the industrial country can facilitate a platform for sharing or acquiring the technological experience, strengthening the existing research and development program and conglomeration of training and human development program surely upgrade the standard the expertise of the developing countries. For extricating the poverty and its related problems developing country should accentuate on the technological adroitness and also realize the gigantic amount of gap with the western world. International community should make the constructive appreciating attitude on the technological development efforts in poor-technology countries through market cooperation as well as non-market technology transfer and technical assistance.

References

Blanchard, O. 1997. *The Economics of Post-Communist Transition*. Oxford University Press.

- Blomström, M. and A. Kokko. 1997. How Foreign Investment Affects Host Countries. Policy Research Working Paper, no. 1745, World Bank.
- Blomström, Magnus, Kokko, Ari, 1996. Multinational corporations and spillovers. *Journal of Economic Surveys* 12(2), 1-31.
- Borensztein, E., J. De Gregorio, and J.W. Lee, 1998. How Does Foreign Direct Investment Affect Economic Growth? *Journal of International Economics*, 45: 115-135.
- Bozeman, B., 2000. Technology transfer and public policy: A review of research and theory. *Research Policy*, 29, pp. 627-655.
- Cohen, Wesley M., Levinthal, Daniel A., 1989. Innovation and learning: The two faces of R&D. *Economic Journal* 99 (397), 569-596.
- Estrin, Saul, Wright, Mike, 1999. Corporate governance in the former Soviet Union: An overview. *Journal of Comparative Economics* 27 (3), 398-421.
- Jones, Derek C., Mygind, Niels, 1999. The nature and determinants of ownership changes after privatization: Evidence from Estonia. *Journal of Comparative Economics* 27 (3), 422-441.
- Kathuria, Vinish, 2000. Productivity spillovers from technology transfer to Indian manufacturing firms. *Journal of International Development* 12 (3), 334-369.
- Kokko, A., 1994. Technology, Market Characteristics and Spillovers. *Journal of Development Economics*, 43: 279-293.
- Lundquist, G., 2003. A rich vision of technology transfers technology value management. *Journal of Technology Transfer*, 28(3-4), pp. 284.
- Osman-Gani, A.A.M. 1999. International technology transfer for competitive advantage: A conceptual analysis of the role of HRD. *Competitiveness Review*, 9, pp. 9.
- Phillips, R.G., 2002. Technology business incubators: How effective as technology transfer mechanisms. *Technology in Society*, 24, pp. 299-316.
- Ramanathan, K. 1994. The polytrophic components of manufacturing technology. *Technological Forecasting & Social Change*, 46, 221-258.
- Santikarn, Miagsam (1981). *Technology Transfer* (Singapore: Singapore University Press). Zhao, L.M. and Reisman, A., 1992. Toward meta research on technology transfer. *IEEE Transactions on Engineering Management*, 39(1), pp. 13-21.
- Souder, W.E., Nashar, A.S. and Padmanathan, V., 1990. A guide to the best technology transfer practices. *Journal of Technology Transfer*, 15(1-2),