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## **Mobility of Highly Skilled Workers and Academic Collaboration in India and Russia<sup>1</sup>**

mobility of highly skilled workers has become an inseparable and regular phenomenon which has resulted shortage of professionals' in developing countries. Mobility of professional from emerging economies, particularly from India, China and some Eastern European countries, is not a new phenomenon, however over the last few years rate of migration has amplified which has drawn attention

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of the policymakers and researchers. This has also reflected in the immigration policies of major host industrialised countries which have shifted their focus to attract highly skilled workers from other countries. Consequently, professionals' mobility has increased from India and Russia to developed countries and the outflow of professionals resulted brain drain in these countries. This can be linked to globalisation which is a driving force for promoting demand of skilled manpower in international labour market demand. Therefore, in this paper an attempt is made to analyse the mobility pattern of highly skilled workers from India and Russia and policy issues responsible for the outflow of professionals. There are certain limitations of empirical analysis of the study due to paucity of mobility data but earlier studies confirm that mobility of professionals to developed countries from India and Russia has spurred over the last few years. However, mobility of professionals between India and Russia is not observed except few exceptions. Further, academic collaboration has increased over the years and post 90s period witnessed a growth of joint research publications between India and Russia.

**Keywords:** Mobility, Brain Drain, Highly Skilled Workers, Emerging Economy, Academic Collaboration.

## Introduction

Globalisation has influenced every sphere of economy, trade and political relations across the world. The transformation in economy brought structural changes in education; particularly in higher education and science & technological (S&T) capabilities which pushed mobility of highly skilled professionals. The mobility of high skilled people or professionals is defined as the movement of people with special talents, skills and specialised knowledge in the scientific, technological, managerial and culture areas across the countries (Solimano, Pollack, 2004). Highly skilled migrants can be categorised into three groups (i) science and education sector which consists of students, scientists and researchers (ii) business Sector which includes engineers, information technology (IT) experts and (iii) banking sector that incorporates portfolio managers, risk analysts and strategists etc. This pool of professionals may be termed as "knowledge bank" and is an important source of talent mobility to developed countries. The increasing demand of highly skilled workers is met from the developing countries. However, the mobility of skilled workers is a historical process but in modern time the term "mobility of professional" drew attention of scholars when the British Royal Society first coined the term "brain drain" in the 1950s to describe the outflow of scientists and technologists to the United States of America. The brain drain is generally associated with de-skilling of emigrants in the host country while the country of emigration experiences the draining of skilled professionals. Therefore, it is defined as "departure of educated or professional/people from one country, economic sector, or field for another, usually for better pay or living conditions» (Brain drain — Definition and More, Free Merriam-Webster Dictionary, 2010). The brain drain or mobility is deemed a cost based economic activity as emigrants carry with them the fraction of gained skill and training from the country of origin. Subsequently, the demand of highly skilled workers has increased over the last decade and emigration of skilled workforce has become more common amongst developing nations such as the Africa, Asia, East Europe and South America. Although, detailed statistics on international professional mobility is not accessible but literature confirms an increase in migration of skilled workers during the 1990s from Asia, for example China and India, and East Europe such as Russia to the USA, Canada, Australia and UK. The process of professional mobility affected mostly Brazil, Russia, India and China (BRIC). But India and Russia are possibly unique among the BRIC counterparts as the globalisation influ-

enced economy of both countries extensively. This is because economy of India and Russia is undergoing vital structural changes which affected the higher and technical education and generated a considerable pool of highly skilled workers. Moreover, Gross Domestic Product (GDP-nominal) of India and Russia was \$1.209 trillion and \$1.676 trillion respectively in 2009 (3). Therefore, comparative assessment of professional mobility may be useful to cope with the future economic development and to make strategy for best utilisation of available skilled in both countries and for BRIC countries in general.

Indo-Russian relations refer to the bilateral relations between the Republic of India and the Russian Federation. During the Cold War, India and the Soviet Union enjoyed a strong strategic, military, economic and diplomatic relationship. After the collapse of the USSR, India improved its relations with the US, however, continued its close relations with Russia. Despite, changing relation India is the second largest market for the Russian arms industry after US. But during the last efforts have been made to make strong relations in strategic areas with Russia since the visit of Vladimir Putin to India. As a result, apart from military and strategic areas India has also collaboration in economic, trade, energy sector, and space research. In the field of science and technology (S&T) India has a largest cooperation programme under the Integrated Long-Term Programme of cooperation (ILTP) which is coordinated by the Department of Science and Technology from the Indian side and by the Russian Academy of Sciences and Russian Ministry of Industry & Science and Technology from the Russian side. Under this programme, eight joint Indo-Russian centres have been established to focus on joint research and development work. Development of SARAS aircraft, semiconductor products, super computers, poly-vaccines, laser science and technology, seismology, high-purity materials, software & IT and Ayurveda are some of the priority areas of co-operation under the ILTP between both countries. Thus, India enjoyed good relations with Russia which may further open the doors of co-operation in S&T and high tech areas. This could be useful to exploit the existing human capital and available expertise for mutual benefits.

### **Aims and scope**

Stimulated by globalisation and contemplation of a better standard of living increasing numbers of people are fleeing from developing or emerging economies to the western world and opting to work on foreign shores. Therefore, a majority of young graduate professionals such as management, economic analysts and IT professionals and researchers are attracting by new opportunities generated due to the new economic policies which spurred demand of professionals in the developed economies from Brazil, China, India and Russia. Subsequently, problem of mobility of professionals from India and Russia has become more alarming than other BRIC countries. A serious mobility of professional dates back from the early 1990s when more than 80,000 talented professionals left the country in search of better earnings, funding and facilities in Europe (Adams, King, 2010). Presently, India sends maximum number of science and engineering (S&E) graduate to US and western countries. Russia is also facing the similar problems of brain drain since collapse of the Soviet Union. Apparently both the countries have been facing comparable issues of mobility of highly skilled workers and professionals. Therefore, the problem is topical which needs to be addressed appropriately. The analysis is more important in the context of India and Russia as

both are the constituent of BRICs block and their economy is emerging rapidly. Therefore, the objective of the paper is to describe the out flow of highly skilled professionals from India and Russia. However, paucity of relevant inter-country data on mobility of professional is a limitation of the study. In addition pattern of research publication and academic collaboration between India and Russia is also analysed in different areas which is supposed to be associated with flow of professional. For mobility of highly skilled workers theoretical issues are discussed while for academic collaborations and publications data SCOPUS database is used. The inferences may significant because both countries are experienced the similar hitch of mobility of skilled workers and the research output has declined comparatively in both countries due to a low demand for researchers from the economy.

### **Factors of skills demand-complementing and competing theories**

Mobility of people is an integral part of human civilisation and has been existing since past. According to the United Nations the total stock of immigrants in the world was 190.6 million or 3 % of the world population in 2005. The top 10 destination countries for international mobility include the United States, Russia, Germany, Ukraine, France, Saudi Arabia, Canada, India, the and United Kingdom. The top 10 emigration countries are: Mexico, Russia, India, China, Ukraine, Bangladesh, Turkey, the United Kingdom, Germany, and Kazakhstan. Furthermore, countries such as Russia, Germany, Ukraine, India, and the United Kingdom, have experienced large-scale in-migration as well as out-migration. The mobility is driven by economic factor to hold better opportunities in the host countries. So, one of the most significant developments related to international mobility, especially from developing to developed countries, is that the migrants transfer a large sum of money to their home. According to World Bank (2008), the estimated total recorded remittance inflows was US\$ 101.6 billion in 1995. This amount increased by three fold and reached US\$ 317.7 billion in 2007. Significantly, the developing countries received a sum of US\$ 239.7 billion or about 75 % of the total remittances in 2007. However, the actual size of remittances including unrecorded flows through formal and informal channels is much larger. The top 10 remittance recipient countries in 2007 were: India, China, Mexico, Russian Federation, Philippines, France, Spain, Belgium, the United Kingdom, Germany, and Romania. The top remittance sending countries include the United States, Saudi Arabia, Switzerland, Germany, Spain, Italy, Luxembourg, Netherlands, and Malaysia. These remittances have been a major source of a wide range of benefits in the recipient countries. The recent surge in world-wide remittance flows has attracted the attention of the researchers towards understanding the causes and consequences of these transfers. (Migration and Remittances, 2008). Given the amount of money involved and its potential impact on the emigrants the highly skilled professional are exploring avenues to go overseas from developing countries. The international mobility of highly skilled workers is asymmetrical and more associated with economy; therefore, the mobility is from developing to developed countries. Accordingly, the mobility of professionals is affecting the policies of immigration in the host countries.

Recently, mobility of highly skilled professional has become one of the important aspects of the global economy which allows skilled professionals to migrate overseas for better opportunities. The international mobility is often visualized in terms of economic globalisation. In addition, mobility is also linked to education which is now treated as a

commodity based on demand, need and requirements and controlled by market forces. The literature on mobility consists of macro and micro perspectives as well. The macro aspect of mobility emphasises on structural causes and functions of immigrant labour for developed nations (Burawoy, 1976; Pedraza-Bailey, 1990) through the articulation of international system (Portes, Böröcz, 1989) where as micro perspectives, advocates “push” and “pull” theory of migration (Lee, 1966). The third aspect of mobility of highly skilled workers is emerging with the growth of information technologies (IT) which has offered tremendous opportunities in developed countries in the last decade. Therefore, demand and supply are the major factors that support the mobility of skilled people generally from developing economies to developed economies. The reason could be obvious that the developing economies are producing surplus professionals due to up gradation of higher and technical education with low capacity of absorption. Further, the improvement in infrastructure in higher and technical education encouraged competition and increased specialisation by raising demands of professional. Thus, host nations attempt to pull highly skilled professionals by implementing new work permits for the emerging pool of knowledge. The receiving countries underline their demand for highly skilled professionals in order to succeed in the global competition for talents (Florida, 2002). However, the labour market and social integration of these professional emerge due to their high level of education and the impact of the mobility has positive and negative aspects as well (Pethe, 2007). For example, the migrants are believed to contribute to the wealth of their destinations while the country of origin lost highly skilled people to industrialised countries because of income gaps between countries of origin and receiving countries (Fortney, 1970). The earlier theory of mobility thus advocates the model of brain drain but contemporary theory assumes mobility as an economic activity which is beneficial for both receiving and source countries. Subsequently, over the past few decades a new mobility pattern was emerged where brain drain is translating into brain circulation. Further, earlier research on mobility was focused on internal exchange of highly skilled professional within transnational companies but scholars advocated other channels of migration (Findlay, Li 1998). They suggested that recruitment agencies and international bilateral contacts, who recruited externally, are additional channels for highly skilled workers apart from the internal labour market. The external channels of mobility are more demanding than intra-company transfers of professional due to the diversity of actors in the process of mobility (Koser, Salt, 1997). Therefore, the mobility of qualified workers happen in two forms: (i) students who go for higher studies continue to carry out their research and professional activities in the host country and (ii) internships are often required at the end of students’ studies to validate their theoretical learning subsequently they are placed suited to their level of qualifications (Tremblay, 2001). This hypothesis is widely acknowledged as the mobility of highly skilled professional is judged now in terms of a win-win situation than a gain sum situation.

Besides economic viewpoint the mobility of highly skilled workers has other side also which includes home country and host country aspects (Nath, 2009). The home country mobility theory based upon the relationship between migration and well-being effects of migration while the host country theory confirms that education of foreign-born workers has become competitive due to higher education which provides opportunities for global resource re-allocation of workers through mobility from developing to developed countries that benefits the world as a whole. Also improvement in educational infrastructure in higher and technical education in emerging countries like India and Russia the potential

pool of talented workers has grown quickly but a fraction of jobs are suited for the potential candidates as a result they look towards foreign countries for better employment. The host (foreign) countries have substantial job opportunities in engineering, financing, accounting and life sciences. In addition emergence of Information and communication Technology (ICT) has opened the doors for IT professionals in foreign multinational companies.

### **Global mobility: An Indo-Russian experience**

Globalisation influenced all sectors of economy not only in developed but also in developing countries. The new economic policies encourage competition in trade and communication resulting development of infrastructure in manufacturing, service, agriculture and education sector. The studies on globalization explain the unprecedented expansion of transnational corporations (Dicken, 1992, Kamel Rachael, 1990) which stimulated the flow of professional across national borders. Consequently, many countries worldwide expanded their higher education systems as well as access to higher education in their country. Expansion in infrastructure and access of higher education improve the quality of education in developing countries. As a result the flows of students worldwide increased, particularly from developing countries to developed countries, and from Europe and Asia to the United States. Therefore, new economic policies have changed the demand pattern for foreign labour in most of the industrialized countries which caused brain-drain in the country of origin. The process of migration is discussed widely (Marmolejo, 2010) which will continue as international mobility of students is expected to rise in future (Kumar, 2008). It was estimated that more than 200 million people live in a country other than the one in which they were born so the share of highly skilled students was increasing. The number of foreign higher education students doubled during 2000–2007 and the number of people on international assignments increased by 25 % in the last decade which may further rise 50 % by 2020. The growing importance of emerging market of highly skilled workers will change mobility patterns as developing countries are producing more specialised talent PriceWaterHouce-Coopers (PwC) (Talent, 2010) and the E7 countries (China, India, Brazil, Russia, Mexico, Indonesia and Turkey) will overtake the G7 in terms of GDP by 2020, that comprises an large pool of talent. Obviously, the global demand for highly skilled workers will be met from developing countries. This fact triggers an exodus of human capital and high-skill personnel from developing countries.

The demand for skilled workers has been on the rise in the last decade and the United States was the major recipient of foreign skilled people followed by Europe. Nearly 40 % of foreign-born population in the U.S. have tertiary level education. Since the early 1990s around 900,000 skilled professionals, mainly Information Technology (IT) specialists, have immigrated to the United States coming from India, China, Russia and some OECD countries (U.K., Germany, Canada) up to 2000. The US was the largest recipient of this migration and US accounted 32 % of all foreign students in the OECD countries (The growth of Cross, 2002). Earlier studies (Solimano, Pollack, 2004) indicate that most of the recruiters come from developing and emerging economies like India Russia. Although both countries send a significant number of skilled workers to other countries but due to non-accessibility of data, the detailed analysis and estimates of mobility pattern of skilled workers is beyond the scope of the paper.

## India

India being one of the largest pools of skilled labour is a vital source of labour mobility. The past few decades there has seen an upsurge of migration from India to the US and Europe and also North America. India has been among the toppers list for sending students which is a major source of professionals mobility to overseas. The mobility of professional from India includes engineers, scientists, analysts and software engineers. The mobility of software engineers exemplifies likely future trends especially in services sector. It is significant to mention that around 67,800 science & engineering (S&E) students went to United States followed by China (53,740) in the year 2008/2009 out of 258,950 students (India Sends Maximum). Thus, India accounts for the largest number of foreign students (nearly 26 %) in S&E in the United States. Similarly, UK, Australia, Canada and other developed economies are receiving significant number of students for higher and technical education from India. According to an estimate the average stay rate for foreign recipients of science and engineering doctorates is four to five years after earning their degree which rose from 41 % to 56 % between 1992 and 2001. In the case of Indian students the average stay rate rose from 72 % to 86 % for the same period though for other countries more students are returning home after completing their studies except China. Accordingly, demand for Indian professional is increasing and India is exporting about 4 % of its total generated skilled talent (Brain Circulation). Thus, India is a huge source of highly skilled workers to developed countries (Cross-Border Higher, 2008) and India stands as a main source-country for emigrants of highly skilled workers in the world.

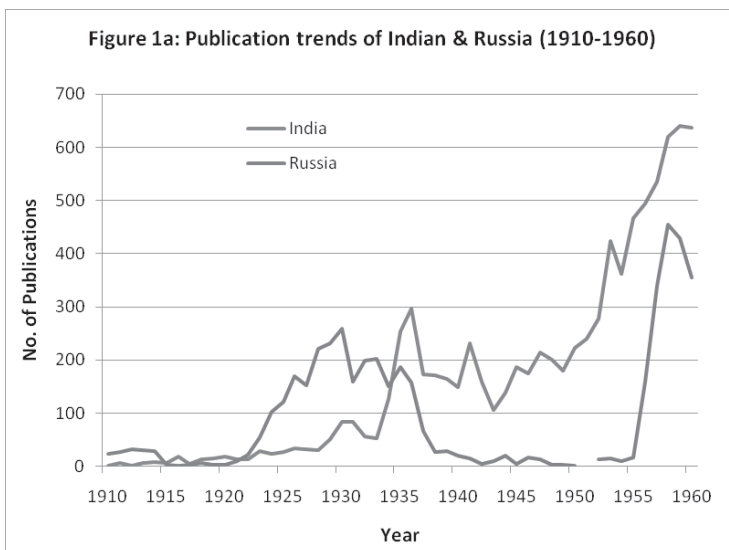
## Russia

Once has been a scientific powerhouse the modern Russia has been facing a hardship of economy after collapse of the Soviet Union in 1991. This was followed a severe outflow of skilled professional to Europe from Russia as most of the highly skilled professional were not ascertain about their future. The economic turmoil led mobility of highly skilled workers from Russia to the developed countries resulted serious brain drain which dates back from the early 1990s. It was estimated that about 35,000 scientists emigrated from Russia to the Western world in the 1990s. The outflow of professional was further increased and about 80,000 talented professional and scientists left the country since 1990/1991, in search of better earnings, funding, and facilities abroad — to the benefit of Western Europe in particular (Stafford, 2010) and the US. The problem of mobility of professional is more upsetting which was reflected in the policy of Russian government to take corrective measures for discouraging the outflow of professional from Russia. The Russian government recently announced a 90-billion-rouble (US\$2.8 billion) programme aimed at strengthening universities and getting high-profile expatriate researchers to return to Russia (Schiermeier, Severinov, 2010). The policy measures seem to be effective as enrolment in tertiary education was increased, particularly in science and technology, because Russian students thought that science and technology would improve opportunities for emigration (Ellerman, 2003). However, studies show that about 2 % highly skilled works of total highly skilled labour force migrates from Russia to OECD countries (Dunnewijk, 2008). The outflow of scientists in Russia was largely attributed due to a squeeze in the

budget of the science and technology sector that cut salaries, research budgets and deteriorated working conditions in the S&T sector.

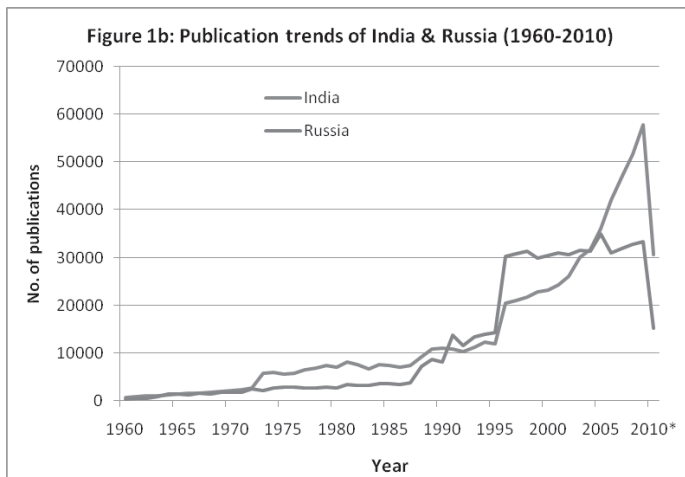
### Publication trends and emerging research areas

Mobility of highly skilled professionals is an immense loss for the country of origin which affects research base of the respective country. Narrowing the research base of any country may lead decline of scientific output along with quality of the research. Indo-Russian economy is undergoing structural changes and affecting the pool of professionals due to outflow of the highly skilled professionals. Subsequently, researches and professional in both countries are losing scientific motivation which has affected the research publication. Estimates show that Russia produced about 154,993 research papers across all sciences, accounting for about 2.25 % of the world's output from 2000 to 2004, indexed by SCOPUS database. The number of research papers further declined during 2005–2009 as compared to previous five years. During this period total numbers of publications were 164,126 which was 1.73 % of the world output. While in the case of India the research publications were 135,098 and 234,123, accounting 1.96 % and 2.74 % of the world's out for the same time span. Evidently, share of Russian publication as compared to the world's publication output declined marginally over the last decade whereas India's publication share is increased considerable. However, the contribution of scientific publication indicates a marginal increase in both countries over the last five years (2005–2009) indexed by SCOPUS data base. But the increase is insignificant as compared to other BRIC countries. Figure-1, illustrates the performance of the last hundred years research publications in all sciences in India and Russia.



Computed from SCOPUS database; \*upto the end of July 2010

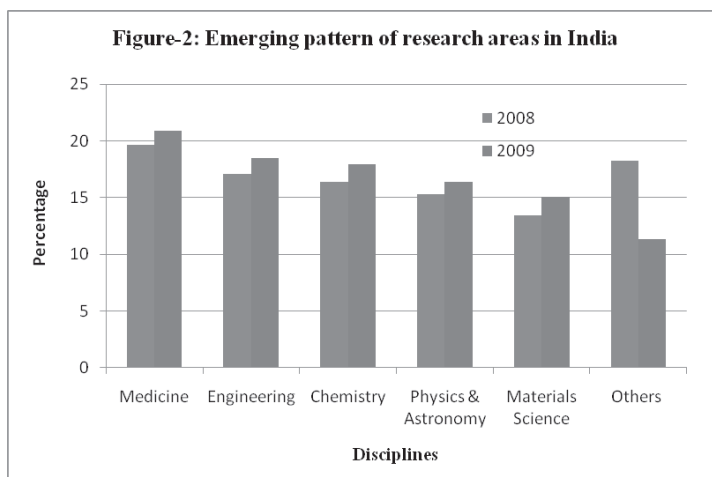




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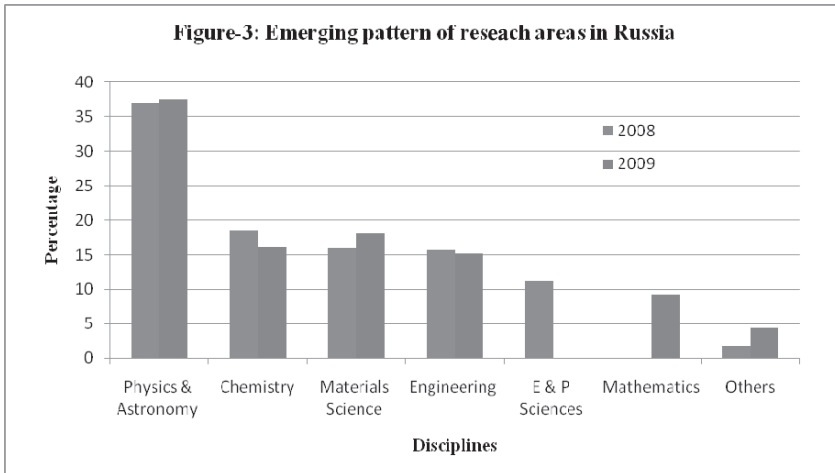
It is obvious from the Figure-1, that a considerable fluctuation in publications is observed during the period 1935–1955 in the case of Russia where as in the case of India fluctuation was negligible. It is important to note that pre-independence India was academically strong despite resource crunch as India was under the colonial rule up to 1947. On the other hand after 1960s both the countries exhibit constant increase in their publications output, however, Russia encountered an insignificant growth in research publications and declined was observed from 2005 onward.

The research focus and priorities in publications are different in India and Russia. India's major emphasis was on Medicine, Engineering and Chemistry related areas though Material sciences were also equally important. Research in Medicine was the highest priority of government of India which counted 20.88 % followed by Engineering (18.45 %), Chemistry (17.95 %), Physics & Astronomy (16.35 %) and Materials Science (15.04 %) in the year 2009 (Figure-2). It was important to mention that the share of publication in Mathematics was very negligible in India.



Computed from SCOPUS database upto the end of July 2010

On the other hand, Russia's major research emphasis was on Physics and Astronomy which was reverse as in the case of India. The share of publication in the area of Physics & Astronomy counted 37.50 % followed by Chemistry (16.09 %), Materials Science (18.11 %), Engineering (15.22 %) Earth & Planetary (E&P) Sciences (11.24 %) and Mathematics (9.29 %) in 2009. The share of other field was nearly 4.00 % in the same period. The Figure-3, illustrates that Chemistry, Material sciences and Engineering areas realised the similar attention of the researchers. It was observed Mathematics share was more than 9 % in Russia in the year 2009 contrary to India.



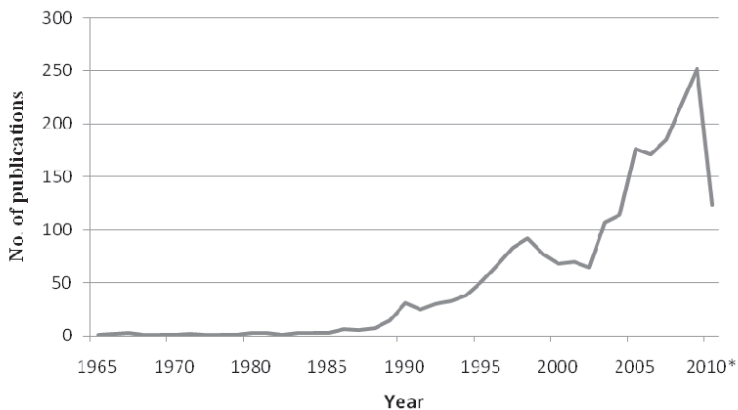
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### Knowledge flow and collaboration trends

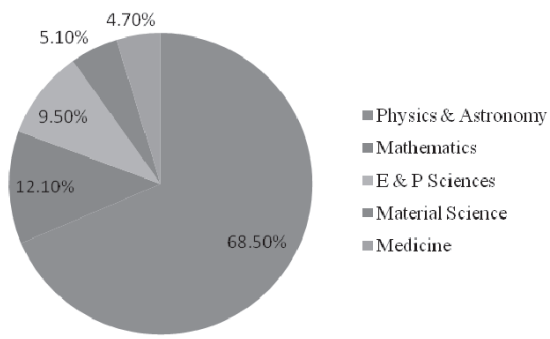
India and Russia have political and academic association since India's independence and Russia played a significant role in the development of Indian economic and strategic areas. India adopted a mixed model for economic development which was influenced by Russian model of economy. The political and economic relations encouraged academic collaboration between both the countries. Although inter-country mobility statistics of academic people and highly skilled professional is not available but there has been a constant flow of knowledge between India and Russia. The flow of knowledge includes the creation of new academic linkages and knowledge networks to facilitate academic collaboration. Indo-Russian academic collaboration was geared up in the late fifties. Since then the number of joint research publications has grown continuously (Figure-4). The pace of joint publication was slow in the beginning up to the year 1988, i.e. only single joint publication was observed in the year 1965. But the rate of academic collaboration for joint research publications accelerated in the late 80s and the post 90s period witnessed for a substantial growth in the joint publications.

The academic collaboration is not focussed on a particular field or discipline but the collaboration was observed inter-disciplinary areas. The priorities for academic collaboration were unlikely as respective country. The majority of joint publications came out in the field of Physics and Astronomy which constitutes about 70 % of the total publication as

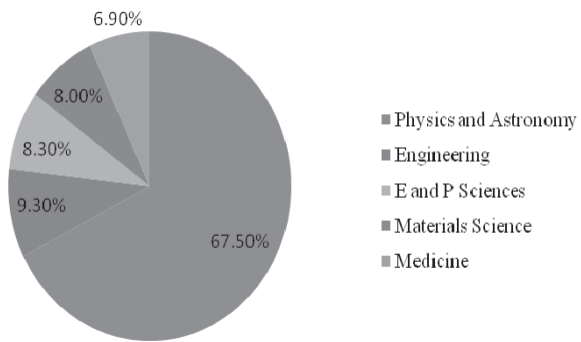
**Figure 4: Collaboration trends between India & Russia (1965–2010)**



**Figure 5: Pattern of collaboration between India & Russia (2008)**



**Figure 6: Pattern of collaboration between India & Russia (2009)**



shown in Figures-5&6. The reason could be that Physics and Astronomy are the traditional disciplines for both India and Russia consequently joint research in these areas were the priority of both the countries. Physics and Astronomy was followed by Engineering and Earth and Planetary (E&P) sciences. However, the trend was not followed in the case of Mathematics as no joint publication was observed in the year 2009 while in the year 2008 the joint publication share was more than 12 %. The least collaboration was found in the field of Medicine.

## Results and discussions

Mobility of professionals among the countries and firms has long been recognized as a powerful source of knowledge transfer – both in terms of technology and of knowledge such as business practices and networks of contacts. The knowledge transfer is likely to be more significant when the mobility occurs across the national boundaries. The mobility of highly skilled workers affected the developing or emerging economies like India and Russia as a result both countries are losing their skills as a number of students and highly skilled workers are migrating to OECD countries for higher education and for better employment opportunities. The outflow of professionals is not only led by better opportunities for study and work in the developed countries but also by economic and political conditions at home. For example, thousand of professional and scientists left Russia to West Europe and the US after the collapse of USSR. The collapse resulted economic crises in the Russia that triggered dramatic budget cut in a number of organisations so the financial crisis was probably led mobility of highly skilled workers. Similarly, India is also facing scarcity of highly skilled workers and specialists in most of the research institutions and organisations as India's investment in research and development (R&D) is slightly more than 1 % of the Gross Domestic Product (GDP). Also India is producing more highly skilled workers than its absorption capacity. Further, higher education is one of the important paths for recruiting highly skilled personnel therefore majority of H1-B visa holders were students in U.S. universities. However, the U.S. is not the only importer of foreign talent in the OECD, Germany also introduced in 2000 Green Card (visa) programme to recruit foreign IT specialists. This encouraged out flow of IT and technical specialists from Eastern Europe particularly from Russia, Poland and other nations that had an important pool of scientific and technical specialist trained workers during the socialist period. Similar initiatives were launched, recently, in the U.K., Australia, Canada and New Zealand to attract overseas professional. In addition, the OECD countries are struggling with the aging problems and the respective governments are designing their policies to attract professionals from developing countries. India could be a major source for mobility of highly skilled workers as it has a large pool of trained human capital.

Mobility props up professional association, knowledge transfer and network. The network and association of professionals can be materialised in terms of academic and research collaboration. Although, statistics of mobility of highly skilled workers between India and Russia is not accessible, however, there has been a continuous flow of knowledge between the professional of both the countries. This is reflected in the co-authored research papers from India and Russia where joint publications have grown considerable over the last three decades. The most of the co-authored papers came out from Physics and Astronomy which constitutes about 70 % of the total joint publication in 2009. Physics and

Astronomy was followed by Engineering and Earth and Planetary (E&P) sciences. The least collaboration was observed in the field of Medicine which contradicts as observed research output indicates that India is emphasising in the field of Medicine. Further, causality in co-authored research papers in the field of Mathematics was observed. This causality indicates that research in mathematics in India is declining as compared to Russia. This is a matter of concern and positive initiatives are required to promote research in mathematical sciences. Therefore, India and Russia may collaborate in the areas of mutual interest and capabilities such as Physics and Astronomy, Engineering, E&P science and Mathematics.

It may be argued that India and Russia are trying harder to restructure their system of research in order to meet the contemporary challenges and bolster scientific research as both the countries are sufferer of decline in science and shortage of quality professional due to mobility of highly skilled workers. On the other hand, the international mobility of skill is necessary in the global economy, albeit the benefits of mobility are shared unequally between sending and receiving countries. So, mobility should be consider in terms of mutual benefits; brain drain is now referred as “brain circulation” as migrants return to their origin and bring with them useful knowledge, experience, skills and capital. Subsequently, the existence of scientific and professional mobility supports the development of science and the transfer of knowledge towards the host country along with the remittances.

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