

# **Innovation and social inclusion: Integration between emergent India and Colombia in a post-conflict era**

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## **Abstract**

This article states that innovation, science, and technology have to be a priority element in the bilateral dialogue of integration between India and Colombia, while the inclusive development has to be the main motive of our nations. They are living historical periods that are influencing their regions, the consolidation of India as an industrial and regional power, and the imperative beginning of a post-conflict process in Colombia. We analyse the recent socioeconomic evolution, the global innovation and competitiveness index as well as some potential dynamics in areas of disruptive and inclusive innovation such as agricultural, satellite, and pharmaceutical sectors.

**Keywords:** Relations India and Colombia, innovation and inclusive development.

## **Innovación e inclusión social: Integración entre la India emergente y Colombia en una era post-conflicto**

### **Resumen**

Este artículo establece que la innovación, la ciencia y la tecnología deben ser un elemento prioritario en el diálogo bilateral de integración entre la India y Colombia, y principalmente el desarrollo inclusivo. Estos países están viviendo períodos históricos que influyen en sus regiones, la consolidación de la India como potencia industrial y regional y el comienzo imperativo de un proceso post-conflicto en Colombia. Analizaremos la reciente evolución socioeconómica de estas naciones, los índices de innovación y competitividad global así como algunas dinámicas potenciales en áreas de innovación disruptiva e inclusiva como los sectores agrícolas, satelital y farmacéutico.

**Palabras clave:** Relaciones India y Colombia, innovación y desarrollo inclusivo.

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Recibido: 28.2.17 / Aceptado: 30.3.17

## **1. Increasing global concern on inclusive development**

The escalation of social crises in rich and poor countries as a consequence of growing inequalities in the distribution of wealth and the multiple expressions of social exclusion demands a major commitment of those involved in the international relation sphere and, particularly, in the economic integration scenario. The concepts of *science diplomacy* and *diplomacy for innovation*, a trend all over the world, have to be a priority in the speech that advocates a more equitable and inclusive Latin America.

It is in this scenario of innovation and development in which the debate on a new phase of a wider reach in the relation between India and Colombia must occur. On one hand, this should be done to establish a clear role of the foreign policy in the facilitation of systems of innovation and to set the scope of public, private, and communitarian actions when these two countries decide to wager on quality growth. On the other hand, with the purpose to design strategies in the bilateral integration process, that allow removing those features of a relationship that is subordinated to the costs of raw materials, in need of more and better mechanisms of cooperation, and characterised by a flow of foreign direct investment that mainly takes place in one way.

Although the commercial exchange and the flow of investment have increased exponentially between the two countries in the last decade, the motivation for these economic dynamics has neither been the inclusive development nor the political determination to harvest a profound and definite relationship based in the exchange of knowledge, technology and innovation. It was just in March 2017, when Colombia and India finally decided to put in action some necessary steps in the framework of an MOU in Science and Technology, signed in 2005, which is a welcome advance taking into account the growing preoccupation of multilateral organisms, regional forums, and global governance institutions in respect to these matters.

In regional scenarios there are many examples of this trend. The meeting of the APEC nations in 2015 had as the primary subject the creation of a regional strategy to monitor the quality of growth building inclusive, balanced and sustainable economies through innovation (APEC, 2015). The third meeting of the BRICS' science and technology ministries in Moscow reaffirmed the necessity to face global and regional socio-economic challenges through science, technology, and innovation drivers. The "2030 Agenda for Sustainable Development" scenario that compromises the partners to transform the current development paradigm, invokes the use of frontier

knowledge and innovation as indispensable to get their achievement. Regarding forums and reports, the Global Innovation Index of 2016 (WIPO), is inviting countries to upgrade their strategies of globalization introducing elements related to innovation diplomacy.

Currently, to be globalised has more to do with being locally responsible. Which are the priorities of a country regarding social inclusion and economic development? How do foreign policies better serve to those aspirations? What is the meaning of diplomatic innovation for countries like Colombia? These are major questions for policy makers and academicians working in processes of regional integration, due to the unavoidable fact that at a certain point, local and international objectives must converge.

## **2. India and Colombia: Poverty, inequality and exclusion**

According to the data, although India and Colombia are economies in a consistent path of growth and development, they are at the same time, two of the nations in which exclusion and social inequalities are the highest in the world.

According to Oxford Policy and Human Development Initiative's latest figures (OPHI), a total of 1.6 billion people are living in multidimensional poverty (MP). The same source states that 53% of them are living in South Asia and, of those, 54% are localised in India (Global Multidimensional Poverty Index MPI - OPHI 2015 and 2016). In Latin America, nearly 26 million people are multidimensionally poor that is equivalent to 5.2%, of the population (Global MPI-OPHI, 2015).

Colombia, a country with more than 48 million people has reduced systematically its (MPI) passing from 21,9% in 2014 to 20,2% in 2015 and 17.8% in 2016 (DANE, 2015 and 2016). Despite the reduction, the current percentage indicates that exclusion among Colombian population is still very high; consequently, improvements in primary dimensions like education, health and standards of life have to be urgently addressed. Income inequality is rising around the world. Colombia was the nation number 11 in terms of inequality in 2013, and a report of ECLAC (2016), states that inequality in this country, despite having reduced, it is still being one of the highest in the world. Colombia has grown during the last decade, but it is the country in the region that concentrated most of the income in the richest population, which only covers the 1%.

India, with a population of 1250 Billion in 2011, shows for the period of 2005-2006 an (MPI) of 0,283, with 53.7% of the population living in multidimensional poverty and an intensity deprivation among poor

of 52.7 % (OPHI, 2015). According to the analysis made by (Alkire and Seth, 2013), although the situation of the poor in India improved between 1999 and 2006, the rapid development of living conditions among those who are multidimensionally poor is not taken place.

### **3. Colombia: Development in the middle of the conflict**

Despite the protracted conflict, Colombia has managed to develop and grow. During the last five years (2010-2015), the economy grew on average 4.5%, and during 2015 the GDP increased 3.1%, more than three times the average in LAC. Regarding GDP Per capita in nominal terms, figures arrived at \$US 7.930, and a GDP PPP was reaching \$US 13.430. However in 2016, the 6.5% contraction of oil and mining sectors had a strong impact in the GDP that slowed down to 2.0%. Colombia will grow at 3.0% in 2017 but in peace it will grow 1,5% additionally during the next five years.

Colombia during all these years of conflict managed to be, in basic terms an educated nation, with a literacy rate of 94.3% and well-developed and qualified workforce being the second in the region, although we have to improve availability and training of human capital for strategic base knowledge sectors. The unemployment rate in 2014 was the lowest in 15 years with 9.1%, while poverty in the last decade decreased 18% reaching a rate of 28%, a middle class arriving at 31% and expected to have 46% of the population in this a segment in 2025 (Pro-Colombia, 2015).

As a result of the long conflict that was mainly localised in rural areas, Colombia ended up being developed in metropolitan cities. Nine of those areas, gather about 18 million inhabitants. In total, , In spite of the internal conflict and different sources of violence threatening the population, Colombia was constantly acknowledged as one of the most prosperous countries in Latin America since the year 2000, an important destiny to invest and a fair place to do business.

But at the same time, we have a country in which farmers abandoned the countryside, half of the territory is unproductive and the richness of its soil is unknown. This is why the dimension of a new Colombian momentum, gathering all stakeholders in favour of a Peace Agreement between the Government and violent groups is an immense, historical opportunity that cannot be dismissed. The agreement that was signed by the government of Colombia and FARC, revealed a depletion phase of violence in national life and a new historical cycle that starts with a widespread manifestation of citizenry to reject the use of violence as an instrument of power.

The road-map designed to advance in the post-conflict process is considered by the international community as the most complete in the recent history of humanity, because it has its cornerstone in an agrarian, integral reform aiming to recover the agricultural potential of our land. Some of the objectives are: to reduce in 50 % poverty in the countryside; the legalisation of 7 million hectares in 10 years because only 30% owners have formal titles over their estates and to open a land market, guaranteeing no future spoliation. Colombia needs to update its cadastre, modify the fiscal regime imposing tax burdens over non-productive territories. Colombia already starts the process of inclusion; 5.850.000 victims are receiving direct subsidies (Oficina del Alto Comisionado para la Paz, 2016).

According to FAO, Colombia is among the 7 countries in the world with highest agricultural potential. However, the internal conflict forced the distortion of the vocation and real use of land. 27 million of hectares have agricultural vocation, of them only 7 million are in use. In the case of livestock farming 10 million of the productive lands have that particular vocation, but today 34 million hectares have been used for that purpose causing collateral environmental and social damages. Our challenge is to overcome this reality.

This complex peace process has taken place in the context of modern global agriculture and innovative societies that are more interconnected every day. The expansion of international chains of added value, the specialization of the agricultural production and the increasing demand for traditional and new agricultural products in emerging countries like India is the background curtain of this agrarian integral reform. The incorporation of vanguard technologies through the agrarian system is a must. For that purpose, alliances with base-knowledge sectors have to be systematic and strong (IT and Satellite industries, particularly play nowadays a strategic role in the development of agriculture). The urgent needs demanded by the post-conflict become an opportunity for stakeholders in the relation India – Colombia.

#### **4. Emerging India: Competitiveness and innovation for social inclusion**

India, on the other side, is also living a significant momentum. India is a global determinant and a regional economic power. Despite being located in a geopolitically complex region, this nation is an emerging market that during the last two decades has led a committed process of industrialisation

and transformation of its productive infrastructure. A traditional and dramatically diverse society, with tremendous social challenges, a democracy of 1.3 billion people, which exceeded in 2015 the economic growth of China, India is the most important case of emerging development. The evolution of India within a historical short cycle in areas such as education, innovation and technological development is remarkable.

Though ambitious, Indian business class is committed to the unity of its nation. Indian entrepreneurs are non-risk averse but creative, and a constant source of knowledge that is applied in innovation and diversification to compete in internal and external markets. Despite the social challenges pending in the Indian society, the way it conceives development for people and the way in it linkages technology and social inclusion becomes a reference and turns India into the best ally of our country in Asia.

This South Asian country is a global leader in IT, is becoming a power in the aerospace industry, is a reference in the pharmaceutical sector, and an important player in the automotive industry. India is also an important producer of minerals, a leader in the production of pulses and other agricultural products and overpassed Brazil in the production of meat in 2011. India has decided to give a clearly economic emphasis to its foreign policy, looking for new strategic markets, foreign investors and new destinations for their capital flows.

The Indian performance in terms of competitiveness and growth is beyond the variables that conformed the Global Competitiveness Index (GCI) as we will see further on. However, the positive results in 2015 and 2016 have proved an enforced in the industrialization process of this nation. In 2016 India finally resumed and overpassed the position (48) it left in 2007-2008 on competitiveness, reaching the place 39 managing to confront the financial and geo-political instability that characterized the new global normal let by the big global crisis. After declining indicators for 5 years, the country jumped 16 positions in 2015 to the place 55, only surpassed in Latin America by Chile and Costa Rica. Colombia reached the number 61 in that exercise. To a large extent, the Indian performance was due to the sense of security the announcement of Narendra Modi as a new Prime Minister of India made in the business sector at national and international levels, as well as the rapid implementation of a government plan aimed at industrialization, reduction of corruption and the pertinent openness in strategic areas such as defence, mining and public transportation (WEF Report, 2015-2016). Colombia instead, is facing a period of stagnation in almost all the competitiveness variables.

There are deeper reasons behind the Indian experience in competitiveness. Statistics and economic index show fractions of realities. Students, scholars and policy makers approaching the case of India, must take into account some complex aspects that in the Indian society have tremendous capacity to enhance or retract any kind of social, economic or political process.

#### **4.1. The influence of tradition in modern India**

Although subject of all kinds of debates in the West and in India itself; the weight of the Indian tradition, the sense of Dharma, the duty before its community and what Gandhi called the trusteeship entrepreneurial duty, still have important role in the productive life but also in the Indian definition of wealth. Castes have been protagonist in the industrial and trade history of India. Gujarati Banias/Jains, Marvaris and Parsis, or Lohans and Bhatias, are traditional communities whose networks in the world of business and banking have spread throughout the territory and history to form the “Pan-India Capitalist Class” (Damodaran, 2008). Lower castes were responsible for the development of itinerant trade: livestock, agriculture, handicrafts, foundries and distilleries, and Muslim communities located in India developed important networks in the world of commerce.

#### **4.2. The existence of historical national capital**

As reflected in the extensive work of Tirthankar Roy, there are historical moments that marked the business and industrial life of India and gave impetus to traditional sectors of productive activity to forge a new national capitalism. Roy is controversial, the position of the author before the British contribution to the Indian industry is a matter of strong debate. Agree or disagree with the author, the fact is that unlike Latin American countries, India already has its sixth generation of national capitalists. The first business groups: Tata, Birla, Walchand and others, funded and wove close ties with political leaders who forged the foundations of the young nation, accompanied them in the constitution of the new State and welcomed the first industrialization plans. Indians has always been familiar with foreign trade, flows of capital and people, and global integration. Knowledge and innovation have ever been part of Indian history of development (Pinto, 2009).

#### **4.3. The planned economy and a smart, gradual liberalisation**

Seventy years ago India chose a planned economic model incorporating elements from socialist patterns, but taking distance in two funda-

mental aspects: the pre-eminence of the State in the context of a vibrant democracy and a model of self-reliance accompanied by the private capital, which has had varying degrees of participation throughout the 12 five year plans that India put in place. Along these periods, liberalisation of the Indian economy took place gradually, measuring the capacity of national companies to compete in their own field with foreigners and enhancing local knowledge and innovation.

#### **4.4. Active policy schemes designed to shift towards an opened market economy**

According to the Department of Commerce of India, strategic priorities since 2014 are focused on the diversification of production, implementation and deepening of trade agreements with non-traditional markets, apart from strengthening the required infrastructure for commercial activity. The determination to become an industrial power by 2020, has involved initiatives that generate great expectations in the world as Make in India, Digital India, and Skill India schemes that are supported by total liberalisation of strategic sectors and incentives that induce higher levels of competitiveness and linkages to global value chains.

Innovation, on the other hand, is a critical vector for growth, economic development and job creation but India knows, it also can be a powerful double-edged tool to include large segments of the population or extend the differences in income and opportunities. The development of information technology IT in the 90's, triggered in the world new ways of production and doing business but, above all, IT allowed the humanity to overcome the idea of innovation as an exclusive asset of rich countries and R&D departments of multinationals. The excessive fragmentation of production globally, allowed emerging countries the generation of endogenous knowledge overcoming steps of duplicative and creative imitation. Autonomy, employment and income benefits were the immediate positive externalities (Lema; Quadros; Schmits, 2015).

The analysis by Cornell University, INSEAD and WIPO to establish the rate of global innovation in the year 2015 and 2016, distinguished India as the first country in South Asia and Central Asia that increased systematically in innovative capacity. India passed from the place 81 in the Global Innovation Index (GII) in 2015 to the place 66 GII in 2016; remarkable achievement if we compared with the case of Colombia that only moved five places passing from the place 67 in 2015 to the place 63 in 2016.



However, the index results are not enough to explain why, despite ranked below Colombia, Mexico, Costa Rica or Chile, Indian cities like Bangalore and Hyderabad are current destinies of R&D investments of the most prominent corporations in the aerospace industry. Around 870 multinationals in 2012 built centres of R&D in India, 100 of them dedicated to aerospace research (Zinnov, 2014).

Although Global Innovation Index (GII) is an important tool for public policy makers and entrepreneurs, some reasons that explain Indian proclivity to innovate are also significant:

1. INNOVATION HAS BEEN A CONSTANT FACT IN THE HISTORY OF INDIA. The Indian tradition of contributions to knowledge becomes inexhaustible: the invention of the zero on which, rests the whole decimal system and the pillar of modern sciences. The value of number Pi, the early development of algebra and trigonometry, the first techniques in metallurgy, the Ayurveda and holistic health sciences are just some of those generous deliveries of India to the world (Enterria, 2009).
2. ENDOGENOUS INNOVATION AND NATIONAL CAPITALISM AT THE TIME OF INDEPENDENCE. Important names for universal science have appeared in India such as S.N. Bose who developed the Bose-Einstein statistics. Meghnad Saha with his theories of thermal ionisation. The Nobel Prize C.V. Raman with his theory to explain the molecular energy levels, in addition to contributions from companies such as TATA, the leader in the cotton and textiles industries and subsequently in the steel sector. Kirloskar Brothers in the fertiliser sector, Walchand in agribusiness, Birla, in the textile industry, Hero in the nascent automotive industry, this, without neglecting the remarkable contribution of state enterprises to develop science, with companies such as Hindustan Aeronautics (Pinto, 2009).
3. JUGAAD, THE INDIAN WAY OF THINKING AND ACTING AGAINST THE DIFFICULTIES. The Jugaad describes the ability of the Indian people to improvise in shortage scenarios and to build solutions to everyday problems (Radjou, Prabhu; Ahuja, 2012). According to Sam Pitroda, chairman of the National Knowledge Commission of India between 2004 and 2009, the unique needs of developing countries, require innovation models departing from the base to the bases. The Jugaad to this scientist should be institutionalised as part of the Indian Model of Innovation, to inspire similar efforts in developing countries that cannot follow the path of Western innovation, elitist and insular (Pitroda, 2014). Indian based-knowledge companies are in parallel

working on the consolidation of a frugal, sustainable, inclusive and cutting edge innovation model. Seeking opportunity in adversity, doing more with less, acting flexibly in procedures, giving priority to simplicity, have become part of the everyday life of R&D departments in India and in the world. Companies like Apple, Facebook, 3M, Philips, GE, Google, Yes Bank, Suzlon, TATA, have implemented in their structure the principles of Jugaad, combining the frugal spirit of innovation with traditional approaches that involve a greater allocation of financial resources (Radjou; Prabhu; Ahuja, 2012).

4. PROGRESSIVE AND PLANNED COMMITMENT WITH SCIENCE, RESEARCH AND TECHNOLOGY. India's leadership as an innovative country has always been in the political agenda: Post-independent India focuses on science as a tool for growth and development of heavy industry. In a framework of a planned economic model, Nehru, supported cooperation in the fields of advance technology with developed countries which allowed the IITs, first technical education centres to be created with the assistance of foreign governments (Sharma, 2013). In the 70's, under the leadership of Indira Gandhi, decentralisation and the development of endogenous technologies were the goals. They launched crash programs to develop the field, which resulted in the green, white and blue agribusiness revolutions through which the country achieved significant levels of self-reliance, and laid the agro-industrial pillars for a competitive global industry. In the 80's the public speech focused on the need to develop own technologies and to support the full capacity of absorption and effective adaptation of imported technology. The 90's witnessed the great economic transformation, progressive opening of sectors and regulations favouring research, technological development and innovation in all its facets as well as cooperation between public and private entities for development projects. The aspiration of India in 2020 is to invest 2.0% of GDP in research and development.
5. REORGANISATION OF VALUE ADDED CHAINS. Industrialisation programs of Narendra Modi like Make in India are divided into strategies, those aimed at intensive-comparative advantage sectors and those aimed at capital and knowledge intensive sectors (ASOCHAM/ YES BANK, 2015). India is aware of the growing importance of the reorganisation of global value chains and with it, the change in the global distribution of innovation activities. New trends in globalization of R & D will force multinational to relocate their facilities in emerging countries, in order to innovate and produce to meet the demand of global market

so as to address the growing markets in the host country, or practicing a kind of reverse engineering in which goods produced for emerging countries end up being demanded by global consumers.

India innovates because a) it has the ability to build highly specialised clusters; b) its diaspora, more than 20 million people, is acting as the agent of knowledge between India and host countries (Kumar, Dhanarajan, Contractor, 2015); c) regarding FDI, analysing a sample of 7.238 Indian investments abroad, Karna, Upadhyyalula & Kumar found that unlike western business community, Indian investor are less risk-averse, investing without local partners in countries with which, they do not have much familiarity; d) for some, the existence of family capital is an advantage to enable rapid decision-making and diversification of business areas more smoothly than in the structural professional manner; e) India is a large pool of trained professionals in different areas of knowledge, with varying levels of bilingualism.

## **5. Disruptive sectors. Strengthening relations between India and Colombia towards social inclusion**

A second phase in the relation India Colombia should be based in diversification of our export offer and inclusive growth. The relation has to overpass the simple export of commodities to India and accentuate the configuration of a complementary relation where intermediate segments in global chains of production are properly identified in order to design public policies effectively oriented towards those sectors. For that purpose, Innovation Diplomacy is necessary in the future dialogue India-Colombia. Flow of knowledge and information as well as coordination among institutions and stakeholders regarding cooperation oriented to those disruptive areas.

## **6. Diversification of the agro industrial sector after the conflict**

India is a great producer and supplier of commodities. It increased investment in research, and incorporated technologies that improved productivity in the land. Indian policies are aimed at the inclusion of farmers and human capital formation. This emerging country passed from being an impoverished nation affected by recurrent famines and shortages to being the largest producer and consumer of oil, an important producer and consumer of cereals, a power in dairy goods and the largest producer and exporter of beef.

In relation to Colombia, the Indian government advanced in talks with VECOL a State Colombian company dedicated to the production of veterinary products. The agreement was about the development of vaccines for livestock in India. In other areas, there are significant some associations for the generation of alternative energies, Indian companies have made substantial investments for the production of ethanol coming from the bagasse of sugar cane and other agricultural residues. Governmental cooperation has been applied in the research of alternative energy use for the bagasse of bamboo and, entrepreneurial efforts joined in development of new coffee varieties of interest for India (Interview APC Colombia, 2016).

Food security is a concern shared by both countries, and in the case of Colombia, the recovery of the countryside and the improvement of crop productivity are necessary stages in the post-conflict process. According to the latest research prepared by the Agricultural Planning Unit UPRA in 2016, from 114 million arable hectares that comprise the country, 26 million have possibilities for agricultural, livestock and forestry activities. Of these 11.3 million have pure agricultural vocations, of which, 65% are not used correctly. Possibilities of diversification and improvement of conditions in the Colombian countryside are clear in regions of high social complexity. For example, only 54% of lands in Valle del Cauca have the adequate use the rest has to be reconverted. Arauca, traditionally known for its mining activity, has 11,17% hectares of agricultural land available. In the Guaviare, which has been hit by the armed conflict, 84.9% of the land is available for agriculture. La Guajira the region bordering Venezuela, a country that is a natural market, has only 1% of its capacity in well-developed agriculture (TIME, 2016).

The relation India-Colombia, however, requires focus in those areas in which diversification, specialisation and added values can be induced, if the goal is the inclusion of those small farmers and families in the countryside that are looking to improve their quality of life. “We have to enhance a new agricultural offer in Colombia and specific infrastructure”:

ZIDRES (Interest Zone for Rural, Economic and Social Development), are special territories, intended for agriculture, livestock, and forestry that are far from urban centres, have a low-density population and limited infrastructure. They are part of the Rural Integral Plan for post-conflict in Colombia, aiming to enhance foreign and local investment in those areas affected by the conflict. More than 150.000 Km of high plains are going to be available for joint ventures and strategic associations between big, medium and small farmers or stakeholders. This framework is an opportunity for

Indian investors in Colombia to be involved in the development of new crops for export of grains and pulses to in India and South Asia. ZIDRES can enhance Indian capital flows to ensure crop diversification, modernization of the agricultural activity, and development of trade infrastructure while ensuring for Colombia a market of 1.3 billion consumers.

Any strategy pretending the internationalisation of our rural economy, demands responsible identification of those sectors in which is pertinent the specialisation of Colombian Production, during this new cycle. It is also important to precise those segments of GVC that our producers can join. Focusing the strategy on niches, natural and exotic products for Indian and Asian Markets could help in the definition of the productive vocations of those territories.

Colombia is offering investors attractive scenarios for the developments of projects in which research, innovation, and social development are primary goals. The Law 145/ 2011 has established incentive trough which, 175% of the amount invested will be returning to the companies trough the income tax. Additionally, the Embassy of Colombia in New Delhi is working with Colciencias and DEST for the development of scenarios to work jointly in projects that enhance research and innovation (Interview with Augusto Castellanos, Procolombia in India, 2016).

## **7. Digital agriculture: elimination of intermediaries and the development of cooperative systems**

The position of IT industry in the development and extreme transformation of the agriculture industry around the globe and the presence of the most prominent IT Indian corporation in Colombia, allowed us to propose public and private stakeholders to jointly invest in the transfer of edge knowledge that favour the extensive use of precision agriculture, helping large and small farms alike, harness digital technologies, to improve their yields and increasing profitability.

IT and satellite Indian technology, worldly acknowledged and accessible, should be part of the modernization and digitisation process of cadastral systems in Colombia. Regional governments urgently require automatic systematisations of all property records, including its modifications. Digitalization of maps and geospatial data, integration and updating of research through a single window are also urgent necessities (Accenture, 2016).

IT and satellite technologies, in India are deserved for the inclusion of farmers in better marketing of their products. Through digital systems

India and Colombia can work in the construction of platforms that eliminate middlemen and allow small producers to know in real time the value of their crops as well as information related to the production process, reducing costs in planting, harvesting or storage. This is the case of the services offered by The Multi Commodity Exchange of India Limited (MCX) to farmers in India, ensuring their effective inclusion on fair trade, technological development of agricultural and services linking producers to market. La Bolsa Nacional Agropecuaria in Colombia would be highly benefited with that best practice.

India has deeply developed the concept of cooperatives. IFFCO and AMUL, the first one on fertilisers and the second on dairy products are the biggest in the world. Cooperatives are the associative option for inclusion but also, the perfect scenario for application of technology innovations. The development of modern cooperatives is a challenge that has been foreseen by Colombia in the framework of its post conflict process and India has a word to pronounce in that respect.

The experience of India in the extensive use of groundwater should be, as well, a matter of study about the case of Colombia.

## **8. New areas of convergence in the aerospace industry**

The emergence of Brazil, India, China and Russia as powers in the industry is of great importance for the ability of these nations to generate knowledge and transferable technologies in a more competitive way to the developing world. Since independence, India has worked on ambitious aerospace development programs, aiming to improve own capabilities in advanced technologies to alleviate their concerns on defence and allow high levels of industrialization in context of self-sufficiency. As a highly specialized sector, India has not yet achieved self-sufficiency parameters; however, it occupies an honourable fourth place among the economies that globally invest the most in the sector (OECD, 2014).

After the 90's, the Indian aerospace industry redefined its objectives and its scope without the Soviet Union on stage, the globalization underway, and the mainstream of the IT industry. The defence, as original goal, gave much space to the development of other segments, part of the aerospace economy. Developments for social inclusion and the participation of its productive fabric in global value chains became important priorities. In the case of aviation, the development of civil aviation took place, while in space sciences began: a) The supply chains of satellite manufacturing component responsible for production and assembly of space vehicles; b) the service

chain for satellite operators (telecoms, public institutions, technology services companies, launches observation satellite, geo-referencing systems, etc.) and the chain services to end users of such technologies.

The Indian Space Research Organization ISRO, The Indian Space Agency, was created in 1969. The courageous and successful implementation of strategic space projects over the decades, have positioned it as the sixth space agency in the world. ISRO supplies the growing demand for fast and secure communications. Synoptic broadcast satellites are useful for the management of agriculture and soils, information about the oceans, the atmosphere and environmental aspects. ISRO has been responsible for the development and delivery of satellite products and tools for radio and TV, weather forecasts, disaster forecasting, navigation systems, cartography, satellite navigation, telemedicine, distance education.

Although the leadership of MinTic that has allowed Colombia to become one of the most interconnected countries in the region, our industrialists, and the State have not ventured in the aerospace sector. We urgently need the guidance of the Indian aerospace industry to introduce competence for the supply of available technology and cross useful tools used in the development of the agroindustry and other areas like those related to climate change, education, geo-reference geology, mapping of mining areas and inventory of biodiversity. On the other hand, space for manufacture is also possible: In Colombia, the organized metalmeccanic sector is starting process towards the development of components to supply the aviation industry. This is an interesting field in which added value can take place not only joining European and American chains of value but also the Indian ones.

## **9. Medicine and healthcare for all**

A special case is the pharmaceutical and health care industries in India. After independence, India used to import 90% of its demand in medicines. It was the result of a policy of "smart substitution" of imports with technical support, training of human capital, combined with a selective and effective price control, together with facilities to enhance capacity building that favoured the emergence of this industry. This sector has been able to follow the sequence from duplicative imitation, passing to creative imitation and reaching the creation of new products for the disadvantaged population.

The boost by generics and bio-similars, the Indian pharmaceutical industry is projected to grow from US \$ 20 billion in 2015 to US \$ 55

billion by 2020. The momentum of this industry in the next five years is mainly due to the growing demand for generic in the world, particularly in developing countries like Colombia, Mexico and Brazil. Market expansion of biological treatments for diseases such as diabetes, cancer, multiple sclerosis and rheumatoid arthritis; have also influenced the good prospect for this sector. The health industry will grow in India from US \$ 65bn in 2015 to US \$ 250bn by 2020 (GlobalData, 2016).

Indian companies in LAC are producing and selling specialised services and are building joint research. The diversification of the supply of goods and services is already very important, clinical research services, development of new products, services in bioavailability/bioequivalence, and services of clinical pharmacology, clinical laboratory, biostatistics, pharmacokinetics, pharmacodynamics and management of clinical data. Other alliances produce anaesthetics and injecting high-end products for the cardiovascular system, central nervous system and oral hypoglycemic. Cipla has also invested in the region, as Hetero Drugs recently did in Colombia.

A future relation of greater value between Indian and Colombian pharmaceutical markets implies a widespread policy in the region to attract science-based investment and targeted the benefits that those investments should mean for our communities. For example, access to medicines at low prices, greater transparency in the services to supply medicines by the actors who are part of our healthcare systems, research for the development of new drugs for endogenous diseases, human capital formation in science and health, information systems, development of healthcare services.

At this point the real question is if main actors in the relation India-Colombia have the political will to go further with a new strategy in the approach. As scholar I have not seen a systematic and robust agenda integrating Ministries, Agencies, and interests of private sector representatives. There are isolated efforts, but not a clear intention to introduce disruptive elements for a depth association. This is a call to our leaders in the high government, this is a call to Colombian private sector, to the academy and other representatives in the civil society, the relation India-Colombia is strategic for all, it is valuable, has all its potential unexploited and we do not have more time to take the decision.



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