PRODUCTION SEGMENTATION: ECONOMIC, SOCIAL AND INSTITUTIONAL CHANGE [1]

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INTRODUCTION

Industry in the developed countries is increasingly organized in the form of production modules and part of the manufacturing capacity is decentralized toward suppliers that, in turn, place some productive segments in emerging economies[3].

With the processes of fragmentation of production[4] (which gathered strength since the 1980s although they began in the previous decade) the international trade in intermediate products acquired rapid growth. This also corresponds to the industrialization strategies adopted by emerging economies.

Some implications from this, in terms of international trade, are the following: 1) emerging economies' imports of manufactured goods are heavily weighted toward intermediate manufactured goods; subsequently, they export a high percentage of final products, particularly to the markets of the developed countries. In general terms, the intermediate products have a higher technological content than the final product. 2) There is a well defined international division of labor in the production of intermediate goods, parts, and components. This generates regional or global international networks where each network takes advantage of a combination of different benefits offered by countries, production sites, and companies. 3) Many emerging economies modify the characteristics of their international trade from a model based on their comparative advantages to another in which they export differentiated goods and services, benefitting from economies of scale to offer growing returns.

Finally, and tied to the two previous ideas, a central premise is that fundamental differences exist in terms of the stage or segment in which each country is incorporated, and that this has micro and macroeconomic implications, since it affects economic growth, foreign trade, investment, employment, foreign investment, productivity, technological development, the structure of the comparative advantages, etc. The combination of several factors that come into play internationally leads to the danger of emerging economies being left without clear industrial strategies, trapped in the assembly stages, with low technological levels and reduced value added. As a method of analysis, we will conduct our study based on international trade using the United Nations Comtrade SITC and BEC Rev. 3 data bases.

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3 For simplicity, unless specified to the contrary, the emerging economies will refer to countries in the following sub-sectors as a whole: to) large countries: China, India, Russia; b) Southeast Asian nations: Hong Kong, Indonesia, Malaysia, Taiwan, Philippines, Republic of Korea, Singapore, and Thailand; c) Eastern Europe: Albania, Bosnia Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Rumania, Serbia, Montenegro, Slovakia, Slovenia; d) Latin American countries: Mexico, Brazil, Argentina.

[4] We will use the concepts of segmentation or fragmentation of production indistinctly.

II. SOME LANDMARKS IN THE EVOLUTION OF SEGMENTATION

The segmentation of manufacturing production had its beginnings in the maquiladora industry of Mexico in the mid-1970s, which provided U.S. industry with unskilled labor and increased that country's industrial competitiveness. A similar process -in this same period of time- took place in Southeast Asia, where the productive fragmentation of Japanese manufacturing companies implied investments or subcontracting and offshoring in the neighboring countries especially in the stages of labor intensive production. Taiwan, South Korea, Singapore, and Hong Kong are currently undertaking investments or offshoring activities in countries with lower production costs.

At the present time one of the greatest recipients of such activities is China. This country follows an economic model that implies huge imports of intermediate products for their re-elaboration or assembly. Thus, for 2008, 72% of China's imports of manufactured goods corresponded to intermediate goods. In other emerging economies the corresponding percentage was 80% for Malaysia, 82% for Thailand, 84% for the Philippines, and 66% for Mexico.

At present the Eastern Europe countries are also important venues for manufacturing activities based, in this case, on investments from Western Europe. Important processes of industrial relocation are also underway from Europe toward North Africa and other countries of the Mediterranean Basin, where major regional networks are developing (see Table 4). In all cases, these processes are having a decisive impact on industrial competitiveness of the countries where segmentation is underway.

Nowadays, the processes of productive fragmentation are extending to high tech manufacturing and tertiary activities, such as company functions, high tech services, financial operations, accounting and juridical analysis, management and technical services, etc. All of these are activities intensive in intellectual labor and are high value added. The segmentation of the primary sectors is a slower process but is currently in expansion.

The parts and components that form part of the production process of final and semi-finished goods and products are manufactured in production units located in different countries. These are intermediate products that, in many cases, benefit from economies of scale and which can be combined in the production of a great variety of final products. These developments have led to numerous studies in international trade that discuss the exchange of unfinished goods.

With productive globalization, the international trade in intermediate goods and services in relation to manufactured products as a whole was 55% in 1998 and 57% in 2008 (see Table 5). The data in tables 1 and 2 show the importance of the international commercial linkages derived from the globalization of manufacturing and intermediate goods. Table 3 illustrates the importance of the linkages created by international trade in intermediate goods. It is based on whether such products are earmarked for advanced or emerging economies. It should be noted that the fragmentation of manufacturing production is not exclusively confined to the relation between developed and emerging economies. These processes are quantitatively more important among the developed countries.

Table 1. Matrix of intra-trade of manufactured goods by major exporters, 2008 (millions of dollars)

	Exports																		
Imports	**China**	**Germany**	**U.S.**	**Japan**	**France**	**Italy**	**Belgium**	**H.K.**	**U.K.**	**NL**	**Singapore**	**Canada**	**MX**	**Switzerland**	**Sweden**	**Total M from selected countries**	**Imports from ROW**	**Total M**	**% M from selected countries/ World M**
China		45,149	46,485	104,099	11,460	8,835	3,777	166,936	6,365	3,717	25,077	3,586	884	5,055	3,544	434,968	298,426	733,395	59%
Germany	56,727		47,480	22,333	69,131	56,952	72,431	11,957	35,186	61,807	5,792	2,195	4,782	35,028	13,719	495,519	279,989	775,508	64%
U.S.	242,459	95,941		129,699	28,550	27,620	18,804	45,876	42,404	13,544	22,991	170,428	172,958	18,216	9,723	1,039,213	380,826	1,420,039	73%
Japan	100,352	16,450	44,757		6,353	5,330	2,557	15,275	5,394	2,895	13,073	1,226	891	5,735	1,559	221,846	119,361	341,207	65%
France	22,319	113,508	25,464	8,483		50,685	59,587	4,804	22,567	27,105	3,055	2,092	438	15,017	6,943	362,068	126,910	488,978	74%
Italy	25,301	72,248	10,767	6,511	35,920		19,157	4,319	14,094	17,605	419	748	286	13,517	4,767	225,660	115,488	341,148	66%
Belgium	13,862	58,875	25,299	7,704	30,576	12,285		2,120	17,682	29,103	1,844	1,814	552	3,473	6,540	211,728	117,386	329,115	64%
H.K.	178,862	5,720	18,235	32,823	3,263	4,489	2,336		5,171	1,175	23,802	616	290	4,596	474	281,852	67,012	348,864	81%
U.K.	34,518	79,159	40,587	13,512	33,307	22,769	27,401	9,336		26,023	4,072	5,416	847	8,759	7,433	313,140	117,700	430,840	73%
Netherlands	42,714	64,941	30,665	19,620	16,017	10,423	35,322	5,766	16,965		5,365	1,096	1,798	5,370	6,279	262,341	19,824	282,165	93%
Singapore	29,706	7,073	24,963	18,883	5,829	2,112	754	6,874	4,203	2,093		587	328	2,021	1,009	106,435	98,363	204,799	52%
Canada	20,375	8,410	204,360	10,399	3,151	2,953	2,677	3,430	4,303	1,294	1,904		5,326	2,084	1,417	272,083	29,363	301,446	90%
Mexico	13,209	9,703	111,949	9,353	2,666	3,423	1,148	1,732	1,364	896	1,294	3,492		1,164	734	162,128	77,182	239,310	68%
Switzerland	3,859	45,335	10,504	2,020	13,074	17,424	5,055	2,232	7,009	4,632	558	664	108		1,391	113,866	32,119	145,985	78%
Sweden	4,920	24,684	4,140	1,812	7,016	5,032	5,786	1,031	7,341	6,265	122	359	80	1,615		70,201	45,495	115,696	61%
Total X from selected countries	789,182	647,197	645,653	387,250	266,314	230,332	256,792	281,690	190,048	198,154	109,368	194,319	189,568	121,649	65,533				
X from ROW	540,076	535,386	331,416	305,899	193,103	213,735	101,585	66,191	130,503	101,562	127,169	20,710	22,442	57,441	71,474				
Total X	1,329,258	1,182,583	977,070	693,149	459,417	444,068	358,378	347,881	320,551	299,715	236,537	215,029	212,011	179,090	137,007				
% X from selected countries/ World X	59%	55%	66%	56%	58%	52%	72%	81%	59%	66%	46%	90%	89%	68%	48%				
Trade balance of manufactured goods	595,863	407,075	-442,969	351,942	-29,561	102,919	29,263	-983	-110,289	17,551	31,739	-86,417	-27,300	33,105	21,311				

Source: Project Team´s computation, based on UN, COMTRADE, SITC Rev.3. Simbology: X= Exports; M= Imports; %= Porcentage, ROW=Rest of the world

Table 2. Matrix of intra-trade of Intermediate manufactured goods, by major exporters , 2008 (Billion dollars)

	Exports																		
Imports	**China**	**Germany**	**U.S.**	**Japan**	**France**	**Italy**	**Belgium**	**H.K.**	**U.K.**	**NL**	**Singapore**	**Canada**	**MX**	**Switzerland**	**Sweden**	**Total M from selected countries**	**Imports from ROW**	**Total M**	**% M from selected countries/ World M**
China		22,454	29,951	77,701	5,164	5,010	2,705	137,403	4,232	2,580	20,758	3,565	698	2,519	2,198	316,937	209,391	526,329	60%
Germany	19,669		25,890	11,783	44,006	36,473	45,315	2,756	22,949	39,842	4,851	1,308	1,068	21,563	9,525	286,998	194,238	481,236	60%
U.S.	74,423	45,365		54,485	14,691	13,721	11,169	10,577	21,732	8,741	15,341	110,851	76,884	7,746	4,947	470,672	176,507	647,180	73%
Japan	45,147	7,991	26,550		2,892	1,690	1,546	6,322	3,269	1,638	10,007	1,726	593	3,149	869	113,388	94,509	207,897	55%
France	5,830	59,189	16,188	3,333		28,718	34,439	1,319	12,152	13,617	2,731	1,642	376	7,457	3,898	190,890	76,212	267,103	71%
Italy	12,675	38,950	7,345	2,473	19,992		12,168	941	6,928	9,711	316	832	305	8,375	3,128	124,137	78,050	202,187	61%
Belgium	7,580	25,949	16,712	3,931	15,771	5,517		1,012	7,647	19,051	1,534	578	568	1,624	4,892	112,367	65,446	177,813	63%
H.K.	86,062	3,443	11,649	22,183	1,095	2,231	1,676		3,317	659	20,346	774	124	2,222	281	156,061	62,507	218,568	71%
U.K.	10,198	36,576	25,374	8,305	19,180	10,874	13,142	2,856		13,041	3,158	6,588	1,040	4,259	4,864	159,455	45,844	205,299	78%
NL	13,018	40,470	16,106	10,639	8,363	5,045	21,589	1,236	8,368		3,798	1,411	577	2,248	5,037	137,906	11,893	149,799	92%
Singapore	14,029	4,590	17,502	12,399	3,026	1,262	569	4,148	2,961	1,487		485	183	881	730	64,253	84,771	149,025	43%
Canada	7,029	3,185	113,036	3,655	1,455	1,531	766	659	2,425	747	790		1,727	1,140	587	138,732	21,835	160,567	86%
MX	6,342	5,824	81,976	6,492	1,168	1,949	735	847	727	603	542	2,781		538	446	110,971	48,121	159,092	70%
Switzerland	1,098	25,053	13,148	1,304	5,619	7,165	2,475	1,711	2,815	2,383	484	636	514		833	65,239	10,542	75,781	86%
Sweden	1,829	14,029	1,889	689	5,082	2,672	3,351	208	4,390	3,270	94	179	61	841		38,584	28,517	67,100	58%
Total X from selected countries	304,929	333,067	403,317	219,372	147,503	123,859	151,645	171,995	103,912	117,370	84,750	133,355	84,718	64,563	42,235				
X from ROW	277,771	287,940	183,213	165,548	93,957	113,927	53,251	36,761	60,352	52,982	94,999	13,355	10,559	25,741	37,346				
Total X	582,700	621,007	586,530	384,920	241,460	237,787	204,896	208,756	164,264	170,353	179,749	146,710	95,277	90,303	79,581				
% X from selected countries/ World X	52%	54%	69%	57%	61%	52%	74%	82%	63%	69%	47%	91%	89%	71%	53%				
Trade balance of manufactured goods	56,371	139,771	-60,650	177,023	-25,643	35,600	27,083	-9,812	-41,035	20,554	30,724	-13,857	-63,815	14,522	12,481				

Source: Project Team´s computation, based on UN, COMTRADE, SITC Rev.3. Simbology: X= Exports; M= Imports; %= Porcentage, ROW=Rest of the world

Table (3.1): Trade of OECD advanced economies by destination							
Exports of intermediate goods (%), 2008							
World	OECD Advanced (selections*)	Eastern Europe	China	Mexico	Russia	Rest of emerging countries ***	Rest of the World
100%	61%	6%	5%	3%	1%	11%	12%
Imports of intermediate goods (%), 2008							
World	OECD Advanced (selections*)	Eastern Europe	China	Mexico	Russia	Rest of emerging countries ***	Rest of the World
100%	65.5%	5.1%	9.2%	2.7%	1.3%	8.9%	7.3%

Table (3.2): Trade of OECD emerging economies by destination							
Exports of intermediate goods (%), 2008							
World	OECD Advanced (selections*)	Eastern Europe	China	Mexico	Russia	Rest of emerging countries ***	Rest of the World
100%	36.9%	1.2%	13.2%	0.7%	0.9%	32.4%	14.6%
Imports of intermediate goods (%), 2008							
World	OECD Advanced (selections*)	Eastern Europe	China	Mexico	Russia	Rest of emerging countries ***	Rest of the World
100%	42.8%	0.4%	16.0%	0.2%	0.8%	33.7%	6.0%

* OECD Advanced (selections): Australia, Austria, Belgium, Canada, Denmark, Finland, Germany, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States.
** Eastern Europe : Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Rep., Hungary, Poland, Rumania, Serbia and Montenegro, Slovakia, Slovenia.
*** Rest of emerging countries: Hong Kong, India, Indonesia, Malaysia, Taiwan, Philippines, Rep. of Korea, Singapore, Thailand.
Source: Project Team´s computation, based on UN, COMTRADE, BEC and SITC Rev.3.

III. SEGMENTATION AND NEW THEORIES OF INTERNATIONAL TRADE

New theories of the international trade have been developed to take the phenomena of fragmentation into account. They not only consider the final product but also to the different productive stages that result in international trade in intermediate goods. The main focuses of these new theories are the following:

- A first line of analysis is the traditional theory of comparative advantages based on the relative costs of production under conditions of autarchy. The theories of the technological gap and the relative differences in factor prices have been applied to segments even though these theories were developed for the international trade in finished goods (Bhagwati et. al. 2004. Gregory Mankiw et. al. 2006).

- A second theoretical line analyzes the internalization of productive activities within and beyond the limits of the company. In this focus, the transaction costs are what determine these limits. This theory is grounded in Coase, 1937, Williamson, 1975, etc. The companies set their limits seeking to internalize their central activities and, at the same time, they make decisions on placing segments taking into account their specific assets and production costs in different countries and production sites.

- A third line of analysis is agglomeration theory. It is an extension of the theory of international trade under conditions of imperfect markets, which incorporates the economies of scale external to the company. (Krugman 1991, 1995; Fujita, Krugman and Venables, 2001). The industry's economies of scale do not necessarily depend on initial conditions of autarchy and the countries or regions can have economies of agglomeration by chance. The prediction of these models is that international industrial decentralization can imply the development of activities with growing returns in only a very few emerging economies. The consolidation of the latter will hinder the establishment of new industrial centers in countries that lack the flexibility necessary to rapidly change and adapt to new conditions of industrialization.

- A fourth line of analysis is the theory of fragmentation (Feenstra, 1998; Jones and Kierzkowski, 1990; Ardnt and Kierzkowski, 2001; Deardorff, 2001; Cheng and Kierzkowski, 2001; Deardorff, 2001). This focus emphasizes the existence of economic forces that push toward industrial decentralization in developed countries and the importance of the costs of "connection services" between productive stages. The fragmentation is beneficial when the cost of those "connection services" that unify the different productive localities is sufficiently low. These costs, which include transportation, telecommunications, and coordination between activities that are geographically distant, are being reduced by technological advances. This reduction encourages industrial dispersion although at the same time the "connection services" present very important economies of scale favoring the concentration of production. As is the case with the theory of agglomeration, the conclusion reached is that globalization and economies of scale determine situations in which certain countries benefit significantly from the segmentation processes, while others are excluded. The different theoretical lines have important coincidences in some concepts and conclusions, despite differing in the causal focus that they establish.

- The theoretical line that I apply in my studies includes many of the previously mentioned concepts. It is based on the recognition offered by the new theories on international trade and industrial organization in relation to the importance of growing returns that emerge from static economies of scale, from agglomeration, from learning, and from the externalities of knowledge. Not all economic activities have same returns. They are sustained not only in the fundamental importance of technical change but also consider as a central question the rapid obsolescence of technological and organizational knowledge and the very unequal distribution of knowledge, especially cross-border knowledge, between countries. In the following section we will develop this focus.

IV. CAUSAL FACTORS OF THE SEGMENTATION

Three central causal factors explain the fragmentation and re-localization of the previously vertically integrated production: a) increases in production costs and the resulting modular organization in the original sites of manufacturing activity; b) technological advances implying drastic falls in costs of the international transactions;

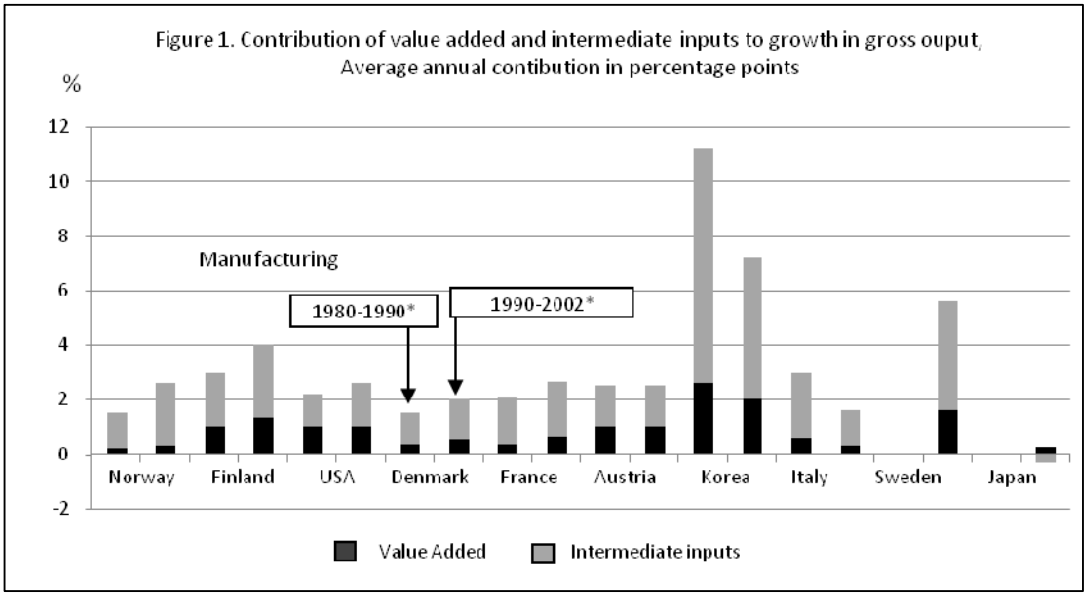
c) correlation between the organization in multinational corporation networks and the current industrialization strategies in emerging economies.

Innovation processes today represent a new causal factor behind segmentation. This involves productions of new or innovated goods, parts, components or intangibles that evidently, were not previously a part of an integrated production chain.

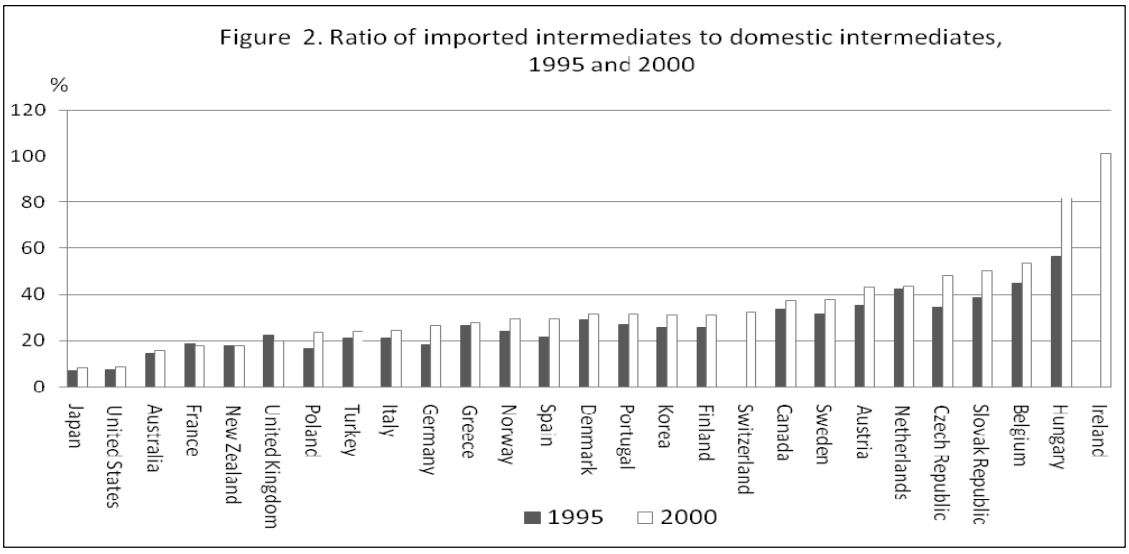
A) COSTS OF PRODUCTION, MODULARIZATION, AND OBSOLESCENCE

Manufacturing is an activity with growing returns. How, then, can its geographical dispersion be explained? The fragmentation can be attributed to important increases in costs in companies or centers of national production (for example, on a company level due to the lack of specific knowledge, different fixed costs of each segment, degree of obsolescence, increases in wages costs, or congestion costs on the level of traditional production sites). The vertically integrated chain of manufacturing production is comprised of heterogeneous activities in terms of their requirements for productive and technological inputs. The increases in costs and obsolescence can occur in some productive segments and not in others. Separate management in each stage increases total micro-economic efficiency and represents the first step toward a modular type domestic organization and its subsequent national and international dispersion (Sturgeon and Florida, 2003; Curry and Kenney, 2003; Leachman and Leachman, 2003). Industry in countries such as the United States and other developed nations is organized under the modality of production modules. The leading companies in these networks are focused on activities involving innovation and design and in the creation, penetration, and defense of the markets for final products. At the same time, manufacturing activity and many business services are transferred toward supplier companies, many of which are large transnational companies. There is a continuous growth in the division of labor among companies.

To illustrate this growth, data are available from the main input-output tables of the most advanced industrialized countries (OECD, 2005). Intermediate products accounted for between half and two-thirds of the growth in production value in the 1990s. Their contribution has increased since 1980 in most of these countries (see figure 1). The segmentation of production is still mainly a national process. The companies are supplied with intermediate products from domestic sources, especially in the large countries. Nevertheless, imported supply has been growing in the past decade (see figure 2).



Note: The contribution of intermediate inputs has increased since the 1980s in Norway, Finland, United States, Denmark and France. In Austria remains the same contribution.
Source: Pilat, D. and A. Wölfl (2005), "Measuring the Interaction Between Manufacturing and Services", *OECD Science, Technology and Industry Working Papers*. 2005/5. OECD Publishing.doi:10.1787/882376471514



Note: *Australia: 1995 and 1999; Canada: 1997 and 2000; Greece: 1995 and 1999; Hungary: 1998 and 2000; Norway: 1995* and 2001; Portugal: 1995 and 1999.
Source: *OECD, Input-Output Tables Database.*STAYING COMPETITIVE IN THE GLOBAL ECONOMY: MOVING UP THE VALUE CHAIN. OECD 2007.

A hypothesis that I presented at the end of the 1970s is based on the rapid obsolescence of modern production as an explanation of modularization (Minian, 1981). In the high tech industries, modern technological developments lead to a rapid automation of manufacturing production. However, in certain segments of the productive chain automation is minimized -where it is technically feasible to do so- in order to diminish the occurrence of the enormous costs implied by obsolescence derived from new technological cycles and innovation. This is an investment option and a technological selection one, which determines the heterogeneity of the production chain, since together with the automated productive stages there are segments with much less technological intensity. Obsolescence has become a central factor of economic life. The obsolescence of knowledge is particularly accelerated under the current conditions of production.

The production modules require separate management and some of them are candidates for national or international relocation based on the differences in production costs and differences in the knowledge required in each stage. The companies in developed countries react to the international competition from nations with low production costs, accelerating the processes of relocation of labor-intensive segments toward the latter. At the same time, the most sophisticated production segments are distributed among the developed countries.

An additional hypothesis is that in the long term, technological progress and its implications for productivity could lead to the complete automation of the entire production chain, slowing or even reversing the relocation of manufacturing activity. In this case, technological progress could become an alternative to globalization (Froëbel, et. al, 1980). However, the globalization of production toward emerging economies has not only not stopped but rather has continued, with increasingly greater strength since new advantages have been accrued from this phenomenon. The growing participation of emerging economies in the global markets allows them to achieve important static economies of scale, learning, and agglomeration, which when tied to the modern technologies transferred by the multinational corporations, allows them to enter the trade in differentiated goods and products with growing returns.

There are additional benefits from the international trade in intermediate products in relation to final products. A much more fine division of labor takes place. The benefits of taking advantage of the factorial and technological differences or the economies of scale increase. In addition, producers obtain a greater variety of specifications of intermediate goods, which allows them to multiply the technical and economic options at their disposal. This is particularly important for innovation processes, increasing their effectiveness.

B) DRASTIC REDUCTION IN INTERNATIONAL TRANSACTION COSTS

The new technologies drastically reduce communication and transaction costs, market information expenditures and, to a lesser extent, transportation costs. This allows for the international circulation of many intangibles and the tradability of services. All these changes decisively reinforce modalities of segmented organization of production. The differentials in production costs between the advanced and emerging economies and the drastic fall in the costs of conducting international commercial transactions provide for an explosive combination that encourages the relocation of productive segments.

In response to this phenomenon it is necessary to ponder whether geographical proximity continues to be a decisive factor in the placement of production network segments. Different economic studies argue "the death of distance." Multinational corporations (MNC) can control activities from a distance despite the global dispersion of their activities and companies in the networks in which they operate. They operate with geographical dispersion and organizational proximity.

Table 4. Intraregional trade of finished and intermediate manufactured goods, 2008.

Country	Exports from the region: % of total exports		Imports from the region: % of total imports	
	Finished products ****	**Intermediate manufactured goods**	**Finished products ******	**Intermediate manufactured goods**
Mexico *	86%	91%	***53%***	59%
China**	***28%***	***41%***	16%	58%
Hong Kong**	***33%***	78%	84%	70%
Rep. of Korea**	***21%***	56%	18%	60%
Singapore**	***50%***	62%	36%	54%
Malaysia**	***27%***	58%	***40%***	59%
Germany***	69%	70%	21%	72%
USA*	***33%***	***37%***	***57%***	***29%***
Japan**	***21%***	51%	18%	47%
France***	64%	71%	72%	75%
Spain* (2007)**	79%	74%	69%	75%
Italy***	67%	69%	45%	71%
United Kingdom***	62%	60%	60%	66%
Belgium***	76%	79%	73%	73%
Netherlands***	80%	77%	***49%***	64%
Canada*	91%	78%	56%	69%

Source: Project Team´s computation, based on UN, COMTRADE, BEC and SITC Rev.3.
* North America region: USA, Canada, Mexico, Central America y CARICOM (Antigua and Barbuda, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Montserrat, Saint Kitts, Nevis and Anguilla, Saint Lucia, Saint Vicente and the Grenadines, Suriname, Trinidad and Tobago).
** South East region: Japan, China, Rep. of Korea, Hong Kong, Singapore, Malaysia, Indonesia, Philippines, Thailand.
*** Europe region : Albania, Andorra, Austria, Belarus, Belgium, Luxemburg, Bosnia Herzegovina, Bulgaria, Croatia, Czech Rep., Denmark, Estonia, Faroe Isds, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Rep. of Moldova, Romania, Russia, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Macedonia, Ukraine, United Kingdom.
**** Finished product is the difference between manufactured products and intermediate goods. Intermediate products are the sum of semi-finished and parts and components products.

In bold: countries where global market is more important than regional.

However, dispersion comes up against a geographical limit corresponding to transportation costs, tariff and non-tariff barriers, and differences in financial, economic and political risks. Although transportation costs have considerably diminished in the past few years, they have not fallen as drastically as costs involved in processing information. The relation between the value and weight of the product reduces the radius of circulation of physical goods. It can thus be noted that electronic parts and components, which are lighter than auto industry products, have a greater radius of circulation. These costs and risks in many cases create a regional rather than global division of labor, which is what has occurred in Southeast Asia, the Mediterranean Basin, North America, and Western and Eastern Europe. Intermediate goods must

repeatedly cross national borders, in many cases between countries that are in geographical proximity to each other. (See anew table 4).

The Eastern Europe countries also illustrate the importance of geographical proximity in placing production, since despite having wage levels that are higher than those of South Asian nations, they receive a high proportion of direct investments from Western Europe.

C) CORRELATION BETWEEN ORGANIZATION OF INTERNATIONAL NETWORKS AND INDUSTRIALIZATION STRATEGIES IN EMERGING ECONOMIES

Industrialization strategies in emerging economies correlate with the modalities of productive organization in networks of MNC. Intervening in these networks are large multinational companies and a multiplicity of national companies of very different sizes and technological levels. In these networks, the multinational corporations play a central role to the extent that they coordinate the production, distribution, and reallocation of resources in accordance with economic, technical, social, and political changes. The strategic importance of the MNC coordinating production processes that are geographically dispersed is reinforced by the scale of international intra-firm trade and their participation in different forms of investment, mergers, and acquisitions. The organization in networks allows for an increase in micro-economic efficiency by combining multiple advantages of different companies, countries, and production sites. It brings together segments with different capacities on the level of knowledge, innovation, manufacturing, finances, organization, design, and access to markets. This leads to major restructuring in companies that comprise the network in order to adapt to new organization forms.

The relocation of productive segments in branches or companies integrated in the manufacturing network is facilitated by the mobility of factors such as technological and organizational knowledge and other intangibles, which are coupled with relatively immobile local resources (such as unskilled labor). The heterogeneous chain is thus distributed internationally, leading to greater global trade.

The companies in the advanced countries increase their competitiveness through the acquisition of parts and components manufactured in nations with lower production costs. By the same token, the intangible resources that flow to companies in the emerging economies are indispensable inputs for their production to be in accordance with the characteristics of international competition. The industrialization strategies cannot ignore the complementarity of modern production, since the production of goods results from a combination of tangible and intangible inputs coming from different countries. This productive dispersion implies that the trade in complementary resources is an important part of the international trade in manufactured goods.

The emerging economies industrial strategies are in accordance with the evolution of the globalization of production: importing intermediate goods in a much higher percentage than the world average and exporting above all final goods. This modality represents the current form of insertion in the world economy of many of these countries. The industrialization strategy through segmentation makes national production increasingly depend on imported inputs (see table 5). Countries such as

China, India, Russia, and Eastern European nations have developed important localization advantages increasing productivity, reducing unitary labor, creating efficient educational systems that train human capital, developing modern infrastructure, establishing institutions that encourage good investments, and implementing proactive industrial policies. As a result, they have dramatically increased the international supply of goods and services. They enter the international networks, beginning with standardized products and competition via prices, but using scaling strategies directed toward items of higher technological level and greater value added, that is, products with entry barriers. Many emerging economies achieve high savings and investment rates and are large exporters of capital to developed countries. This latter phenomenon is derived from their high trade surpluses. They are not mere export markets for MNC

Country	Table 5. Share of intermediate products in global manufacturing trade.			
	1998		2008	
	X	M	X	M
World	54%		56%	
China	35%	73%	44%	72%
Hong Kong	44%	52%	60%	63%
Indonesia	58%	61%	67%	71%
Malaysia	61%	76%	62%	80%
Mexico	45%	66%	45%	66%
Philippines	72%	83%	71%	84%
Rep. of Korea *	64%	88%	57%	72%
Singapore	52%	63%	76%	73%
Thailand	56%	74%	57%	82%
Canada	57%	58%	67%	52%
France	52%	56%	53%	55%
Germany	52%	55%	53%	62%
Italy	49%	60%	54%	59%
Japan	51%	51%	56%	61%
Spain *	50%	56%	54%	54%
United Kingdom	49%	50%	51%	48%
USA	60%	45%	60%	46%
* Last year available (2007)				
Source: Project Team´s computation, based on UN, COMTRADE, SITC Rev.3. and BEC (Intermediate goods)				

d) INNOVATION AND SEGMENTATION (Intermediate goods not previously produced in vertical integration)

Innovation processes involving intermediate goods are a new source of segmentation that does not have its origin in the separation of production previously integrated vertically. Technical progress that leads to the creation of new parts and components make more complex the organization of the international production networks. In many cases this involves the production of semi-finished standardized parts, components, and products. The electronic and auto industries offer numerous examples of this form of

segmentation. Figure 3 presents different organization modalities in the production of intermediate goods. The second part of the figure includes the case of intermediate goods resulting from innovation.

Figure 3. Organization modalities: models of internal supply, national or international acquisition of intermediate goods.

		National	**International**
	Continuation in the vertically integrated		
I	**Internal supply**	• Vertical Integration in the national firm (insourcing)	• Vertical Integration in the international firm (insourcing-offshoring)
	Intermediate goods previously vertically integrated		
II	**Acquisition (market relations)**	• Acquisition from domestic suppliers (outsourcing)	• Acquisition from international suppliers • Intra or inter industrial trade (offshoring)
	New intermediate goods (resulting from innovation) (No previously produced in vertical integration)		
III	**Internal supply**	• National vertical integration (insourcing)	• International vertical integration + (insourcing-offshoring)
	Without Vertically Integration. New intermediate goods (resulting from innovation)		
IV	**Acquisition (market relations)**	• Acquisition from domestic suppliers (outsourcing)	• Acquisition from international suppliers • Intra or inter industrial trade (offshoring)

Source: Author

The segmentation of production was initially organized with the creation of subsidiaries of multinational corporations in emerging economies to carry out productive processes and functions previously undertaken in the country of origin. The corporations outsourced or subcontracted productive stages in local firms in close coordination with and dependence on the home company. This coordination also implied the transfer of technological, organizational, and design knowledge. These processes continue to this day. However, since the 1990s the number of companies that supply intermediate goods (in many cases they are also multinational corporations) have multiplied and they basically function on the basis of commercial market relations. To the extent that these latter corporations undertake innovation and create new intermediate goods, these modalities of segmented production not previously vertically integrated develop.

V. RESEARCH ISSUES RELATED TO FRAGMENTATION: ECONOMIC, SOCIAL AND INSTITUTIONAL CHANGE

Based on an analysis of the international fragmentation of production, a broad panorama is posed of problems that need to be studied for the purpose of understanding the implications of this process on economic development. I will discuss some particularly important questions.

i. Segmentation and employment

The empirical evidence on the relationship between segmentation and employment is still extremely limited and partial, since it deals with specific sectors in studies undertaken by academics and international institutions (Organization of Economic Cooperation and Development, OECD). Some of the most important studies only focus on the short term and mainly on the direct impact of the phenomenon, and therefore they reach negative conclusions on employment for the developed countries. The information on the impact of the segmentation on the labor market is almost nonexistent for emerging economies.

Different factors have a greater weight than segmentation in terms of their impact on employment, including the phase of the economic cycle, demand levels, exchange rate, commercial surplus in manufacturing and services. Many times there are causal factors that are difficult to separate. However most of the analyses point out that it is the growth of productivity in manufacturing and in the services that is affecting employment. Information technologies have an enormous impact on productivity and forms of productive organization. These technologies replace unskilled labor and are complementary with human capital. The technical changes very much studied in manufacturing are now affecting services (ATMs, secretarial services substituted with answering machines, software programs that replace skilled labor).

The labor markets of the emerging economies are also affected by the growth in productivity. In China, Brazil, and Russia, manufacturing industry employment declined despite the growth in industrial production (ONUDI 2005). In the same sense, an analysis by the U.S. Census Bureau of Labor Statistics (2005) points out that manufacturing industry employment in China declined from 98 million workers in 1985 to 83 million in 2002. It also indicates that employment remained relatively stable in India and Indonesia, where manufacturing production has increased.

Despite the recognition that the main cause of changes in employment is productivity, the debate concerning the impact of globalization and fragmentation on employment is being followed by the communications media and the public in general. The global and regional value added networks are perceived by the public of developed countries as mechanisms for “exporting jobs”, for boosting imports, and for increasing inequality in income distribution. In the emerging economies, there are other fears of the impact on the labor markets, as segmentation creates an industrialization that is dependent on the MNC with voluminous import requirements to maintain industrial production and exports.

Are the effects of the international fragmentation of production on employment different from those of international trade? Bhagwati (2004) sustains that there is a

major increase in the international relocation of developed countries' services and in this case, in general, the impact is completely similar to that of international trade. The comparative advantages could explain this phenomenon.

In another study, Grossman (2002) argues that the successive stages of the unbundling of the final product allow not only for the relocation of productive segments but also of specific tasks. Therefore, competition today is not only between unskilled labor of emerging economies and developed countries but also between their respective skilled workers.

Other OECD studies (Van Welsum and Vickery, 2005) analyze the number of workers currently employed who are engaged in activities that could potentially be undertaken in other localities. Their analysis suggests that around 20% of the total number of jobs in OECD countries corresponds to such activities. The possibility of relocating such jobs is facilitated with the tradability of services.

Although the outlook for employment has been studied more for the case of the developed countries, there are numerous problems that should be analyzed in relation to the impact of productive fragmentation on the labor market in emerging and developing economies. An initial question is that the segmented industrialization models result in enormous requirements for imports of goods and services. Indeed, the adaptation to export requirements implies imports while technological change permanently transforms parts and components that are used in products, thus increasing the ratio of imported content in exported goods. This can imply the substitution of parts and components previously produced internally. The obsolescence that this process generates also affects all the inputs necessary for production, with the need to readjust the labor force, capital goods, and industrial organization. Finally, the advanced countries can respond with protective measures to deal with growing imports of manufactured goods from developing nations, even though fragmentation decisively contributes to the competitiveness of industries that could be completely lost for the developed country.

ii. Global labor market?

The wage differentials between national labor markets represent one of the very many factors that intervene in decisions to relocate productive segments of multinational corporations. However, investment in different national markets leads to a greater interconnection of the labor markets. Does this lead toward the formation of a global labor market? According to some studies, such as those undertaken by the World Bank (World Bank, 2007), a long-term trend is underway toward a convergence in the wages in the different markets, thus annulling one of the causal factors behind segmentation in favor of emerging economies. The same study points out that at present, the wages of skilled and unskilled workers inserted in the international networks are growing much more rapidly than average national wages, thus increasing the heterogeneity of the labor markets. As a result, the hypothesis of the formation of a world labor market seems premature. Labor markets as a whole to a large extent depend on the national and local context and only a segment is connected to international production networks.

This does not mean that the national labor markets are not strongly linked to each other. Through different channels, multinational corporations deepen this interrelation: in the

trade of goods, formation of value added networks, direct investment and loan capital movements. The international trade in intangible resources (technological knowledge, business organization) is becoming a powerful factor in connecting markets. International migration, despite the existing restrictions, also represents a factor connecting labor markets. In addition, international institutionalism, with multiple trade treaties, national investment and foreign direct investment (FDI) policies, tax policies, intellectual property rights, bank supervision, and monetary convertibility link up the labor markets and create a direct or indirect impact on them. Globalization in general and relocation in particular make both specialized and unskilled workers of different domestic labor markets compete. An issue that is broadly debated internationally is whether this interrelation of labor markets represents one of the explanatory factors behind the growing inequality in income distribution both in emerging as well as developed economies.

iii. Reduction in prices of labor intensive manufactured goods

The international supply of unskilled labor intensive manufactured goods has increased considerably, above all due the expansion of China's industrial exports. This therefore poses the possibility of a continual fall in international prices of these products.

The growth in export volume of manufactured goods (finished products or intermediate inputs) does not provide a true picture of the earnings that are obtained with standardized exports[5], since the competition via prices that prevails in these sectors leads to part of the profits obtained from exports being transferred abroad as a result of the weakening of the terms of trade between manufactured goods of different technological levels (Minian-Luna, 2006). The changes in relative international prices derived from the international trade of the emerging economies can be an inhibiting factor for changing each country's specialization profile.

According to some studies by academic specialists and international institutions, the fall in prices of exports of unskilled labor intensive manufactured goods (textiles, electric and electronic products) responds to the expansion of the international supply of such items by countries such as China, Thailand, Malaysia, Philippines, and India (CEPII 2006-05, March). This therefore poses the possibility of a continual fall in international prices of these manufactured goods. This affects countries that have a similar specialization structure (Mexico, for example) since they are exposed to the decline in international prices of their exports of manufactured goods.

The growing economic weight in the world economy of large countries such as China and India (and to a lesser extent the new exporters of manufactured goods in Southeast Asia), with their strong growth rates can lead to important structural changes in relative world prices between manufactured and primary goods. These trends could well be long term, beyond temporary fluctuations.

The industrialization strategies must not only take into account the productive transformations in the advanced countries but also the existence and development of new industrial export bases in other emerging economies.

[5] A contrary point of view can be found in Bhagwati, 2004, pp. 3-27.

iv. Segmentation and industrialization strategies

The emerging economies, in their quest to achieve more advanced forms of industrialization, should consider the main trends in the new international industrial structures, the characteristics of technological progress, and the strategies that the multinational corporations are adopting (Navaretti and Venables, 2004). Some of the significant issues are enunciated below:

a) Industrialization and segmentation

The technological changes underway require that the emerging economies evolve toward more complex industrial structures, in which companies have greater entry barriers not only in terms of capital but also in skills and infrastructure. By the same token, in responding to the new international trends in production that require goods and services to have a high content of knowledge, companies in the emerging economies need to have specialized productive segments. The required investments combine the use of capital goods involving information technology (IT) with investments in intangible resources to achieve increases in productivity and competitiveness. In addition, the companies require connections with international production networks, since externalities in the learning processes occur in the interaction with companies supplying inputs, capital goods, specialized services, and with users and competitors.

The creation of new knowledge and innovative production processes implies having large amounts of capital tied up and extensive markets, and is subjected to important economic and financial risks as well as to rapid obsolescence. The obsolescence of knowledge is particularly rapid under current production conditions. This not only extends to capital goods, but also to infrastructure projects, products, human capital, organizational capital, and to the different intangible resources that are used. This provides advantages in terms of velocity in innovation, production, and marketing and represents a strategic factor of competitiveness to avoid loss of value.

b) Competitive threat and specialization profile

According to the traditional theories, to the extent that the markets function efficiently, there can be no competitive threat for countries derived from the entry of a new international supplier (Gomory and Baumol, 2000). This is only operative on the level of companies that compete in the same market. For national economies, the benefits of international trade are not a zero-sum game (Krugman, 1991). There are not just competitive threats for the country but, on the contrary, the new competitor opens new and greater possibilities of specialization. The countries displace their productive activities to the limit of their production possibilities finding a new balance in which international trade benefits all the parties involved. In advanced economies specialization will be found in more capital and knowledge intensive activities. At the same time, in less developed economies it is probable that the comparative advantage will correspond to the most traditional activities and, in many cases, in commodities and perhaps outside of the manufacturing sector.

However the appearance of new international suppliers generates competitive threats for countries that export unskilled labor intensive manufactured goods. The economic adjustment in response to this situation is particularly difficult in economies that face

great international mobility of productive factors and restricted internal mobility, with incomplete, inefficient markets, with high levels of unemployment and unskilled labor, with the existence of large monopolies or oligopolies, deficient information, and uncertainty. In these cases the appearance of an international competitor in similar products negatively affects the economic growth of emerging economies.

Even more complex are the problems faced by countries that attempt to insert their economies in a technologically more advanced specialization model. Not only the requirements in terms of investment, technology, human capital, and new institutions are enormous, but to this must also be added the difficulties that emerge from the existence of countries whose economies are characterized by the new industrialization already consolidated in this new paradigm. The latter compete favorably in industrial sectors with the countries that seek to enter that model and they even inhibit the arrival of new competitors.

To advance toward a new industrialization model is important not only to overcome competition via prices but also due to the positive effects that it can create. Indeed, there are many activities that offer a positive by-product given that they correspond to sectors with growing returns, with greater potential for technological progress and learning, with important externalities, with economies of scale of supply and demand, and with more possibilities to provide differentiated goods and to sustain entry barriers. Furthermore, the production and international trade in products based on medium and high-level technology have a greater dynamism, partially reflecting the greater demand for these goods. These benefits are in general cumulative. The new theories of growth, of international trade, and of economic geography analyze precisely these activities under conditions of imperfect markets.

This focus differs from that of orthodox economic theory according to which the specialization model of a country does not count for economic growth, since all the activities are equally beneficial and all the productive factors have same returns in the margin, and therefore the structure of the comparative advantages are of no interest. The policy implications allow for free trade without restrictions. There is always a static benefit of international trade.

Different theories affirm that there are enormous advantages for the first countries that adopt the new international specialization model. A central factor in this conception is that technological knowledge is cumulative; it is developed in companies and, increasingly, is created and spread within international production networks. It is also affirmed that the technology is path-dependent, in other words, the technological capacities present are conditioned by those that are preexistent (Nelson and Winter, 1982). Being part of an international production network will favor the companies that are first integrated into it because the knowledge is spread within the network (Gereffy and Korzeniewicz, 1994)

c) Some industrialization strategies

One of the strategies presented to the new emerging economies consists of creating internal, economic and institutional conditions in order to more strongly attract the international production networks. The idea is to participate in the multinational corporations' segmented production. The insertion in these networks can occur in

segments with very different technological levels, which results in a very unequal participation in the benefits generated within the network. Indeed, there are segments with high entry barriers, capable of retaining most of the returns, and others whose competitiveness depends to a large extent on low salary costs. Within a network, a country's progress toward insertion in segments with higher technological levels requires a proactive industrial policy, focused on the absorption of knowledge and international technologies, the formation of human capital, the development of modern infrastructure and financial, technological, and juridical institutions that favor growth. Market signals, when the former is essentially imperfect -particularly the tech market- are not sufficient by themselves to spur the required changes.

A fundamental question is the lack of access to and the spread of the most advanced technologies in developing countries and emerging economies. Once it is acknowledged that it is expensive to obtain and apply technology, that companies of industrialized countries have strategic reasons to retain it, and that local conditions are required for the absorption of the technology and the development of the factor market, the industrial policies take on meaning. (Stiglitz and Charlton, 2005). The strategy for the new industrialization consists in concentrating efforts and resources in a very few innovative segments. Under these conditions, it is indispensable to absorb international knowledge. This is achieved with the international acquisition of capital goods, of intangible goods (such as software, product design, and organizational methods of production), with investments from multinational corporations and through different types of interpersonal relationships.

Another possible strategy consists of generating industrialization processes with a higher degree of autonomy, that is, with less dependence on the multinational corporations, similar to the model of a very small number of Southeast Asian countries that implemented proactive industrialization policies. In this case, this involves taking advantage of the generic character of the new technologies for their application to different productive sectors of goods and services. This demands considerably greater efforts than in the previous case, because it requires the creation of local knowledge, large fixed-cost investments, assuming major financial risks, and the technology being subject to rapid obsolescence. It is necessary to import technology, skills and intangible resources "unbundled", as well as to take advantage of the extensive international supply of capital goods. This industrialization demands access to broad markets.

In both strategies the increases in productivity also depend on the segmentation and use of different comparative, scale, and agglomeration advantages. It requires a regionalized division of labor among countries. The division of manufacturing production among countries that are in geographically proximity is a result of the weight of transportation and shipping costs. Distance continues to be an important factor, especially for products of low value in relation to their weight or volume. Therefore, the segmentation among countries that are relatively geographically close is more feasible.

Both in the case of insertion in networks as well as industrialization with greater autonomy, the countries that have recently entered a complex industrialization process have to face other emerging economies that are already established and that have accumulated knowledge and learning processes, that have well established modern infrastructure, with the necessary institutions and that benefit from lower production costs given their economies of scale. In this category are a few Southeast Asian nations,

which are further consolidating their economies through the creation of regional production networks, outsourcing unskilled labor intensive productive segments.

The countries with greater accumulation of knowledge, learning capacity and adequate institutions can rapidly advance toward new activities with growing returns. Despite the consolidation processes, those advantages are not in no way permanent in the long term given the dynamism and obsolescence of knowledge. Even high-tech production with the passage of time becomes a commodity.

VI. BY WAY OF CONCLUSION

The industrialization and economic growth strategies in emerging economies should take into account the important changes that have occurred in the world economy. They modify the factors that determine the international localization of industry. There is a process underway of de-industrialization in the advanced nations and rapid industrialization in China, India, Russia, Southeast Asian countries, and Eastern Europe. The new industrial geography is spurred by numerous factors, although in this study I will focus on the forms of segmented organization of national and international manufacturing production and more specifically on manufacturing production that is located in emerging economies.

The fragmentation of production has led to new theories of international trade that include an analysis of intermediate goods and services. The international trade in intermediate products generates a much more defined division of labor than that of final products. This increases the general benefits although their distribution is related to the specific stage in which each country specializes. The growth in the variety of input specifications is another benefit. It is particularly important to multiply the technical and economic options of innovation.

One of the most important characteristics of globalization on the level of production and trade is the segmented organization of national and international production. This organizational modality implies the formation of complex production and distribution networks in which the multinational corporations coordinate the value added chain of an final good or service, from its design to its placement in the markets. The companies involved in these networks are permanently being restructured seeking greater micro-economic efficiency, which leads them to transfer part of their productive activity to other national and international supplier companies.

One of the aspects of the current international division of labor is the participation in fragmented production and trade not only on the part of the advanced countries but also those that recently have become more integrated in the world economy. This is the case of large countries such as China, India, and Russia and the Eastern European nations.

The overall problem of fragmentation opens up numerous lines of investigation that can provide responses to economic, social and institutional change**.** The incorporation of the emerging economies into the new pattern of innovative industrialization –in which extremely imperfect (or nonexistent) markets prevail- depends on the capacity of economic agents and medium and long-term government policies to orient the production factors toward activities that offer the best opportunities for growth, since technological scaling processes are not automatic in response to changes in relative

prices. These policies should incorporate factors that are more realistic than with the static models, such as problems of uncertainty, technological and informational disparities among countries, the existence of market power on the part of the large companies, the enormous costs and timeframes of economic adjustment, unemployment, and the relative immobility of internal production factors.

The integration of large emerging economies in the world economic scene has led to deep concerns, analysis, and debates on the evolution of the economic specialization of the developed countries and the industrialization strategies that are available for emerging economies. What are the consequences of the division of productive activity on the structure of comparative advantages in advanced, emerging, and developing economies?; Are the implications for employment the same as in the case of the international trade in end products?; Are the trends observed toward a more unequal distribution of income both in developed countries as well as emerging economies, derived from the greater interrelation of the national labor markets?; What is the role of technological progress and innovation in the redistribution of productive activity among countries?; What is the impact in the medium and long term of the enormous exports of manufactured goods of emerging economies on the terms of trade of these countries?, What are the implications on the national labor markets of the new marketability of many services?

The advanced countries fear that the economic integration of emerging economies, especially the largest, could imply a decline in their economic well-being to the extent that the latter not only have an extensive supply of unskilled labor but also increasingly of human capital as well, which combined with the high technology transferred by the multinational corporations, could shift activities away from the developed nations, activities in which up until now they have maintained broad comparative advantages.

The emerging economies have their own concerns in relation to this segmented trade and production model. For these countries, their incorporation into this new paradigm implies a major dependence with regard to the multinational corporations that control the market, technology, and the new organization modalities. It also requires them to massively import intermediate inputs in order to produce and export; they must undertake considerable investments to modify the structure of their comparative advantages, to reduce the sectors that face competition via prices, and to move toward manufacturing activities tied to innovation with differentiated products and excellence in quality. They must have institutions and incentives for the creation of knowledge and innovation.

Mexico City, April 27th, 2010

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