國際學碩士學位論文

Analysis of Industrial Policy and the Product Space map in Colombia

콜롬비아의 산업정책 및 프로덕트 스페이스 맵에 관한 고찰

2013년 8월

서울大學校 國際大學院

國際學科 國際地域學 專攻

洪 旼 希

Analysis of Industrial Policy and the Product Space map in Colombia

Thesis Presented

By

Minhie Hong

to

Graduate Program in International Area Studies
in Partial Fulfillment of Requirements
for the Degree of Master
in the Subject of International Studies

August 2013

Graduate Scool of International Studies

Seoul National University

Seoul, Korea

콜롬비아의 산업 정책 및 프로덕트 스페이스 맵에 관한 고찰

지도교수 김 종 섭

이 論文을 國際學碩士 學位論文으로 提出함

2013 年 **8** 月

서울大學校 國際大學院

國際學科 國際地域學 專攻

洪 旼 希

洪旼希의 碩士學位論文을 認准함

2013 年 **8** 月

委 員 長 李 永 燮 (印)

副 委 員 長 安 德 根 (印)

委 員 金 鍾 燮 (印)

Graduate School of International Studies
Seoul National University

THESIS ACCEPTANCE CERTIFICATE

The undersigned, appointed by

The Graduate School of International Studies
Seoul National University

Have examined a thesis entitled

Analysis of Industrial Policy and the Product Space map in Colombia

Presented by **Minhie, Hong**

Candidate for the degree of Master of Art in International Studies and hereby certify that it is worthy of acceptance

Signature Committee Chair	Rhee, Yeongseop
Signature Committee Member	Ahn, Dukgeun
Signature Committee Member	Kim, Chong Sup

Abstract

Analysis of Industrial Policy and the Product Space map in Colombia

Minhie Hong
Department of International Area Studies
Graduate School of International Studies
Seoul National University

The research focuses on lagging trend of economic development in Colombia. Since 1980, Colombia has ranked at 5th place in terms of GDP per capita. However the gap between Top 4 countries (Mexico, Chile, Argentina, and Brazil) and Colombia has increased and bisected region's economies into two groups.

Analyzing the rationale for Colombia's failure in joining top 4 countries' economic performance is possible via various dimensions. This research applied Product Space Map by Hausmann et al. to analyze exporting structure of Colombia from 1975 to 2010 and compare the result with Brazil and Mexico's

case. Product Space map allows analyzing sophistication level and volume of the product that has comparative advantage in export.

In addition, the research studies Industrial Policies(IPs) of Colombia. Since the country pursued IPs from 1950, author analyzed the rationale behind stagnated growth despite having policy framework for an extensive period.

Throughout the mentioned processes, this research executes objective as-is analysis of Colombia's export status by providing comparative cases.

Keywords: product space map, industrial policy, Colombia,

Student Number : 2011-22406

Table of Contents

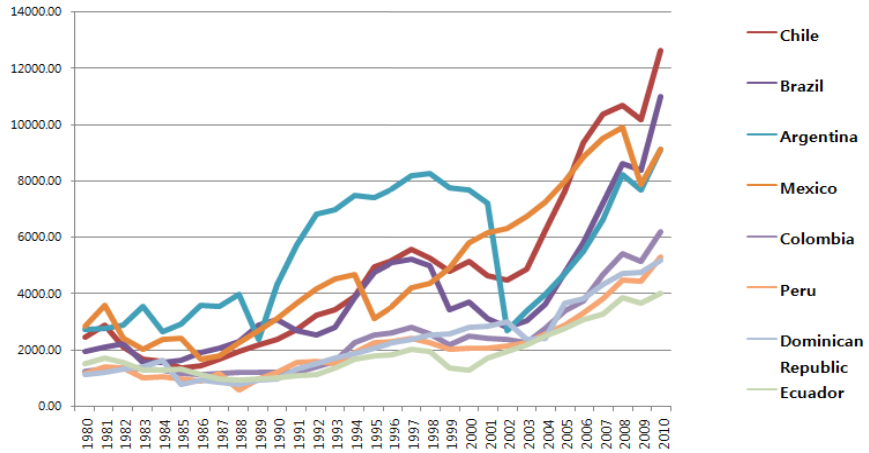
List of Tables

List of Figures

1. Introduction

Latin American Economy is often said to be lagging from the global growth trend. However Argentina, Brazil, Chile, and Mexico have achieved meaningful growth in the past 30 years and now they form top 4 tiers in the region. Their GDP per capita is around 10,000 USD.

Figure 1 GDP per capita of top 8 countries in Latin America (1980-2010, current USD, Tax havens are excluded)



Source: World Development Indicators (http://databank.worldbank.org/data/home.aspx)

However, rest of the countries show lagging trend in terms of economic growth. In the 1980s, differences of GDP per capita among countries in the region were minimal. The gaps were around 2,000 USD among listed four countries and the rest. However in 2010, the gap between the highest GDP per capita in the rest

countries(Colombia) is 6,000 USD while highest in the whole region is 12,000 USD. The gap is now even more obvious and the region has bisected by top 4 and the rest. Latin American Economy is often said to be lagged from global growth trend. However Argentina, Brazil, Chile and Mexico have achieved meaningful growth in the past 30 years and now they form top 4 tier in the region. Their GDP per capita is around 10,000 USD.

Another interesting fact that can be observed from figure1 is Colombia's status. From 1980 to 2010, Colombia has frequently marked on the fifth place in GDP per capita rank in LAC. However it failed to join the top-four group and the gap is now even greater than the past.

The lagging trend in Colombia raises a question about the reason why it could not pursue the same growth path with top tiers while occupying the top 5 status for 30 years.

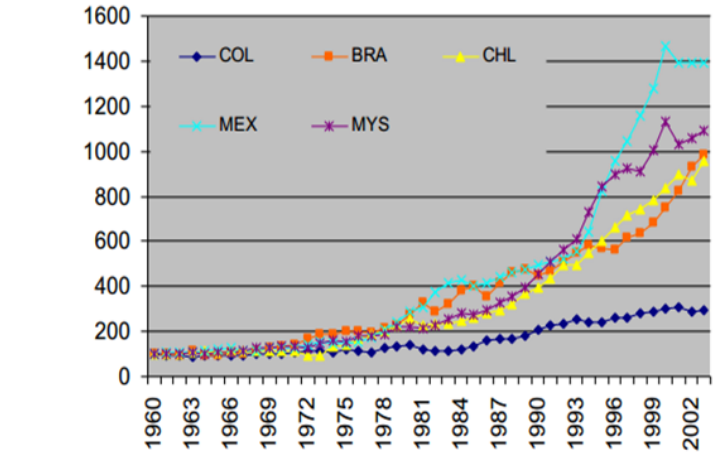
Hausmann and Klinger(2008) argue that growth challenge in Colombia is closely related to its export challenge[1]. Figure 2[2] shows export per capita of Colombia is stagnated and lagged behind countries in the region and Malaysia, where the authors included as performance of other developing country with similar situation. Export per capita in 2002 is 10 times larger than its 1960 figure in Brazil and Chile. In case of Mexico the growth is more dramatic and it reached 14 times larger than its 1960s data. However Colombia's export per capita increased only around 1.5 times than its past.

---

1) HAUSMANN, R. and B. KLINGER(2008),"The Structure of the Product Space and the Evolution of Comparative Advantage", Center for International Development at Harvad University CID working paper ,no.146

2) *Ibid.*

Figure 2 Export per capita 1960-2003



Source: World Bank WDI . Exports of goods and services in constant 2000 dollars divided by total population, scaled to 100 in 1960.

Source: HAUSMANN, R. and B. KLINGER(2008)

The rationale behind this phenomenon can be studied in various dimensions. This research will focus on Product Space Map and Colombian industrial policy as methods of analysis.

2. Methodology

1) Product Space Map[3)]

Hidalgo et al.(2007) consider product as a tree and the set of all products as a forest. It focuses on relatedness of products. (how near by) In theory, many possible factors may cause relatedness between products such as the intensity of labor, land, and capital, the level of technological sophistication etc.

Product Space assumes if two goods are related because they require similar institutions, infrastructure, physical factors, technology, or some combination thereof, they will tend to be produced in tandem, whereas dissimilar goods are less likely to be produced together.

In the product space, relatedness is called “proximity” of products. Unlike traditional notions of development economies where strongly argues the role of “dimension of similarity” where considers factors of production, technological sophistication or institutional quality, proximity of product space seeks the relatedness of two goods by considering ability of a country to produce a good which is in “nearby".

$$\phi_{i,j} = \min P(RCA_{\xi} | RCA_{xj}), P(RCA_{xj} | RCA_{\xi})$$

The proximity Φ between products i and j is the minimum of the pairwise conditional probabilities of a country exporting a good given that it exports another. This concept formalizes the intuitive idea that

3) HIDALGO, C. A., B. KLINGER, A.L. BARABASI and R. HAUSMANN (2007), “The Product Space Conditions the Development of Nations”, Science, 317(5837), 482 - 487.

the ability of a country to produce a product depends on its ability to produce other products.

For example, country A with the ability to export apples will probably have most of the conditions suitable to export pears. They would certainly have the soil, climate, packing technologies, and appropriate logistic method.

In addition, they would have skilled agronomists, sector friendly laws, and trade agreements that could be easily redeployed to the pear business. If instead we consider a different product such as copper wires or home appliance manufacture, all or most of the capabilities developed for the apple business render useless. Hidalgo et. al introduce proximity as the concept that captures this intuitive notion.

International trade data (NBER) was used to measure proximity. Disaggregated according to the Standardized International Trade Code at the four-digit level (SITC-4), providing for each country the value exported to all other countries for 775 product classes was observed. With these data, researchers calculated the 775-by-775 matrix of revealed proximities between every pair of products by using the equation of proximity.

Product Space also tests diffusion to ensure that countries develop comparative advantage in relatively nearby goods.

Software to draw product space map is available through the web site[4].

The interpretation of the map starts with understanding the

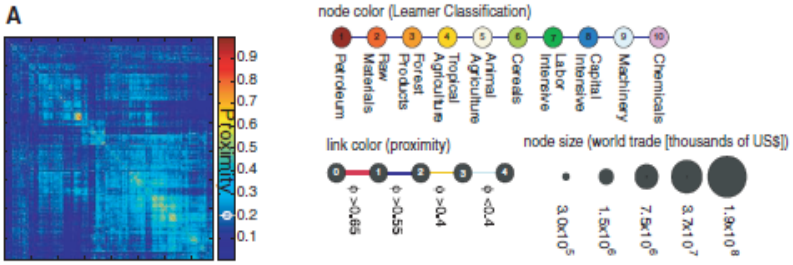
---

4) Maps Until 2000: http://www.chidalgo.com/productspace, via downloading software "Cyto-space"
after 2000: http://atlas.media.mit.edu/explore/product_space, via direct download from website

visualization of Product Space as a network. Figure 3 shows products are depicted as nodes and are connected if they require similar know how. The intensity of the similarity is expressed in the shade of the links. The color of the node expresses the type of product it is and its size expresses global trade in that product.

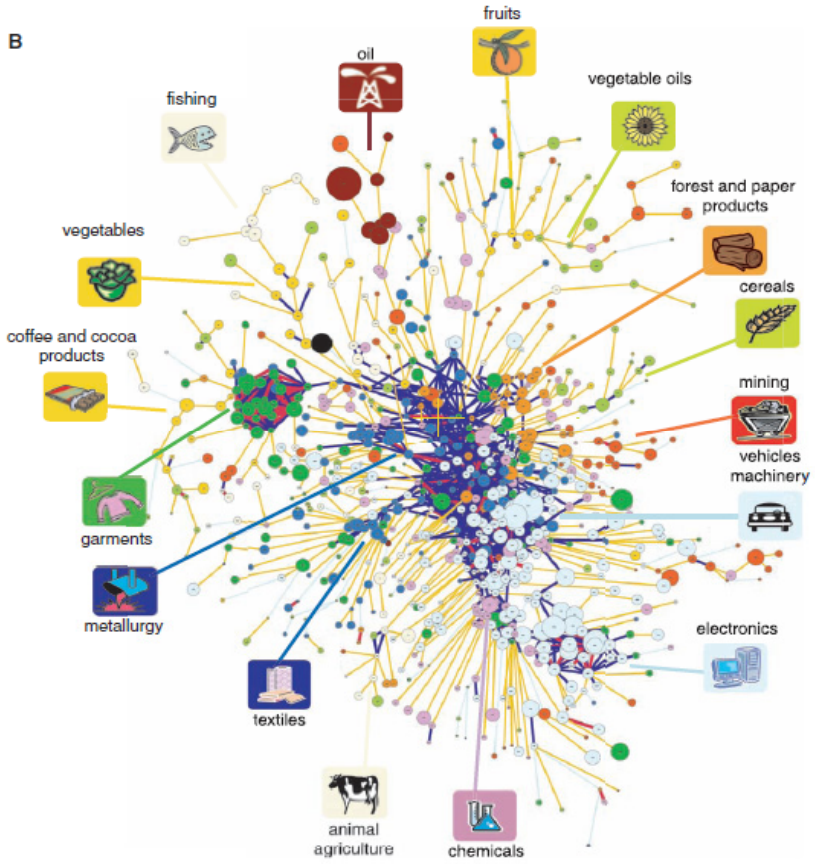
Figure 4 is a example of the visualized map by using explained elements by Figure 3.

Figure 3. How to interpret the Product Space map



Source: Hidalgo CA. Klinger B, Barabasi A-L, Hausmann.R, Science 317, 482-487 (2007)

Figure 4. Composition of Product Space map



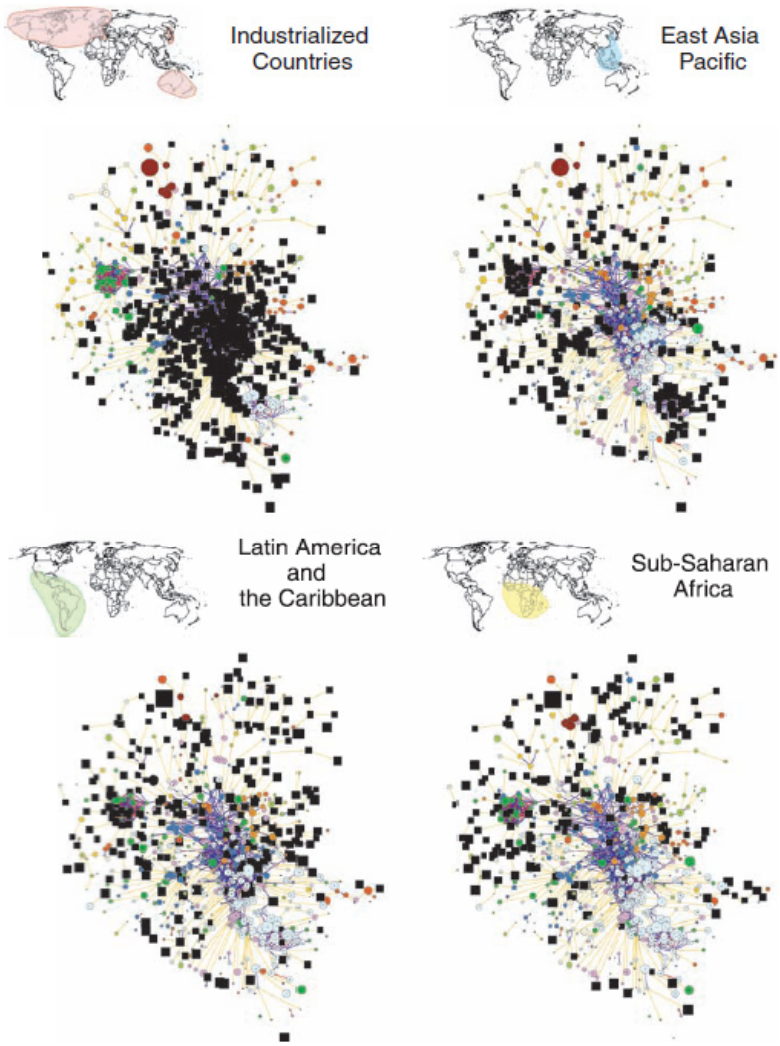
source: Hidalgo CA. Klinger B, Barabasi A-L, Hausmann.R, Science 317, 482-487 (2007)

The result of simulation of Product Space demonstrates that if countries diffuse to nearby products and these are sufficiently connected to others, then after several iterations, 20 in their exercise, countries would be able to reach richer parts of the product space.

Figure5. below shows the pattern of specialization for four regions in the Product Space. Products exported by a region with comparative advantage captured by RCA(RCA>1) are marked with black squares.

Industrialized countries tend to export products located in the core area of the map which is machinery, metal products and chemicals. These countries also have competitiveness in products located in periphery of the map (textiles, forest products and animal agriculture). In case of Ease Asia Pacific, they occupy garments, electronics and textile products while Latin America and Caribbean countries have developed their comparative advantage in another periphery area of the map (mining, agriculture, and garments). Sub-Saharan Africa exports relatively small types of products, as shown in the map, all of which are occupying periphery area of the product space. The figure shows different pattern of specialization that can be clearly observed by product space.

Figure 5. Example of Product Space map



Source: Hidalgo CA. Klinger B, Barabasi A-L, Hausmann.R, Science 317, 482-487 (2007)

2) Revealed Comparative Advantage[5)]

The concept of comparative advantage is an important factor to explain the pattern of trade. It is simply a country's advantage of specializing in relatively efficient productions.

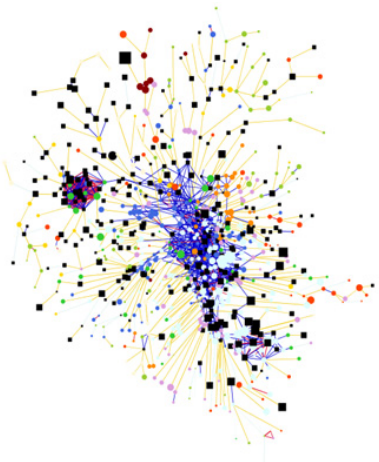
In practice, the revealed comparative advantage(RCA) is measured based on a country's actual export and import data and it presents the country's current status of relative performance in particular products. This measurement is often used to compare across countries to find out what comparative advantage the country has as compared to other countries and thus which sector it should focus on more. The RCA is calculated as follows.

$$RCA_{c,i} = \frac{x(c,i)}{\sum_{i} x(c,i)} \Big/ \frac{\sum_{c} x(c,i)}{\sum_{c,i} x(c,i)}$$

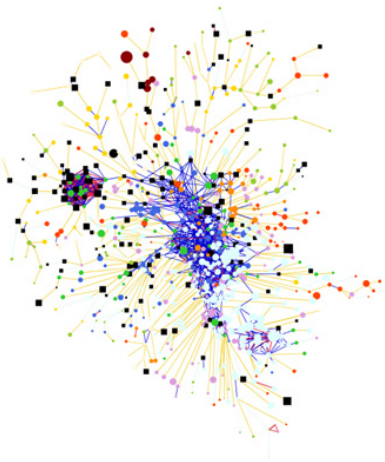
5) BALASSA, B. (1977), "'Revealed' Comparative Advantage Revisited: An Analysis of Relative Export Shares of the Industrial Countries, 1953-1971", The Manchester School of Economic and Social Studies, 45(4), 327- 344.

3. Product Space map analysis

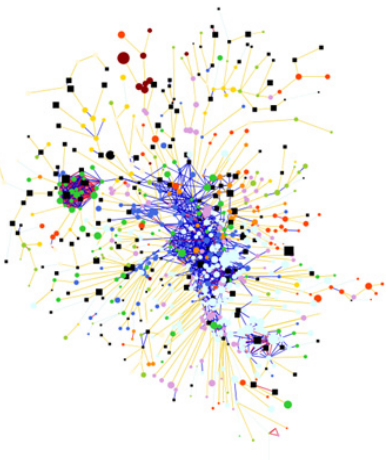
Figure 6. Product Space map of Mexico, Colombia and Brail(1975)



Mexico



Colombia



Brazil

Figure 6 shows 1975 product space map of Mexico, Colombia and Brazil. RCA>1 products are located in peripherical area of the map.

Commodities[6] that occupy Colombia's production space map are Green and roasted coffee & coffee substitutes(45%), Raw cotton, Fresh or dried banana, refined sugar, Not mounted precious stones, Flora, live bovine, cotton yarn, raw sugar beet and bovine meat. Concentration on primary commodity is observed and reliance to top exporting commodity(coffee) is high.

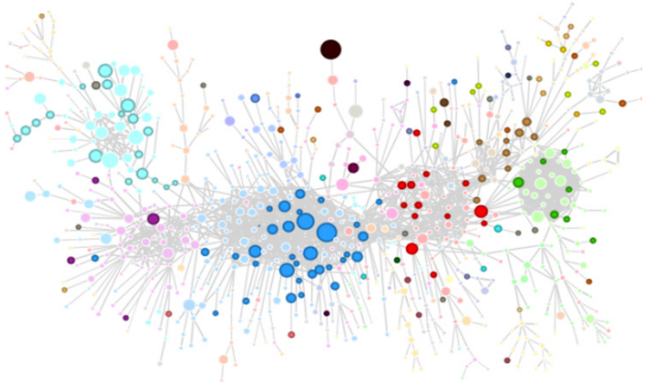
In case of Brazil, top 10 commodities[7] are Green and roasted coffee and coffee substitutes (12.86%), Raw sugar beet, soya beans, refined sugar, oilcake, raw&roasted cocoa beans, footwear, unmilled maize, coffee extracts, and unclassified transaction. Brazil's top 10 products illustrates concentration on primary commodity however light industry such as footwear is top 7 exporting commodity with RCA 3.27. Also unlike Colombian case, Brazil's export is fairly distributed. Top exporting commodity only occupies 12.86% of total export while Colombia's coffee export share was near to 50%.

Commodities that are marked as black dot in Product Space map of Mexico[8] showed country's comparative advantage in sophisticated sectors than other two countries. Its top 10 exporting products are crude petroleum(8.54%), Green and roasted coffee & coffee substitutes, raw cotton, parts of telecom & sound recording equipment, unclassified transactions, molluscs, unwrought silber, other sulphurs, raw sugar beet & cane, fresh or chilled tomatos. The distribution of shard of each products are well spread and though Mexico's top 10 product

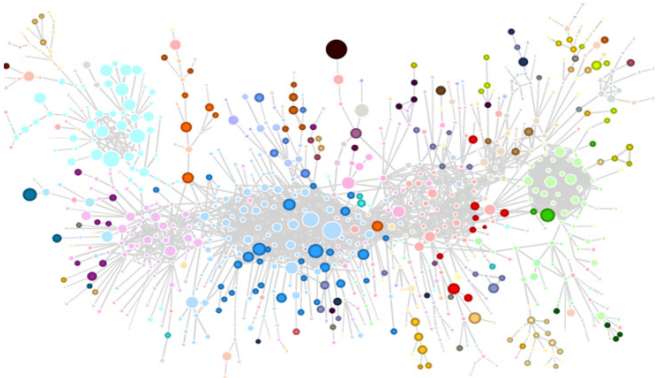
6) See appendix Table 2
7) See appendix Table 4
8) See appendix Table 3

mix shows many primary commodities, its product space map is the most sophisticated level among three countries.

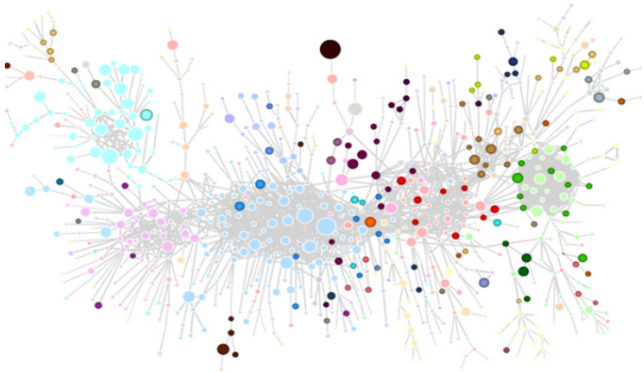
Figure 7. Product Space map of Mexico, Brazil and Colombia(2010)



Mexico



Brazil



Colombia

In 2010 the maps of Brazil and Mexico shows increase of products located in the central area of the map. However map of Colombia shows less number and volume of products that hold comparative advantage.[9)]

This trend is more obvious by referring to the list of top 10 export share products. Mexico's top 10 export products[10)] are composed of various manufactured commodities. Although the most share is occupied by crude petroleum(11.45%), however rests are products such as cars, color TV, other vehicles parts, trucks & vans, television and radio transmitters and etc. Comparing to top 10 exporting commodities in 1975, there has been fundamental change in the composition.

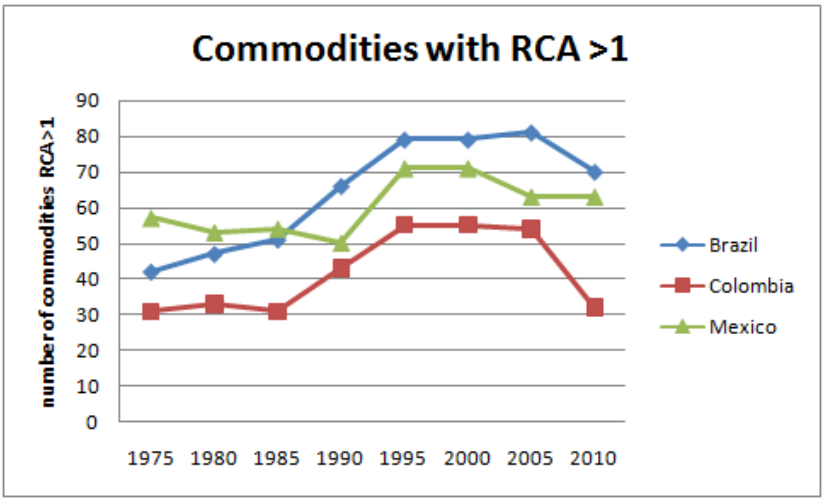
Brazil's top 10 export commodities[11)] shows continuous concentration on primary commodities however the volume is large and product space map shows more sophisticated trend than the map of Colombia.

Colombia's product space map shows very similar form to that of its 1975's map. Its evolution from 1975 to 2010 does not show development in export structure in the map. Not only the level of sophistication but also trade value hasn't increased as much as other countries' cases. Commodities that occupies top 10[12)] trade values are crude petroleum(31.91%), other coal, lubrication petroleum oils N.E.S., Green & roasted coffee & coffee substitutes, freshed or dried banana, gold, flora, ferro-alloys, coke&semi-coke of coal medicaments. Share of Coffee export has declined and crude oil replaced its status with overwhelming share. Unlike other countries' case, Colombian export

9) See appendix for figure 9,10, 11 for evolution of Product Space map from 1975 to 2010(increment of 5 years)
10) See appendix Table 5
11) See appendix Table 6
12) See appendix Table 7

basket tends to have concentration on one product.

Figure 8. Number of commodities (RCA>1) in 3 countries



Souce: UN comtrade, author's calculation (SITC 3digit, 1980 Brazil, 1990 Colombia, 1980 1985 Mexico's data was not available. Author calculated average values between years)

Figure 8 shows number of commodities with RCA higher than 1 from 1975 to 2010. As seen in Product Space map, Colombia has significantly lower number of products that have comparative advantage in exporting. Meanwhile Brazil and Mexico's export commodities with RCA >1 has increased in number from 1975 to 2010. Especially Brazil shows dramatic growth. Not only the number of products but also sophistication level improved in case of Brazil and Mexico. By going back to Product Space map, two countries black dots(commodities with comparative advantage) have moved from peripherical area to centric area, which means more sophisticated products in product space. However Colombia's map doesn't show visible difference.

4. Industrial Policies

1) Policy Shift in Latin America

From 1950s to 1980s Latin American countries pursued various industrial policies[13]. (Devlin and Mogullianski, 2012). Along with long history, numerous political reformations took place. One of the most recent and fundamental shifts occurred in the late 1980s to 1990s. In the beginning of 1990s countries in the region made transition of their focus, which dominated previous industrial policy, from the import substitution (ISI) to policies that promoted export and serve as complement to open economies[14] (Melo, 2001). Colombia was no exception.

In order to understand policy trends in Latin America, beginning with ISI in 1970s will give overview. In this period, industrial policies included two major tools; trade protectionism and investment

13) Melo(2001) clarifies concept of industrial policy as follow:
"First, industrial policy is defined as any decision by the public authorities of a national economy that systematically affects the vector of goods and services produced in that economy. Second, a distinction can be made between explicit and implicit industrial polices. The former are decisions by the authorities that aim, in a clearly expressed manner, at stimulating the allocation of productive resources to particular sectors while discouraging investment and production in other sectors and either neglecting or intending to be neutral on still other sectors. The latter are, in principle, all other policies, to the extent that, at least in principle, they have measurable and relevant effects on the vector of goods and services produced by the economy, favorably affecting some sectors and hurting others, even if those consequences are not part of their stated purpose."

14) According to Devlin and Mogullianski (2012) in 1970s to early 1980s, governments preferred "no industrial policy" under influence of Chicago School and military government

promotion. In addition, finance was provided by development bank. These trends are well reflected to the Brazil's Second National Development Plan and National industrial development program (1979-1982) in Mexico.[15)]

During 1980s, when debt crisis stroke the region, industrial policies were deactivated[16)]. Criticism was pervasive and monetary policies replaced IPs.

From late 1980s, industrial policy started to attain positive perception with new approach. In this period, policies implemented in the region had distinctive characteristics from traditional IPs(ISI). Policies refrained from the active market intervention and valued sound macro economic policy for growth in investment and industrial modernization. Also improvement of domestic producer's capacity by promoting their competitiveness in global market became important agenda. Also government's role has changed from active intervention body to public goods supplier.[17)] Table #[18)](or appendix) demonstrates trends in

---

15) PERES, W. and PRIMI, A. (2009), "Theory and Practice of Industrial Policy. Evidence from the Latin American Experience", ECLAC, Serie Desarrollo productivo No.187, p.32

16) For the reason, Peres and Primi (2009) analyzes as follow:
(i) public enterprises that had traditionally invested directly in new sectors were either privatized or closed, reflecting the new view that the State should play only a subsidiary role in economic growth; (ii) the need to balance public finances meant eliminating subsidies, particularly fiscal ones, and the subsidy components of credit operations, and (iii) there was a (sometimes controversial) perception that many investments suffered from bad planning, poor project management and corruption, and in some cases implied high inefficiencies —-the so-called ""white elephants."

17) MELO, A.(2001), "Industrial Policy in Latin America and the Caribbean at the Turn of the Century", Inter-American Development Bank, Research Development Working paper seris ; 459

18) The contents of table is from MELO, A.(2001), "Industrial Policy in Latin America and the Caribbean at the Turn of the Century", Inter-American Development Bank, Research Development Working paper seris ; 459 p.14-47

industrial policy from 1950 to 2000s.

Policies in 1990[19]s can be decided into 3 groups according to Peres and Primi (2009). Group A promotes sectoral policies. Countries such as Brazil, Mexico, and a few Caribbean countries selects target industrial sector to support according to its contribution to national competitiveness, linkage to technological development and capacity in international trade.

Table 1. Trends in Industrial Policy

	1950s -1980	1980s	1990s
Policy type	Import substitution policy	- "no" IP policy as good policy decision - Monetary approach (neo liberalism)	Export promotion policy
State Role	Active engagement of government	Minimum state role	Coordinator, provider of public goods

According to Devlin and Mogullianski (2012), Latin American governments followed mainstream development economics. As a result countries were successful in achieving growth, industrialization and modernization to a certain extent. However the concept and implementation of industrial policy rendered a serious problem. Crisis

19) See appendix Table 8

in the 1980s raised skepticism regarding industrial policy along with its flaws observed through 1950s to 1980. As a result reform in the 1980s restrained role of government and its industrial policy. In the late 1980s to 1990s, government role started to restore its place as a provider of public goods and coordinator in market failure situation[20].

Recently as necessity of systematic industrial policy arises, approach to industrial policy in LAC is changing. Peres and Primi (2009) identify recent trend in industrial policy in 4 groups[21]:

First group execute vertical policy. They select certain sector and support with objectives such as expansion of sector, technological improvement, and increase in production capacity. Tools used in this group are new segment integration, trade protection and tax incentives. Countries in this group are Mexican automotive sector and MERCOSUR countries. Sectors that receive incentive from this policy are textile, clothing, footwear, electronic products and toys. These sectors needs support in order to achieve better competitiveness. Additionally in some cases there are policies that promote agriculture and mining. Incentive given to mentioned sectors tends to be more stable. Support is guaranteed in various circumstances.

Second group applies extended vertical policy. Computer and electronics industries are usually classified in this group. When ISI was first implemented, support to above mentioned area was in form

---

20) MELO, A.(2001), "Industrial Policy in Latin America and the Caribbean at the Turn of the Century", Inter-American Development Bank, Research Development Working paper seris ; 459

21) PERES, W. and PRIMI, A. (2009), "Theory and Practice of Industrial Policy. Evidence from the Latin American Experience", ECLAC, Serie Desarrollo productivo No.187 p.34-35

of giving incentive for production of hardware. However recent incentive is given to production of software and this shift changed scope of policy. Now the policy includes development of general IT society and spread of information and communication technology(ICT).

The third group supports sectors engaged with economies of scale and network. Electricity, telecommunications, oil and natural gas are examples of target sector of the group. Mentioned sectors are mostly privatized in Latin America and policy aims to provide adjusted government role in 2000s: coordinator and provider of public goods. Creating efficient regulatory body via newly establishing or strengthening agency in charge, legal framework adaptation and coordination with local suppliers are methods of third group's policy. Good example of third group's policy modality is shown from the case of Brazil. The country created sectoral technology fund in the late 1990s in order to develop science and technological field in private sector. The fund was supported by companies in the sector and it helped establishing other funds to finance establishing infrastructure in remote areas.

The last group approaches with cluster support to small and medium-sized entrepreneurs(SMEs) or to the sector where existed numerous number of small sized companies with the lead of large firms. This type of policy is rendering more popular especially in Andean region.

2) Productive Development Policies (PDPs) in Colombia

(1) Evolution of Policies

Colombia has walked similar path to other countries in the region. ISI was main tool of industrial policy in Colombia through 1950 to 1991.

Until 1980s problems in Colombian policy were that it pursued second-best policy due to lacking rationale, protectionism, and transparency when selecting "strategic industry" for selective policies, tax merits or subsidy. These problems were largely solved in 1990s. Protectionism was limited and policy setting was focused on open global economy. Transparency was also enhanced and government's role became more effective in terms of changing its role from provider of government subsidy and protectionism body to infrastructure provider and coordinator[22].

From 1991, government of Gaviera started to reform PDPs and abolished or reduced protectionism, subsidies and government intervention. It is called "apertura(opening)" and demonstrates Colombian version of shift of industrial policy in 1990s.

5 programmes were implemented with new approaches mentioned above. National science and technology policy was newly applied with strategic export plan, agricultural-rural modernization, industrial

22) MELENDEZ, M. and PERRY, G. (2010), "Industrial Policies in Colombia", Inter-American Development Bank, IDB working paper seris no. IDB-WP-126

modernization policy and infrastructure development.[23]

Policy shift in Colombia focused especially on comparative advantage in large extent[24]. The country tried to build up competitiveness in areas beyond natural resources and unskilled labor which occupied Colombia's high RCA for many years. Also integrated approach was implemented in addition to sectoral policy and public-private partnership for development

National Council for Competitiveness was established during following government, administration of president Samper[25]. The council was operated with various participants. Representatives from private sector, labor, universities and government collaborated and the result was reported to president directly. Another institution established for enhancing nation's competitiveness is Commission for Foreign Trade and the Ministry of Foreign trade. Ministry formulated strategic plan for export. Three institutions mentioned above-Council for Competitiveness, Commission for Foreign Trade and Ministry of Foreign trade, however lacked in actual implementing power.

23) MELO, A.(2001), "Industrial Policy in Latin America and the Caribbean at the Turn of the Century", Inter-American Development Bank, Research Development Working paper seris ; 459

24) President Gaviria executed "seven sector-level competitiveness studies" by contracting international consulting firm Monitor.(Melendez and Perry 2010) p.5

25) MELENDEZ, M. and PERRY, G. (2010), "Industrial Policies in Colombia", Inter-American Development Bank, IDB working paper seris no. IDB-WP-126 p.5

(2) Characteristics of PDPs in 2000s

A. Vertical Policies

Colombia has implemented numerous vertical (or sectoral) industrial policies.

According to National Ecnomic and Social Policy Council(CONPAS)'s calculations in 2004, tax incentive to specific sectors reached around 1.41 percent of GDP (1,520 million USD).[26]

Transparency issue has been always raised regarding selection process of beneficiaries of vertical industrial policies. In addition, characteristic of sector policy, that it promotes protectionism, is also facing criticism. Regarding sectoral policy tradition, Melendez and Perry (2010) claims Colombian targeted policies lacks market failure approach and their objective is rater to defend the "rents" of selected group. The instrument is also outdated and inefficient that make assumption such as the intervention is result of "effective lobbying"[27].

B. Horizontal Policies

Colombia has long tradition of horizontal policies as well as it did in vertical policies. Melenez and Perry (2010) states that Colombian horizontal policies are focused on 4 areas[28]: export promotion, support

---

26) MELENDEZ, M. and PERRY, G. (2010), "Industrial Policies in Colombia", Inter-American Development Bank, IDB working paper seris no. IDB-WP-126 p.72

27) MELENDEZ, M. and PERRY, G. (2010), "Industrial Policies in Colombia", Inter-American Development Bank, IDB working paper seris no. IDB-WP-126 p.73

28) MELENDEZ, M. and PERRY, G. (2010), "Industrial Policies in Colombia", Inter-American Development Bank, IDB working paper seris no. IDB-WP-126 p.31

to SMEs, skilled training and innovation.

In the field of export promotion policy there are several tools that contribute to this area. Plan Vallejo, CAT(Certificado de Abono Tributario), Export Free Zones(EFZs, converted to Free Trade Zone since 2007 to adapt WTO agreement) are main instrument of this policies. All these instruments were established before 1990s and they are still in use.[29)]

Proexport service was introduced in addition to mentioned policies above. Proexport provides service regarding trade.

In case of Plan Vallejo, which is duty drawback system, exporters, especially those in capital intensive sectors support the system

CAT which is export subsidy also receives positive feed back from exporter along with other subsidy system. Especially firms that are excluded from benefit of Plan Vallejo. However Melendez and Peres (2009) raised question regarding justification of subsidy. Export subsidy was rational choice in high tariffs era however with recent circumstances, it lacks justification[30)].

The FTZ had limited effect. Especially in the past when the zone was called EFZ, the use was even limited and lacked importance. After changing the form to "Free Trade Zone", it allows general use of the area and inefficiency has improved. However still this modality shows demonstrates limited performance.

C. Remaining Challenges

However there are challenges remain. First, sustainability of policy

29) *Ibid*
30) *Ibid*

is still uncertain. Since early 1990s new administrations changed institutional structure process and content of policy. The existence of Private Competitiveness Council advocates alignment of new governments' strategy to the previous cases but their role is limited. Second, implementation of policy lacks commitment. While some government agencies and ministries are fully executing new policies, some major ministries such as agriculture and transportation and infrastructure continues to pursue traditional behavior[31].

Tensions between old and new policy has reveled as well[32]. For example export promotion via subsidy has replaced by direct approach to market failures but some major sectors are reviving the tradition. In addition, preferential treatment via Export Zone are still effective while it violates WTO agreement. Lastly fund for promoting small and medium entrepreneurship has reduced while job training via SENA is receiving earmarked tax support without actual effectiveness of education, the content of training that lacks recent technology update that does not take current economic status into account[33].

31) MELENDEZ, M. and PERRY, G. (2010), "Industrial Policies in Colombia", Inter-American Development Bank, IDB working paper seris no. IDB-WP-126 p.108
32) MELENDEZ, M. and PERRY, G. (2010), "Industrial Policies in Colombia", Inter-American Development Bank, IDB working paper seris no. IDB-WP-126 p.109
33) *Ibid.*

5. Conclusion

By analyzing Product Space map of Colombia in comparison to Brazil and Mexico's case, it was clearly demonstrated that Colombia has lagged in export sophistication and volume.

Unlike two countries'(Brazil and Mexico) visible evolution through the map, Colombia's Product Space map hasn't evolved significantly from 1975 to 2010. Major exporting commodities were primary goods or products with unskilled labor in 1975 and such trend perpetuated through 2010.

Through the policy analysis, there were problems of sustainability, laking commitment, and transparency were found when selecting strategic sector and tension between old and new policies. Mentioned problems state Colombia's chronic problem in pursuing Industrial Policies.

Problems stated above are critical when one country pursues an industrial policy. Since lack of sustainablilty and commitment could lead the whole policy implementation into vain rhetoric, this phenomena requires urgent improvement.

Also transparency issue raised in vertical IPs is another import factor to improve in order to enhance the effectiveness of policy. Colombian government should manage selection process clear and fair that an industry which does hold comparative advantage in global

economy or industry with high potential of building competitiveness could receive benefit from the policy. This will be reflected in the evolution of Product Space map later.

Lastly, a smooth transition between old and new policy is another factor that cannot be overlooked. It promotes policy effectiveness and help producers in industries to use IPs as a method of developing their firm. This will lead to development of whole industry and further development of export of Colombia.

References

ACEMOGLU, D., G. GANCIA and F. ZILIBOTTI (2010), “Competing Engines of Growth: Innovation and Standardization”, Journal of Economic Theory.

ADAMS, F. G. and I. DAVIS (1994), “The Role of Policy in Economic Development: comparisons of the East and Southeast Asian and Latin American experience”, Asian-Pacific Economic Literature, 8(1), 8-26.

BALASSA, B. (1977), “'Revealed' Comparative Advantage Revisited: An Analysis of Relative Export Shares of the Industrial Countries, 1953-1971”, The Manchester School of Economic and Social Studies, 45(4), 327- 344.

CALDERON, C. and L. SERVEN (2010), “Infrastructure in Latin America”, The World Bank.

ECLAC (2009), “Theory and Practice of Industrial Policy. Evidence from the Latin American Experience”.

DEVLIN, R. and MOGUILLANSKI, G. (2012), "What's New in the New Industrial Policy in Latin America?", The World Bank Development Economics Office of the Chief Economist , Policy Research Working Paper 6191

EDWARDS, S. (1994), “Trade and Industrial Policy Reform in Latin America”, National Bureau of Economic Research Working Paper Series, No. 4772.

HAUSMANN, R. and B. KLINGER (2006), “Structural Transformation and Patterns of Comparative Advantage in the Product Space”, Center for International Development at Harvad University, CID working paper, no. 128.

_____(2007), “The Structure of the Product Space and the Evolution of Comparative Advantage”, Center for International

Development at Harvad University CID working paper ,no.146
_____(2008) "Achieving Export-Led Growth in Colombia", Center for International Development at Harvad University, CID. working paper No. 182
HAUSMANN, R., J. HWANG and D. RODRIK (2007), "What You Export Matters", Journal of Economic Growth, 12(1), 1-25.
HAUSMANN, R. and D. RODRIK (2003), "Economic development as self-discovery", Journal of Development Economics, 72, 603-633.
HIDALGO, C. A., B. KLINGER, A.L. BARABASI and R. HAUSMANN (2007), "The Product Space Conditions the Development of Nations", Science, 317(5837), 482 - 487.
HIDALGO, A. C. and R. HAUSMANN (2009), "The building blocks of economic complexity", Proceedings of the National Academy of Sciences, 106(26), 10570 - 10575.
HUMMELS, D. and P. KLENOW (2005), "The Variety and Quality of a Nation's Exports", American Economic Review, 95(3), 704-723.
MELENDEZ, M. and PERRY, G. (2010), "Industrial Policies in Colombia", Inter-American Development Bank, IDB working paper seris no. IDB-WP-126
MELO, A.(2001), "Industrial Policy in Latin America and the Caribbean at the Turn of the Century", Inter-American Development Bank, Research Development Working paper seris ; 459
PERES, W. (2005), "El (lento) Retorno de las Políticas Industriales en América Latina y el Caribe", ECLAC, Serie Desarrollo productivo No.166
_____ and PRIMI, A. (2009), "Theory and Practice of Industrial Policy. Evidence from the Latin American Experience", ECLAC, Serie Desarrollo productivo No.187
SOLIMANO, A. and R. SOTO (2005), "Economic growth in Latin America in the late 20th century: Evidence and interpretation", ECLAC.

Appendix

Table 2. 1975 Colombia top 15 exports(value) share and RCA

	Code	Name	RCA	Share	Value
1	711	Green & roasted coffee & coffee substitutes	78.67	45.28%	783,312,000
2	2631	Raw cotton	10.88	5.61%	96,969,000
3	573	Fresh or dried banana & plantains	30.79	5.12%	88,550,000
4	612	Refined sugar	6.23	3.81%	65,956,000
5	6673	Not mounted precious stones	28.76	2.38%	41,223,000
6	2927	Flora	23.66	1.77%	30,589,000
7	11	Live bovines	7.64	1.48%	25,564,000
8	6513	Cotton yarn	9.62	1.47%	25,426,000
9	611	Raw sugar beet & cane	2.06	1.34%	23,157,000
10	111	Bovine meat	2.81	1.16%	20,019,000
11	422	Semi or wholly milled rice	4.45	1.11%	19,267,000
12	6521	Unbleached cotton woven fabrics	8.3	0.95%	16,385,000
13	360	Fresh, chilled, frozen or salted crustaceans & molluscs	3.74	0.80%	13,909,000
14	6612	Cement	5.01	0.78%	13,575,000
15	542	Dried or shelled legumes	7.7	0.65%	11,240,000
Total trade value				1,560,615,000	

Table 3. 1975 Mexico top 15 exports(value) share and RCA

	Code	Name	RCA	Share	Value
1	3330	Crude petroleum	0.56	8.54%	387,236,000
2	711	Green & roasted coffee & coffee substitutes	7.6	4.37%	198,387,000
3	2631	Raw cotton	8.05	4.14%	187,944,000
4	7649	Parts of telecom & sound recording equipment	97.9	4.01%	181,765,000
5	9310	Unclassified transactions	4.18	3.96%	179,487,000
6	360	Fresh, chilled, frozen or salted crustaceans & molluscs	17.76	3.82%	173,273,000
7	6811	Unwrought silver	17.4	3.31%	149,932,000
8	2741	Other Sulphurs	26.06	1.75%	79,174,000
9	611	Raw sugar beet & cane	2.67	1.74%	78,809,000
10	544	Fresh or chilled tomatoes	19.69	1.57%	71,007,000
11	8960	Works of art	7.8	1.35%	61,378,000
12	2785	Quartz metal family	33.98	1.21%	54,678,000
13	7512	Calculating & ticketing machines	6.16	1.18%	53,657,000
14	2875	Zinc	10.1	1.13%	51,316,000
15	545	Other fresh or chilled vegetables	6.43	1.06%	48,085,000
Total trade value				3,844,609,000	

Table 4. 1975 Brazil top 15 exports(value) share and RCA

	Code	Name	RCA	Share	Value
1	711	Green & roasted coffee & coffee substitutes	22.34	12.86%	1,225,978,000
2	611	Raw sugar beet & cane	13.69	8.91%	849,965,000
3	2222	Soya beans	16.43	8.14%	775,990,000
4	612	Refined sugar	9.52	5.82%	555,448,000
5	813	Oilcake	17.83	4.50%	429,116,000
6	721	Raw & roasted cocoa beans	11.97	2.43%	231,383,000
7	8510	Footwear	3.27	1.76%	167,699,000
8	440	Unmilled maize	2.04	1.71%	163,220,000
9	9310	Unclassified transactions	1.34	1.27%	120,966,000
10	712	Coffee extracts, essences or concentrates	28.62	1.18%	112,457,000
11	2631	Raw cotton	1.93	1.00%	94,976,000
12	585	Fruit or vegetable juices	13.5	0.99%	94,655,000
13	4232	Soya bean oil	8.23	0.97%	92,883,000
14	3330	Crude petroleum	0.06	0.95%	90,120,000
15	7810	Cars	0.32	0.93%	89,024,000
Total trade value				7,628,929,000	

Table 5. 2010 Mexico top 15 exports(value) share and RCA

	Code	Name	RCA	Share	Value
1	3330	Crude petroleum	1.43	11.45%	31,992,887,167
2	7810	Cars	2.07	7.68%	21,457,748,085
3	7611	Color T.V.	9.35	6.18%	17,276,931,987
4	7849	Other vehicles parts	2.44	4.53%	12,655,083,651
5	7821	Trucks & vans	6.1	4.17%	11,645,337,194
6	7523	CPUs	10.12	4.00%	11,170,442,544
7	7643	Television & radio transmitters	3.48	3.46%	9,656,071,230
8	9310	Unclassified transactions	0	2.51%	7,025,171,540
9	7731	Electric wire	3.94	2.22%	6,215,290,249
10	7721	Switchboards, relays & fuses	2.11	2.17%	6,074,927,623
11	9710	Gold, non-monetary	1.63	2.03%	5,668,355,001
12	8720	Medical instruments N.E.S.	3.81	1.94%	5,418,383,933
13	8211	Chairs & seats	4.15	1.53%	4,268,889,719
14	3345	Lubricating petroleum oils N.E.S.	0.37	1.50%	4,178,858,773
15	7832	Tractors for semi-trailers	9.87	1.16%	3,247,886,697
Total trade value					

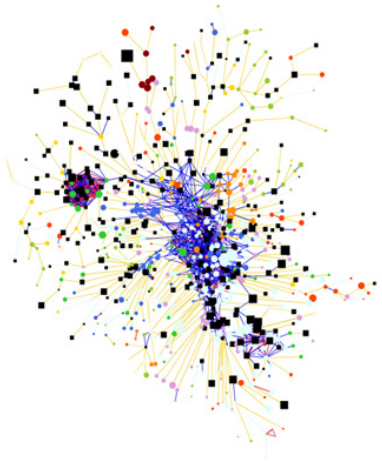
Table 6. 2010 Brazil top 15 exports(value) share and RCA

	Code	Name	RCA	Share	Value
1	2815	Not agglomerated iron ore	18.12	13.58%	27,339,601,514
2	3330	Crude petroleum	1.16	9.36%	18,836,748,662
3	2222	Soya beans	19.57	5.72%	11,519,073,985
4	611	Raw sugar beet & cane	34.76	3.85%	7,756,300,727
5	2816	Agglomerated iron ore	24.67	3.58%	7,213,280,784
6	114	Poultry meat	19.61	2.95%	5,928,423,856
7	2517	Chemical wood pulp, soda or sulphate	12.75	2.62%	5,272,008,407
8	711	Green & roasted coffee & coffee substitutes	14.71	2.40%	4,831,639,301
9	813	Oilcake	11.88	2.31%	4,645,381,645
10	7810	Cars	0.56	2.08%	4,191,082,346
11	7849	Other vehicles parts	0.8	1.50%	3,018,729,693
12	7924	Aircrafts of more than 15 tons	2.16	1.49%	3,003,895,183
13	111	Bovine meat	7.1	1.48%	2,981,674,321
14	612	Refined sugar	14.25	1.34%	2,704,157,641
15	9310	Unclassified transactions	0	1.33%	2,671,258,636
Total trade value					

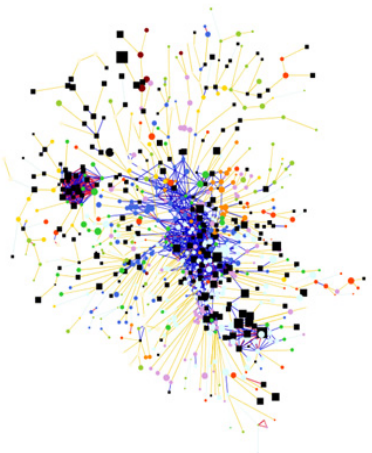
Table 7. 2010 Colombia top 15 exports(value) share and RCA

	Code	Name	RCA	Share	Value
1	3330	Crude petroleum	3.93	31.91%	12,227,006,663
2	3222	Other coal	21.3	14.93%	5,722,083,283
3	3345	Lubricating petroleum oils N.E.S.	1.22	5.03%	1,926,698,622
4	711	Green & roasted coffee & coffee substitutes	28.81	4.71%	1,804,913,994
5	573	Fresh or dried banana & plantains	49.95	4.14%	1,586,558,641
6	9710	Gold, non-monetary	2.86	3.60%	1,381,503,469
7	2927	Flora	44.45	2.49%	952,877,162
8	6716	Ferro-alloys	12.1	2.31%	884,606,164
9	3232	Coke & semi-coke of coal	19.02	1.17%	449,122,463
10	9310	Unclassified transactions	0	1.17%	447,165,457
11	5417	Medicaments	0.44	1.01%	386,865,328
12	5530	Perfumery & cosmetics	2.15	0.94%	361,117,712
13	5834	Polyvinyl chloride	5.8	0.92%	352,478,388
14	612	Refined sugar	9.08	0.86%	328,625,219
15	712	Coffee extracts, essences or concentrates	18.4	0.68%	261,164,628
Total trade value					

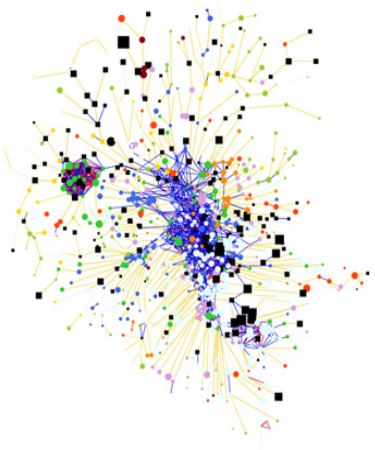
Figure 9. Evolution of Product Space Map of Mexico (1975-2010)



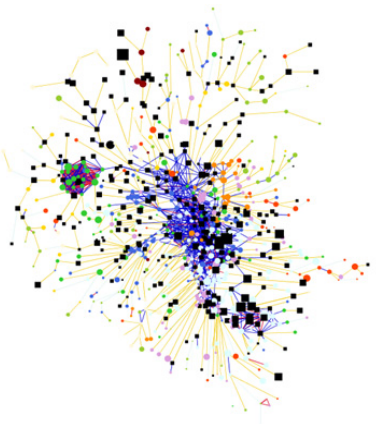
1975



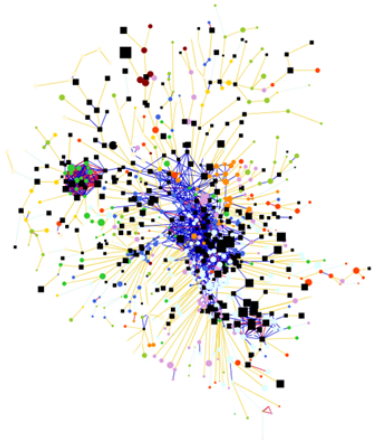
1980



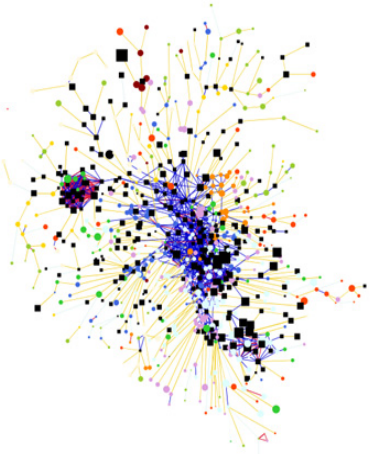
1985



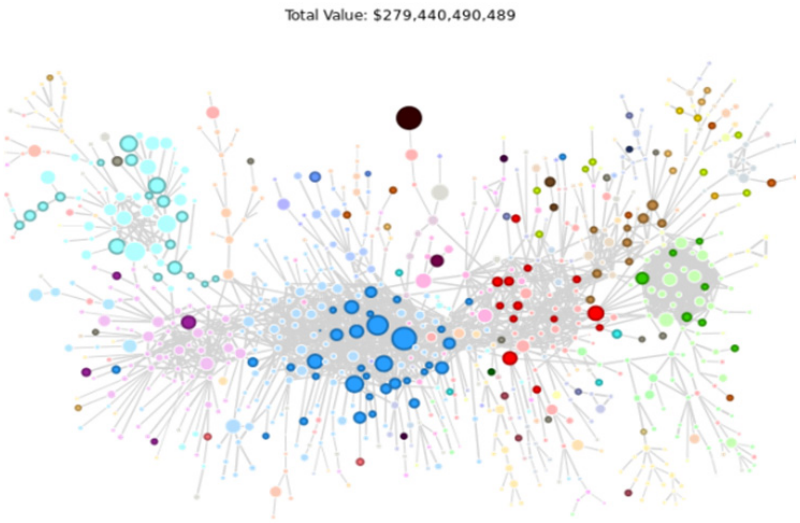
1990



1995



2000

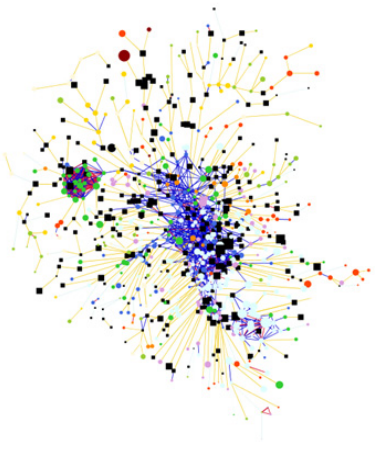


2010

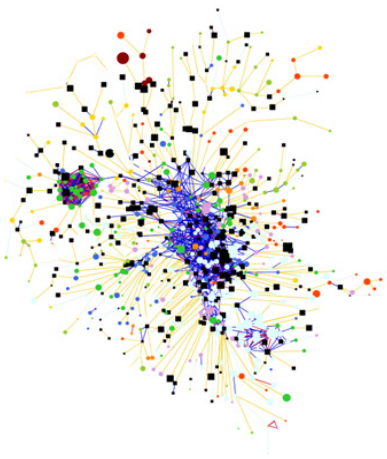
Figure 10. Evolution of Product Space Map of Brazil (1975-2010)

1975

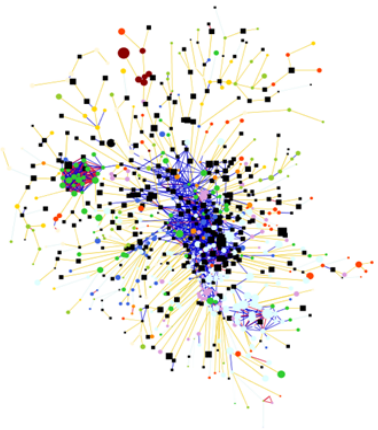
1980



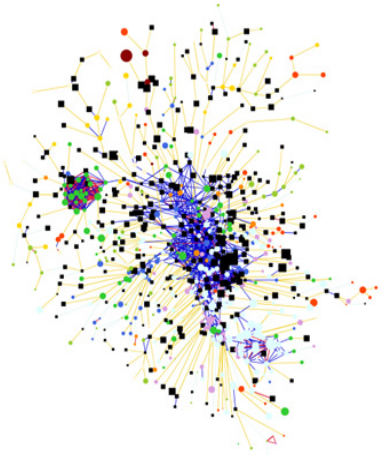
1985



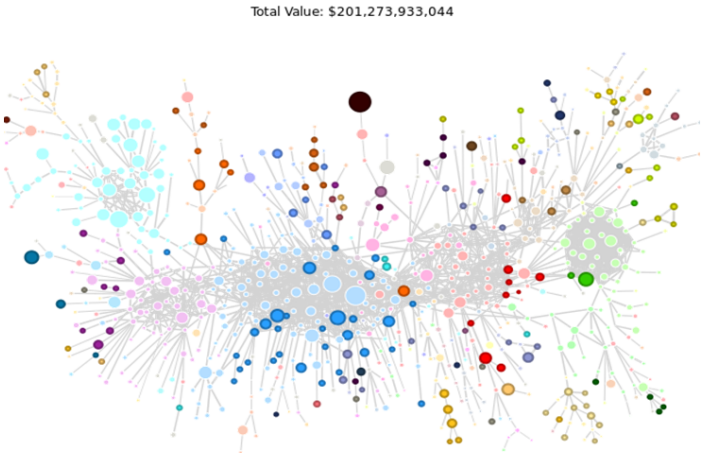
1990



1995

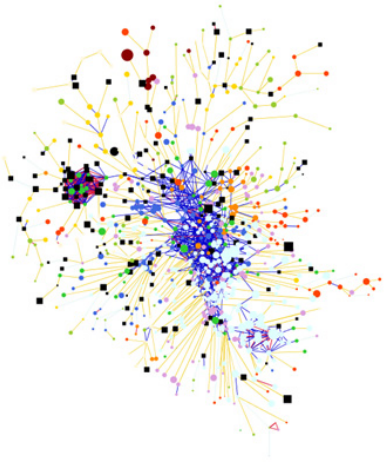


2000

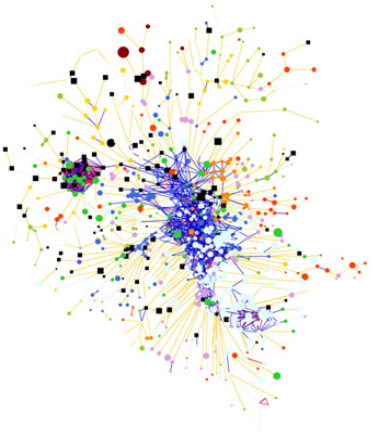


2010

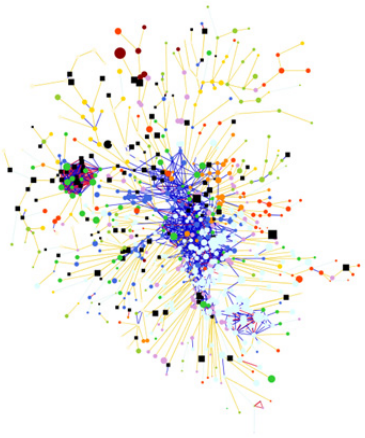
Figure 11. Evolution of Product Space Map of Colombia (1975-2010)



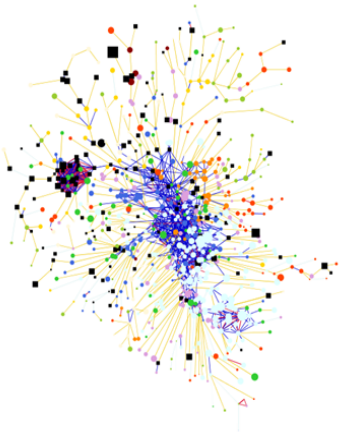
1975



1980

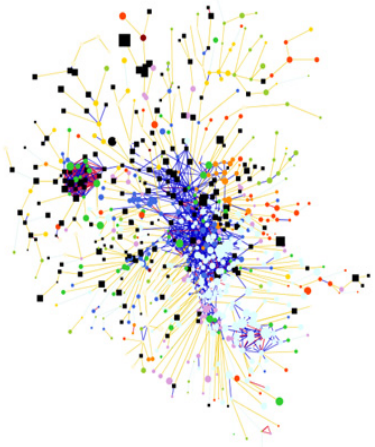


1980

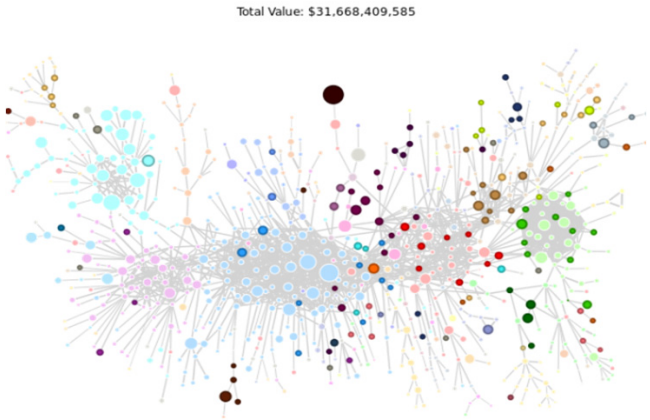


1985

1995



2000



2010

Table 8. Policy tools for Industrial Policies in LACs (1990s)

1. Export Promotion Policies	1.1. Financial Incentives	a) Credit Provision
		b) Credit insurance Schmes
		c) Out right grants
	1.2. Fiscal Incentives	a) Tax refund schemes
		b) Drawback shemes
		c) Temporary admission schemes
		d) Export processing zones (EPC) and Trading companies
2. Fiscal and Financial Incentives to Production and Investment	2.1. Horizontal Provision of credit	
	2.2. Non horizontal Credit Policies	
	2.3. Fiscal incentives	a) Tax incentives
		b) Subsidies
3. Incentives to pproductivity growth and competitiveness	3.1 Fostering the Integration of production chain	
	3.2 Policies to promote technological Modernization	
	3.3 Policies to protect and promote competition	
	3.4 Fostering private-sector investment in human capital	
4. Policies to promote SME Development	4.1 Constraints Faced by SMEs	
	4.2 Policies to enhance SMEs competitiveness	

Source: MELO, A.(2001), "Industrial Policy in Latin America and the Caribbean at the Turn of the Century", Inter-American Development Bank, Research Development Working paper seris ; 459

국문초록

홍 민 희

학과 및 전공: 국제학과 국제지역학

서울대학교 국제대학원

본 연구는 콜롬비아의 저성장 및 경제발전의 뒤쳐짐 현상에 주목하였다. 1980년도부터 현재까지 콜롬비아는 상위 5위의 1인당 국민소득을 기록해왔으나 상위 4개국(멕시코, 칠레, 아르헨티나, 브라질)과의 격차가 점점 심해져 상위소득국가와 하위소득국가로 양분되는 양상이 나타났다.

콜롬비아가 상위 4개국의 발전 양상에 편입되지 못한 이유에 대한 규명은 다양한 방법에 의해 가능하다. 본 연구는 하우스만의 프로덕트 스페이스 맵을 통하여 1975년부터 2010년까지 콜롬비아의 프로덕트 스페이스 맵과 브라질, 멕시코의 사례의 차이점을 분석한다. 수출 품목의 기술적 숙련도와 수출 규모의 발전양상 비교를 통해 콜롬비아가 처한 문제를 1차적으로 분석하였다.

또한 콜롬비아의 산업정책을 분석하여 발전을 저해하는 요인을 조사하였다. 1950년부터 충실하게 산업정책을 수행해왔던 국가임에

도 불구하고 발전이 제한되는 이유를 규명하며 프로덕트 스페이스 맵이 단편적인 생산 품목의 양상만을 다루는 것에 비해 심도 있게 접근 하고자 하였다.

위의 과정을 통해 콜롬비아의 수출 품목 변화 양상을 모범 사례 국가들과 비교하여 국가가 처한 상황에 대한 객관적인 인식 및 수출품목 및 규모 차원의 문제 진단이 가능하다. 또한 정책 분석을 통하여 오랜 산업정책 역사에서 콜롬비아가 극복하지 못하는 과제 분석에 기여하고자 하였다.

주제어: 프로덕트 스페이스 맵, 산업 정책, 콜롬비아 경제 성장
학번: 2011-22406