**ROLE OF INQUIRY BASED SCIENCE EDUCATION (IBSE) IN S&T INNOVATION FOR ECONOMIC DEVELOPMENT AND REGIONAL COOPERATION**

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**Abstract:** Economic development has been and remains the target and priority of each entity, community and country around the globe. However, the ways and mechanisms and the way of thinking have changed. In the present day global ecosystem, name of the game is; "Cooperation and Collaboration". The concept of alliances and togetherness enables communities and countries to perform better when it comes to competition in the dynamic world that we have today! There are many examples of Regional and Global Economic Cooperation Organizations (G-8, G-20, ASEAN, ECO etc.), Unions, Federations as well as those on political, cultural and even religious basis. Airline Alliances, Internet and other services providers are getting together to handle their affairs around the globe. Trend of franchise across the world of various companies, schools and institutions of higher learning is taking place. In all doings, science and technology plays a major role.

For economic development, S&T plays a major role and to sustain scientific and technological development leading to economic development, education plays the crucial role to maintain the feed in of thinkers and innovators. And to nurture scientific and technological innovation, critical thinking and observation, the concept of "inquiry" especially among the young children is vital. Realizing the strengths of "inquiry based learning", thinkers and scientists around the globe have been promoting "inquiry based science education (IBSE)" which in turn inculcates innovation among the children. Thus there are programs and institutions around the world who bring in, even the Nobel Laureates, in promoting IBSE for their future generations. IBSE is being promoted by National Academies of Sciences and Engineering as well as NGOs and Government Organizations around the globe. Thus the global forum of Inter-Academy Panel (IAP) comprising 107 Academies have initiated a Science Education Programme (SEP) for promoting science education and science literacy. UNESCO is also being pursued to patronize the concept of IBSE.

In this context, ECO Science Foundation (ECOSF) is supporting collaborative S&T research of applied nature among its 10 member countries viz., Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Iran, Pakistan, Tajikistan, Turkmenistan, Turkey and Uzbekistan. ECOSF is also promoting and linking IBSE with advance research and industrial development to ensure a sustainable supply of talent to feed the process of development, in line with Post-2015 Agenda of the UN. ECOSF is encouraging international cooperation on the basis of two common goals; advance S&T research and IBSE. It has partnered with International institutions such as; UNESCO, ISTIC Malaysia, La main a la pate France and would appreciate the cooperation of Russian Federation; especially, because six of the ECO member states are former Soviet States and there is a socio-cultural understanding among these nations.

Latest developments in Pakistan-Russia cooperation and trade show significantly positive moves and the major decision is the lifting of ban by Russia on sale of weapons to Pakistan. It is expected that the diplomatic and trade relationship between the Russian Federation and Pakistan will see faster growth in future. ECOSF would like to nurture such a cooperation between Russia and ECO region in the field of science, technology and education.

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**ECO and the ECO Science Foundation**

Economic Cooperation Organization (ECO) with its Secretariat in Tehran-Iran, is an intergovernmental organization of 10 countries viz., Islamic Republic of Afghanistan, Republic of Azerbaijan, Islamic Republic of Iran, Republic of Kazakhstan, Kyrgyz Republic, Islamic Republic of Pakistan, Republic of Tajikistan, Turkmenistan, Republic of Turkey and Uzbekistan. ECO has a number of affiliated and designated institutions and three specialized agencies; viz., ECO Cultural Institute in Tehran- Iran, ECO Science Foundation in Islamabad- Pakistan and ECO Educational Institute in Ankara- Turkey. Overall aim, as the name indicates is; promotion of economic cooperation and trade among the 10 ECO member states.

ECO Science Foundation (ECOSF), established in Islamabad- Pakistan in December 2011, is a Specialized Agency of the ECO. It is an autonomous body with same 10 ECO countries as its members. It is governed by the Board of Trustees (BoT) comprising of the Ministers responsible for Science and Technology of member states; President ECOSF serves as Secretary of the BoT. The BoT is assisted by the Executive Committee comprising an eminent scientist from each member state and chaired by the President ECOSF. Objectives of the Foundation are to:

1. promote and fund scientific and technological collaborative research among the S&T community of member states;
2. promote and popularize science education at grass root level;
3. serve as reservoir of highly skilled scientific human resource of the region;
4. harmonize Science, Technology and Innovation policies in the region

ECOSF has a "Science and Technology Fund" to finance the activities to meet its objectives. The S&T Fund is contributed to by the member states but it can also receive funding from international agencies and donors.

**Economic Development & International Cooperation**

Economic development has been and remains the target and priority of each entity, community and country around the globe. Historically, each country of the world has been pursuing their individual goals and initiatives. However, the ways and means as well as the way of thinking have changed in recent decades. In the present day global ecosystem, "Cooperation and Collaboration" is the name of the game. Cooperation and collaboration can be bilateral between two entities, between two countries or it could be multilateral on the bases of some common issues/interests and objectives/goals. Cooperation and collaboration is pursued even to compete in the market; thus so many mergers of companies take place around the world! All this is based on each other's strengths and is targeted at mutual learning & benefit for all partners.

The concept of alliances and togetherness enables communities and countries to perform better when it comes to competition in the dynamic world that we have today! There are many examples around the world of Regional and Global Economic Cooperation Organizations (G-8, G-20, ASEAN, ECO etc.), Unions, Federations etc. as well as those on political, cultural and even religious basis. Airline Alliances, Internet and other services providers are getting together to handle their affairs around the globe. Trend of franchise of various companies, schools and institutions of higher learning is taking place across the world. In all the happenings, science and technology (for good or bad) does play a major role- though S&T is never "bad", it is always the use or abuse of a technology that causes the good or bad effects.

Nevertheless, we as global responsible citizens should be promoting science, technology and education based economic development or the knowledge economy for overall good of the people at large and for a peaceful, prosperous and better tomorrow. For economic development, S&T plays a major role and to sustain scientific and technological development leading to economic development, education plays the crucial role to maintain the feed in of thinkers and innovators. And to nurture scientific and technological innovation, critical thinking and critical observation, the concept of "inquiry", especially among the young children is vital. It has been this feeling that thinkers and scientists around the globe have been promoting "inquiry based science education (IBSE)" which in turn inculcates innovation among the children. Thus there are programs and institutions around the world who bring in, even the Nobel Laureates, for promotion of IBSE for their future generations. IBSE in one way or the other, is being promoted by National Academies of Sciences and Engineering as well as NGOs and Government Organizations around the globe. Examples are; USA (e.g. *Smithsonian Institute*, *Society for Science and the Public, Intel International Science and Engineering Fairs* etc.), France (*La main a la pate* Foundation), Australia (*Primary Connections*), China (*China Association of Science and Technology- CAST*), Latin America and many more with different local names and brands.

Therefore, the global forum of Inter-Academy Panel (IAP) comprising of 107 Academies of Sciences have initiated a Science Education Programme (SEP) for promoting science education and science literacy. UNESCO has a programme of non-formal science education; however, it is also being pursued to patronize the concept of IBSE.

**Activities of ECOSF**

ECO Science Foundation (ECOSF) is supporting S&T collaborative research projects of applied nature among its 10 member countries viz., Afghanistan, Azerbaijan, Iran, Kazakhstan, Kyrgyz Republic, Pakistan, Tajikistan, Turkmenistan, Turkey and Uzbekistan. ECOSF is also promoting and linking IBSE with advance research and industrial development to not only provide exposure to children of different career options but also to ensure a sustainable supply of talent to feed the process of development (see Fig. 1). ECOSF focuses on UN Sustainable Development Goals or the "Post-2015 Agenda".



Fig. 1. IBSE based strategy for economic development

The UN's Post-2015 Agenda is a universal agenda and is to be driven by five big transformative shifts including "forging a new global partnership". It says; *"A new partnership should be based on a common understanding of our shared humanity, underpinning mutual respect and mutual benefit in a shrinking world"*. ECOSF considers that this approach collectively and ultimately would lead to economic development on sustainable basis in the region. ECOSF is also encouraging international cooperation on the basis of two common goals; advance S&T research and IBSE. It has partnered with International institutions such as UNESCO, ISTIC Malaysia, La main a la pate Foundation- France and would appreciate the cooperation of Russian Federation. Cooperation between Russian Federation and ECO Science Foundation has better chances of success, because six of the ECO member states are former Soviet States and enjoy an excellent socio-cultural interaction, communication and understanding with scientists and educationists as well as the people at large.

**Bilateral Trade between Pakistan and Russian Federation**

Pakistan attaches great importance to its trade relations with Russian Federation. However, the bilateral trade between the two nations has not shown much growth during the past many years. The bilateral trade volume of Pakistan with Russia stood at just US$ $419.34 million during the year 2013-14; The reasons may be many but one major hurdle has been the Russian ban on sale of defense products and equipment to Pakistan.

Nevertheless, there is huge potential of cooperation between the two nations. Major scope for Pakistan’s exports exists in cotton fabrics (woven), fruits and fruits preparations, synthetic fabrics, rice, articles of apparel other than textile material, medical & surgical instruments, fruits & vegetables, and dairy products etc. Recently, the Russian Federation has imposed ban on imports of food products from European Union and USA, and this provides Pakistan a great opportunity to collaborate with the Russian Federation and business community of Pakistan to export food products to Russia.

Similarly, Russia can supply to Pakistan; Fertilizer (manufactured), vegetables and vegetables preparations, iron and steel manufactures, paper & paper board, crude rubber and manufactures of non-ferrous metals etc.

However, lately some very significant developments have taken place. Just two weeks ago (20-21 Nov 2014), Pakistan-Russia Joint Working Group met in Moscow and agreed to cooperate in oil and gas exploration and other transnational projects including TAPI- the Turkmenistan-Afghanistan-Pakistan-India pipeline, LNG Terminals construction in Pakistan and Gas pipeline from Gwader to Nawabshah in southern Pakistan.

Some prominent news published in Moscow and Islamabad read as:

* ***Russia signs Landmark Military Cooperation Agreement with Pakistan*** [The Moscow Times, 20 Nov 2014<http://www.themoscowtimes.com/business/article/russia-signs-landmark-military-cooperation-agreement-with-pakistan/511571.html>
* ***Boosting defence ties: Pakistan, Russia sign landmark cooperation*** [The Express TRIBUTE, Nov 21, 2014] <http://tribune.com.pk/story/794695/boosting-defence-ties-pakistan-russia-sign-landmark-cooperation-pact/>
* ***Russia for strengthening energy ties*** [ DAWN Islamabad, 22 Nov 2014)
* ***Helicopters to be bought from Russia*** [DAWN Islamabad, 23 Nov 2014]

It is expected and hoped that these latest developments and agreements of cooperation will lead to stronger and long term cooperation and bilateral trade between Pakistan and the Russian Federation.

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