THE Global Dimension of the Regional Integration Model (GDRI-Model) APPLIED ON eu, nafta, asean AND mercosur

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15 January 2004

THE GLOBAL DIMENSION OF THE REGIONAL INTEGRATION MODEL (GDRI-MODEL) APPLIED ON EU, NAFTA, ASEAN AND MERCOSUR

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Abstract
This research paper presents a new model of analysis to study the trend of regional integration from a global perspective. This new model is called the Global Dimension of Regional Integration Model (GDRI-Model). The rationale for the creation of this model is the necessity to study regional integration from political, social, economic, and technological perspectives simultaneously. There are four basic phases in the implementation of GDRI-Model. The first phase is the design of the multi-input database table. The second phase is the measurement of individual Regional Global Development Indexes (X_i), which include the Regional Global Political Development Index (X_1), Regional Global Social Development Index (X_2), Regional Global Economic Development Index (X_3) and Regional Global Technological Development Index (X_4). The third phase is the measurement of the Regional Global Development (RGD) index. The last phase is the measurement of Regional Integration Stage (RIS) index. The general objective of GDRI-Model is to offer policy-makers and researchers a new analytical tool to study the evolution and stages of any regional integration process from a global perspective -- based on a group of indexes and graphs. The GDRI-Model is not intended to be a forecasting model in any case. However, its application is not limited to the study of a special group of countries or regions. It is not constrained by issues about the region or the development stages of any member in a region that is interested in integrating into a single regional trade bloc. The GDRI-Model, in effect, is a simple and flexible scheme, which can be applied to any case of regional integration.

JEL: F15
Keywords: Global development indexes; regional integration; economics modeling; Intraregional global development index; regional integration stage index; economic development and domestic system development.

1. Introduction

Over the past 70 years, the field of research on regional integration has changed dramatically, with the discovery and implementation of new theories, models and techniques. In this thesis, the study of regional integration is approached from a few different perspectives, namely, economic, political, social and technological analysis. In addition, the orientation of these perspectives in the context of regional integration is also accounted for. Evaluating regional integration and its benefits is not an easy task. The nature of the subject matter constitutes part of the problem in this regard (Devlin and Ffrench-Davis, 1998). Much of the study related to

regional integration has so far been done from the economic perspective. According to Winters (1999), the study of regional integration from the economic perspective is typically evaluated in light of the probable scenario in the absence of such an approach to the study. Also, as pointed out by Winters, with complications in defining and measuring changes in economic welfare for a particular sub-region, economists use proxy summary statistics that reflect growth of trade.

On the basis of the above idea, this thesis introduces a new methodology of analysis that monitors regional integration process from a new perspective. Called the regional integration evaluation methodology (RIE-Methodology), this methodology will simultaneously study all areas of development (political, social, economic and technological analysis) that each country or domestic development system (DDS) in the same region (same geographical position) shows based on the results of the regional development indexes (X_i)[1]. The idea is to demonstrate that regional development (RD)[2] can affect the evolution of the regional integration process considerably. It is based on the application of a group of indexes and graphs. This group of indexes and graphs shows the evolution and stages of the regional integration process of any region from a multi-dimensional analysis.

It is assumed in the RIE-Methodology that the basic pre-condition to start a stronger regional integration process in any type of trade bloc is a stronger domestic development experienced by each country or domestic development system (DDS) in the same region. Another pre-condition for a stronger regional integration process is a combination of historical timing and political and social willingness. For the latter, the countries involved must be interested in creating a formal or informal agreement with all its members so as to collectively consolidate themselves into a single region.

The difference between the RIE-Methodology and the traditional models of analysis is that the RIE-Methodology will analyze regional integration from a new analytical perspective, that is, under a multi-dimensional analysis based on the study of all areas that domestic development evolves such as political development, social development, economic development and technological development. It allows for the detection of the pros and cons in the evolution of regional integration blocs in any region from a different perspective. The main idea is to show that successful regional integration blocs depend on the majority of the members being interested in building a trade bloc, and, therefore, there cannot be a large margin of difference in the domestic development (political development, social development, economic development and technological development) among its members. The objective of the RIE-Methodology is to offer policy-makers and researchers a new alternative analytical tool for studying the results achieved with regional integration. This will benefit the parties concerned in their policy-making and program development.

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[1] The regional development index (X_i) is as follows: Regional Political Development Index (X_1) will show the level of political environmental that this specific region shows. Regional Social Development Index (X_2) will show trends in social agenda at regional level. Regional Economic Development Index (X_3) will present the economic trends that the region shows. Regional Technological Development Index (X_4) will present the level of technology development that this specific region shows. Each component of these regional development indices (Xi) by area will together present the different stages with which any country can chart its own evolution.

[2] Regional development (RD) originates from the different levels of political, social, economic and technological development that each member country in the same region shows. If the gap between all areas of development (political, social, economic and technological) among all members is considerably large, then the regional integration process can experience serious difficulties.

2. Background Research and Analysis of Different Fields of Research in the Study of Regional Integration

Regional Integration can be studied and researched based on different focuses and approaches. This chapter applies four traditional fields of research in the study of Regional Integration: economic, political, social and technological fields of research. In the first part of the research pertaining to this study, an effort was made to identify the inclination of the fields of research in the study of regional integration. 500 chapters (100%) on regional integration from 75 journals[3] published between the 1950's and the 1990's were selected for this purpose (see: www.jstor.org and www.sciencedirect.com by Elsevier). Next, the percentage of participation by fields of research (economic, political, social and technological) in the study of regional integration was calculated.

The following trend in terms of fields of research in the study of regional integration was observed: 50% from the economic field of research, 40% from the political field of research, 7% from the social field of research and 3% from the technological field of research. It was also observed that, compared to the 1950's, 1970's and 1980's, the topic of regional integration was more frequently researched and discussed in journals in the 1960's (25%) and 1990's (35%).

2.1. The Economic Field of Research in the Study of Regional Integration

In the economic field of research (i.e. the largest field of research) in the study of regional integration, attention was placed on three specific areas: economic theory, political economy and applied economics. Economic theory is divided into two parts, namely microeconomics and macroeconomics, each of which has a different focus. Some of these focuses are: partial or general (type of equilibrium), ex-post or ex-antes (method analysis), static or dynamic (behavior), short term or long term (time frame). Method analysis is either quantitative (econometrics, statistics and mathematics) or qualitative (in the form of comparative studies based on theories or historical data). It is observed that the study of regional integration from the economic perspective mainly centers on macroeconomics applications (80%), quantitative methods (65%), partial equilibrium (60%), ex-antes approach (65%), and static models (65%). Besides, these applications are used in the short term in most research.

The common theories, models and theorems used by researchers in the economic field of research in the study of regional integration are: international trade policy[4] framework, optimal

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[3] American Economic Review, *C*anadian Journal of Economics, Econometrica, Economic History Review, Economic Journal, International Economic Review, Journal of Economic History, Journal of Economic Literature, Journal of Political Economy, Journal of Policy Modeling, Economic Development Journal, Oxford Economic Chapters, Quarterly Journal of Economics, Review of Economic Studies, Review of Economics and Statistics, Canadian Journal of Economics and Political Science, Journal of Economic Abstracts, Contributions to Canadian Economics, Journal of Labor Economics, *J*ournal of Applied Econometrics, Journal of Economic Perspectives, Publications of the American Economic Association, Brookings Chapters on Economic Activity, microeconomics *and* American Economic Association Quarterly.

[4] This includes the basic tariff analysis; cost and benefits of trade; tariff and non-tariff trade barriers analysis and the new protectionism (Krugman and Obstfeld, 2000).

current area theory[5], fiscal federalism theory[6], Heckscher-Ohlin model[7], Kemp and Wan theorem[8]. Among all these theories, the most important theory applied is the customs union theory[9] (including the second best theory[10]). The customs union theory is still used today by many economists to choose between trade creation and trade diversion[11] for evaluating regional

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[5] The optimal currency areas were introduced by Mundell (1961) and Mckinnon (1963). "This approach based its study on monetary policy issues (money, markets for goods, and markets for production factors.) First, we will present the concept of a currency area defined as an area in which a common currency exists (Mattli, 1999). Optimal is defined in terms of the ability of an area to achieve both internal balance (maintenance of full employment and stable internal average price level) and external balance (maintenance of balanced international payments equilibrium). The main idea of optimal currency area was developed because of a dilemma between introducing fixed versus flexible exchange rate."

[6] "The fiscal federalism is an offshoot of public finance theory that analyzes the special fiscal problems which arise in federal countries, drawing on the literature on public goods, taxation, income distribution and public debt incidence, and various parts of location theory" (Mattli,1999). We can observe that this approach focuses on fiscal policy issues based on fiscal coordination. The general objective of this theoretical approach is the improvement of market efficiency focused on the interaction of market and public goods. The method applied in fiscal federalism is of a positive dynamic (general equilibrium).

[7] The Heckscher-Ohlin (H-O) model (Breton, Scott, and Sinclair, 1997), "which is the whole theoretical construction concerning trade and production based upon a difference between countries in their factor endowments, and four hypotheses or propositions which arise from this model. The H-O model assume that each country will export products that are intensive in the use of that country's abundant factor of production (labor or capital), and will import products that are intensive factor of production (labor and capital) in the use of the country's scarce factor of production."

[8] The Kemp and Wan theorem presents this proposition related to the formation of custom unions: "It is consider any competitive world trading equilibrium, with any number of countries and commodities, and with no restrictions whatever on the tariffs and other commodity taxes of individual countries, and with costs of transportation fully recognized. Now let any subset of the countries form a customs union. Ten there exists a common tariff vector and a system of lump-sum compensatory payments, involving only members of the union, such that there is an associated tariff-ridden competitive equilibrium in which each individual, whether a member of the union or not, is not worse off than before the formation of the union" (Kemp and Wan, 1976).

[9] "The custom union argument is based on the free-trade point of view, whether a particular custom union is a move in the right or in the wrong direction depends, therefore, so far as the argument has as yet been carried, on which of two types of consequences ensue from that custom union. Where the free trade-creating force is predominant, one of the members at least must benefit, both may benefit, the two combined must have a net benefit, and the world at large benefits; but the outside world loses, in the short-run at least, and can gain in the long-run only as the result of the general diffusion of the increased prosperity of the custom union. Where the trade-diverting effect is predominant, one al least of the member countries is bound to be injured, both may be injured, the two combined will suffer a net injury, and there will be injury to the outside world and to the world at large." (Viner, 1950).

[10] "The second best theory was presented by Lipsey and Lancaster (1997). These two authors present a deeper study about the custom union theory of Viner based on the application of a positive dynamic method (general equilibrium) to explain the custom union effect on the world trade. The contribution of Lipsey and Lancaster in the custom union theory follows the Paretian optimum which requires the simultaneous fulfillment of all the optimum conditions based on the general economic problem of maximization. A function is maximized subject to at least one constraint, in this case production function and utility function."

[11] "Trade-creation effect occurs when some domestic production in a nation that is a member of the custom union is replaced by lower-cost imports from another member nation. Assuming that all economic resources are fully employed before and after formation of the custom union, this production is based on comparative advantage. The Trade-diversion effect occurs when lower-cost imports from outside the custom union are replaced by higher cost

integration. However, the static analysis used in the customs union theory poses a problem: it frequently uses a partial competitive equilibrium framework to arrive at a general conclusion about a process that is a general equilibrium phenomenon (Devlin and Ffrench-Davis, 1998).

According to Winters (1997), many economists are of the stand that trade creation versus trade diversion is not the core of the problem. The problem lies with the deficiency of the models of dynamics and empirical foundations used for testing them. In effect, Mordechai and Plummer (2002) point out that economists whose research into regional integration is based on ex-post models include a gravity model, an import-growth simulation and other regression approaches. This is because the computational general equilibrium (CGE)[12] model (multi-country and multi-commodity dimension) has become very popular among economists.

Furthermore, the economic field of research merely applies the positive theories of welfare gains and losses associated with regional integration; it provides no explanations of the political choices that allow for integrated fields of research. As such, the economic field of research negates the global context of the evolution and trend of regional integration process as a whole.

In a nutshell, this book maintains that the economic field of research poses many limitations in the study of the effects of regional integration, and that it is merely one part of the complicated puzzle of regional integration research. On this account, this study further maintains that the study of regional integration requires a multi-dimensional analysis (economic, social, political and technological dimensional simultaneously) to be optimally useful.

2.2. Political, Social and Technological Fields of Research

The study of regional integration from the political dimension is also pervasive. It is observed that many studies on regional integration involve extensive elaboration of the following politically-oriented topics: institutional framework (functionalism or neo-functionalism), policy dimensional agreements (negotiation) and international law issues.

As observed, more qualitative rather than quantitative methods of evaluation are used in the political dimension of research. Just as in the economic dimension of research, the political dimension of research in the study of regional integration has many limitations. However, as pointed out by Mattli (1999), the political context in which integration occurs has been specified in the political dimension of research and this has provided insightful accounts of the process of integration.

The third field of research, that is the social field of research, focuses on issues such as history, culture, education, social welfare programs and social policies applied by governments. Usually such research is in the form of comparative studies based on basic statistical comparison, feedback, interview results, history and social theoretical frameworks. Many of these studies are

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import from a union member. This is a result of the preferential trade treatment given to member nations. Trade-diversion effect, by itself, reduces welfare because it shifts production from more efficient producers outside the custom union to less efficient inside in the union. Thus, trade diversion worsens the international allocation of resources and shifts production away from comparative advantage." (Salvatore,2001)

[12] "The CGE models are standard tools for analyzing trade policy. The case of general equilibrium models are: first liking trade and productivity growth; second foreign investment and productivity growth; third, endogenous growth and CGE modeling." (Mordechai and Plummer, 2002).

confined to highly important issues that are worthy of consideration in the study of the effects of regional integration.

    The fourth field of research, that is the technological field of research, has a relatively smaller presence. It focuses mainly on four specific topics: regional electrical inter-connection, telecommunications, technology transfer, and research and development (R&D). Some of these research documents involve advanced technical terminologies and the application of quantitative methods (statistics and mathematics).

3. The Global Dimension of the Regional Integration Model (GDRI-Model)

    Economic, political, social and technological dimensions of research into regional integration clearly do not provide a global perspective in the understanding of regional integration. For this reason, the global dimension of the regional integration model (GDRI-Model) is proposed in this thesis to address the issue.

    The GDRI-Model is a measuring tool for studying regional integration from a global perspective. The proposed GDRI-Model is a simple and flexible model. It applies dynamic and general equilibrium analysis to show the past and present situations in the regional integration process of any region based on a set of indexes and graphs. Its field application is not constrained by region or the development stage of each member interested in integrating into a single regional bloc.

    The GDRI-Model can be applied to any form of regional integration process: between developed countries and developing countries, North-South Integration (e.g. within the Europe Union -EU-), between developed and developing countries (e.g. within the North American free trade area -NAFTA-), and between developing countries or south-south integration (e.g. within MERCOSUR and ASEAN).

    The application of the GDRI-Model is based on the characteristics, conditions and historical moments of a region's regional integration development. The GDRI-Model is like a simulator that applies a series of simulations in different scenarios and in different phases of the regional integration process. This model does not attempt in any way to be a forecasting model. It focuses on the past and present situations in the regional integration process as a whole. It helps to provide a general idea about the situations and evolution of the regional integration process in any region.

4. The Domestic Development System Concept

    This part of the research presents a new concept entitled the "domestic development system (DDS)." The DDS incorporates all economic, political and social characteristics that any country may show in its different phases of development. The GDRI-Model assumes that each country has its own domestic system development. At the same time, it defines regional integration as the joining of a certain number of different countries (or Domestic Development Systems) that are interested in creating a strong regional development system (RDS). The DDS concept is based on five assumptions:

- ✓ Change within the domestic development system (DDS) in any country cannot be forced; it can only be induced by material incentives and motivation.
- ✓ The domestic development system (DDS) of any country is spurred onwards by the limited nature of resources.
- ✓ Each domestic development system (DDS) has its unique set of characteristics. Therefore it might be difficult to try to implement a successful domestic

development system (DDS) in another, less successful, domestic development system (DDS).

✓ The RDS concept attempts to integrate different DDS into a regional integration agreement (RIA) depending on the different domestic development systems (DDS) that are available for integration into a single regional system.

✓ The creation of a regional development system (RDS) depends on the flexibility of each domestic development system (DDS).

The domestic development system (DDS) concept offers a new perspective of analysis and research in the field of regional integration and development economics. The traditional research is based on economic, political, social and technological points of view; but the DDS concept makes it possible to visualize different countries' developments from a global perspective.

5.   Phases in the Global Dimension of the Regional Integration Model (GDRI-Model)

5.1. Phase I: Design of the Multi-input Database Table

The multi-input database table is an alternative style of database analysis framework that permits the storage of large amounts of data to measure a single variable. This single variable can show the evolution of any phenomenon from a general perspective. The multi-input database table is designed to evaluate either by country or region (see Diagram 1).

The multi-input database table is focused on measuring four main independent variables (e.g. X_1, X_2, X_3, and X_4). Each main independent variable is formed by "n" number of sub-variables. The number of sub-variables in each main independent variable is non-limited; for this reason, the multi-input database table concept does not have any specific ranking. Instead, there exists a basic classification of sub-variables. Only two main independent variables have a classification. First, political (X_1) is divided into two large sections: external and internal factors (see Table 3). Second, economic (X_3) is divided into production, consumption, trade, labor, investment, infrastructure, government and international cooperation. However, each sub-variable has a code number respectively. The code number depends on the area of development (X_1 = political; X_2 = social; X_3 = economic and X_4 = technological). The reason that all sub-variables have the same importance (weight) is because we are interested in measuring a single value; in this case, each main independent variable (X_1, X_2, X_3 and X_4). To give the same weight to all sub-variables, it is necessary to use a binary system. The binary system helps to maintain a balance among all variables in each multi-input database table. Another reason is that the binary system helps to create an alternative model of analysis when it comes to countries with limited information, especially in the case of developing countries and less developed countries (LDC's).

The idea of applying a multi-input database is to find the domestic development system -DS- (country) and finally the regional development -RD- (regional bloc). The idea of finding the DDS and the RD is to demonstrate that successful regional integration process depends on the major part of the DDS being strong enough; there can only be a small gap between its members. In this case, the RD is result of the sum of the component DDS. The four main independent variables will show the RD in different areas of development [political (X_1), social (X_2), economic (X_3) and technological (X_4)].

The number of variables used in the GDRI-Model varies, depending on the objectives of the researchers or policy-makers and the orientation of the cases of research. In the case of this

thesis, 98 variables with their respective tables and parameters were selected: 19 variables for regional political development index (X_1) [see Table 3]; 15 variables for regional social development index (X_2) [see Table 6]; 54 variables for regional economic development index (X_3) [see Table 9] and 10 variables for regional technological development index (X_4) [see Table 12].

Once the number of sub-variables is determined, the next step is to collect the statistical and historical data that constitute sub-variables ("n" number) in each main independent variable (X_1, X_2, X_3 and X_4). All sub-variables within each main independent variable (X_1, X_2, X_3 and X_4) may not have a direct relationship between them -- they may be independent variables or endogenous variables. However, all the sub-variables in each multi-input database table are meant to measure a single variable or main independent variable, that is, each of the Regional Development Indexes (X_i).

Each of the four X_i indexes (X_1, X_2, X_3 and X_4) to be measured is viewed as a main independent variable (i.e. endogenous variable). However, there is no connection or interdependency among these four X_i indexes when they are joined in the graph. These four Xi indexes are used to draw a graph that represents the evolution and stages of the regional integration process of the region from a general perspective. The objective of this chapter is to apply the GDRI-Model in many trade blocs simultaneously (e.g. European Union -EU-, North America free trade area -NAFTA-, association of south-east Asian nations -ASEAN-, and MERCOSUR).

5.1.1. The Rational Selection of Sub-variables in each Multi-input Database Table

Regional Political Development
Regional political development is divided into two large sections: external factors and internal factors.
External factors
Colonization: The model assumes that countries which have been colonized for a long time in the past or continue under the domination of a hegemony can stop the process of regional integration anywhere.
Group negotiation power: This can be analyzed by the number of meetings that all members in the same region organize every year.
Foreign policy orientation of each member: The foreign policy is divided into two large focuses: regional and global level (world).
Negotiation style: This sub-variable shows the style of negotiation, whether individual or group behavior.
Internal factors
International organization support: International organizations can facilitate financial and technical support.
Intra-regional institution number: The number of institutions can play an important role in the development of the regional integration process.
Political regime: This sub-variable encourages the political stability of the region.
Legislative background: This can help to facilitate the regional legal framework for environmental and other issues.
Internal Security: Adequate security measures for local and regional citizens.

Human Rights: The level of protection of human rights offered by each member in the same region.

Border Problems: Border problems can hinder or stop the regional integration process.

Political Stability: This is a basic condition in order to integrate all countries into the same region.

Public Administration: Good public administration can facilitate management of the regional integration process.

Army size: Less expenditure on army services can help to redirect resources towards social and public services.

Bureaucracy level: A complicated bureaucracy system can generate difficulties in the regional integration process.

Regional Social Development

Regional social development is generated by seven sub-variables:

Literacy: This sub-variable shows the human capital stock under regional level.

Social Problems: These can generate instability in one member country or at a regional level

Health and Medical programs: The social welfare orientation of the region is important.

External Culture Influence: Societal behavior in order to become an individual or a collective society.

Food Security: This prevents regional disasters and quick handling of emergencies.

Public Education: Infrastructure for training and higher education at the regional level.

Low Cost Housing Projects: Equitable distribution of income at regional level.

Regional Economic Development

Regional economic development is formed by eight large sections: production, consumption, trade, labor, investment, infrastructure, government and international cooperation.

Production

Eleven sub-variables are considered in this section. Among these eleven sub-variables, we include the study of the GDP to observe production structure and growth. In the same section, we also consider natural resources, oil production and environmental protection to evaluate the supply of resources for the regional production. Market location, industrial concentration and subsidies level can generate distortions in regional prices. Export structure can help to visualize if there exist similarities in the export products that members in the same region offer to the international market. The copyright of patents and trademarks can play an important role in the control of pirated mass production.

Consumption

In the consumption section, seven sub-variables are considered, including income *per-capita*, buyer purchase, poverty level, saving rate, inflation rate and wealth distribution. All these sub-variables need to be found among all members to determine consumption behavior at regional level. Market size can play an important role in the regional integration process, which can help to join small markets into a single larger market.

Trade

The trade section has five sub-variables. All these variables show the behavior of the external sector at regional level and the possible obstacles that each member or the region may face. These variables are intra-regional trade volume, extra-regional trade volume, intra regional tariff application, openness and monopoly controls.

Labor
The labor section has six sub-variables. This section considers the fact that international social division can facilitate the regional integration process together with labor distribution under urban and rural areas. The immigration and emigration levels can demonstrate the mobility of labor into the region and the rest of the world. Population growth is considered a vital variable in the study of labor to observe the population pyramid of the region and predict future human capital stock supply. Labor productivity also plays an important role in encouraging the possibility of FDI attraction to expand regional production and exports.

Investment
This section is divided into seven sub-variables. Three categories of investment - domestic, intra-regional and foreign direct investment - are used in this section. We will study how these three types of investment play an important role in the regional integration process of any region. Additionally, the same section maintains that the privatization process (public goods) needs to be considered in the analysis of regional integration process to facilitate the mobility of capital at regional and international level. The interest rate, exchange rate stability and stock market activity can show the level of banking and stock market development in the region, and the possibility of joining the financial regional system.

Infrastructure
The infrastructure is formed by six sub-variables; this section will show the level of coordinate infrastructure under the regional level, and how it can facilitate the mobility of labor and goods (transport system, intra-regional coordinate projects and tourism), communication services (telecommunications) and energy (electricity production).

Government
The government section has seven sub-variables. The inclusion of this section into the analysis of regional economic development is in order to study the tax income distribution (taxation), domestic debt and foreign debt of each member in the same region. Centred on the same issue, it is possible to observe the level of government income and spending (e.g. government expenditures and planning economy sub-variables) of the different governments in the same region. We assume that the good performance of governments can help the standardization and management of public finances (income and expenditure). Additionally, corruption levels are included in this study to help determine how corruption can affect the regional integration process originated by political groups to protect its personal interests.

Regional Technological Development
Regional technological development is formed by ten sub-variables. This section aims to show the level of technological development of each member in the same region. We assume that if the majority of members in the same region have a small gap of technological development between members, this can facilitate the regional integration process. The variables are technology (R&D) level, internet hosts, software production, internet access, telecommunications, research institutes, biotechnology advances, import of new technologies, R&D public investment and IT development.

5.1.2. Types of Multi-input Database Tables
The first type of multi-input database table pertains to "country or domestic system development". It uses "N" number of variables. The number "N" is decided by researchers or policy-makers. The number of cases in the study is represented by "M". In the case of the GDRI-

Model, "M" represents only one country (i.e. a domestic system development). The time factor "T" depends on the time parameters that the researchers or policy-makers are interested in using. Therefore, "T" can be in terms of years or decades. The second type of multi-input database table pertains to "region or regional system development". All the conditions and functions of "N", "M" and "T" factors are the same as that in the first type of multi-input database table, except that "M" here represents a "region or regional system development" rather than a "country or domestic system development". For this chapter, the second type of multi-input database (by region) is adopted.

5.2. Phase II: Measurement of Regional Development Indexes (Xi)

The second phase of the implementation of the GDRI-Model involves the measurement of regional development indexes (X_i) using the variables in four basic multi-input database tables (see Diagram 1). The regional development indexes are regional political development index (X_1)[13], regional social development index (X_2)[14], regional economic development index (X_3)[15] and regional technological development index (X_4)[16]. These variables are analyzed with their codes, descriptions, parameters and sources respectively (see Tables 4, 5, 7, 8, 10, 11, 13 and 14).

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[13] The measurement of the regional political development index (X_1) originates from the calculus obtained from the politics multi-input database table (see table 3 and 5). After we obtain the result of X_1, we can proceed to classify the results into three different parameters. These parameters are: under-developed stage or level 1 $(0 \leq X_1 \leq 0.33)$, X_1 index is developing stage or level 2 $(0.34 \leq X_1 \leq 0.66)$ and X_1 index is developed stage or level 3 $(0.67 \leq X_1 \leq 1)$.

[14] The measurement of the regional social development index (X_2) originates from the calculus applied in the social multi-input database table (see table 6 and 8). After we obtain the result of X_2, we can proceed to classify the results into three different parameters. These parameters are under-developed stage or level 1 $(0 \leq X_2 \leq 0.33)$, X_2 index is developing stage or level 2 $(0.34 \leq X_2 \leq 0.66)$ and X_2 index is developed stage or level 3 $(0.67 \leq X_2 \leq 1)$.

[15] The measurement of the regional economic development index (X_3) originates from the calculus applied in the economic multi-input database table (see table 9 and 11). After we obtain the result of X_3, we can proceed to classify the results into three different parameters. These parameters are under-developed stage or level 1 $(0 \leq X_3 \leq 0.33)$, X_3 index is developing stage or level 2 $(0.34 \leq X_3 \leq 0.66)$ and X_3 index is developed stage or level 3 $(0.67 \leq X_3 \leq 1)$.

[16] The measurement of the regional technological development index (X_4) originates from the calculus applied in the technological multi-input database table (see table 12 and 14). After we obtain the result of X_4, we can proceed to classify the results into three different parameters. These parameters are under-developed stage or level 1 $(0 \leq X_4 \leq 0.33)$, X_4 index is developing stage or level 2 $(0.34 \leq X_4 \leq 0.66)$ and X_4 index is developed stage or level 3 $(0.67 \leq X_4 \leq 1)$.

		TABLE 3						
MULTI-INPUT DATABASE TABLE: REGIONAL GLOBAL POLITICAL DEVELOPMENT OF TRADE BLOC "XYZ"								
CODE	**TRADE BLOC NAME**							
	POLITICAL FACTORS LIST	**COUNTRY**					**Result**	
	VARIABLES	**C1**	**C2**	**C3**	**C4**	**......CN**	**AS**	**TPR**
P.1.	**External factors**							
P.1.1.	Colonization (country)	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ1	5
P.1.2.	Group negotiation power	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ2	5
P.1.3.	Domestic foreign policy influences							
P.1.3.1.	Regional	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ4	5
P.1.3.2.	Global	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ5	5
P.1.4.	Negotiation style	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ6	5
P.2.	**Internal factors**							
P.2.1.	International organizations support	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ7	5
P.2.2.	Regional institutions role	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ9	5
P.2.3.	Political regime	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ10	5
P.2.4.	Legislative background	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ11	5
P.2.5.	Internal security	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ12	5
P.2.6.	Human rights	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ13	5
P.2.7.	Border problems	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ14	5
P.2.8.	Political stability	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ15	5
P.2.9.	Political structure and public adminis	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ17	5
P.2.10.	Army size	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ19	5
P.2.11.	Bureaucracy level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ20	5
TOTAL							**ΣAS**	**ΣTPR**
TOTAL (%)							**AP**	**100%**

AS= ACTUAL SITUATION

TPR = TOTAL OF POSSIBLE RESULTS

X_i= GLOBAL DEVELOPMENT

MEASURES:

$\Sigma 1 \ldots \ldots N$ = The total sum of all country at the same region

ΣAS = Total of actual situation

ΣTPR= Total of possible results

$X_i = \Sigma AS / \Sigma TPR$

	TABLE 4					
	THE GLOBAL REGIONAL POLITICAL DEVELOPMENT PARAMETERS					
CODE	**POLITICAL FACTORS LIST VARIABLES**	**PARAMETERS**				
P.1.	**External factors**	**Limit**	**Description**			
P.1.1.	Colonization (country)	1= Exist or 0= NE	Short colonization period less than 50 years			
P.1.2.	Group negotiation power	1 = O or 0 = S	No. of activities per year under regional level			
P.1.3.	Foreign policy orientation in each member					
P.1.3.1.	Regional	1 = H or 0 = L	Foreign affairs policy attention focus			
P.1.3.2.	Global	1 = H or 0 = L	Foreign affairs policy attention focus			
P.1.4.	Negotiation style	1 = F or 0 = I	Procedures of style negotiations			
P.2.	**Internal factors**	**Limit**	**Source**			
P.2.1.	International organizations support	1 = H or 0 = L	Number of international organizations			
P.2.2.	Intra-Regional institutions number	1 = S or 0 = L	Number of institutions and activities			
P.2.3.	Political regime	1 = D or 0 = ND	If exist democracy at the last 15 years			
P.2.4.	Legislative background	1 = E or 0 = NE	Law system exist			
P.2.5.	Internal security	1 = H or 0 = L	Most safe 100 countries around the world			
P.2.6.	Human rights	1 = H or 0 = L	Human rights first 150 countries around the world			
P.2.7.	Border problems	1 = Ne or 0 = E	Border problems at the last 30 years			
P.2.8.	Political stability	1 = H or 0 = L	Exist democratic elections at the last 20 years			
P.2.9.	Public administration	1 = F or 0 = U	Based on taxation system structure			
P.2.10.	Army size	1= L or H = 0	Less of the 10% of all population in this country			
P.2.11.	Bureaucracy level	1 = L or H = 0	Less than 15% of all population is working at the gov.			

OR= Old Regionalism

NR= New Regionalism

FTA= Free Trade Area

CU= Custom Union

D= Democratic

ND= Non Democratic

NE= Non Exist

E= Exist

R= Right

L= Left

U= Unitary

F= Federalism

P= Presidential

Par= Parliamentary

Note: */ We are using in all QT measure, the average variation rate by decade

(e.g. Variation rate between 1960's and 1970's to analyzing decade of 1970's)

CODE	POLITICAL FACTORS LIST VARIABLES	Source				
	TABLE 5					
	THE GLOBAL REGIONAL POLITICAL DEVELOPMENT SOURCES					
P.1.	**External factors**					
P.1.1.	Colonization (country)	The Library of Congress U.S.:www.loc.gov				
P.1.2.	Group negotiation power	Regional Integration Institutions by region in analysis				
P.1.3.	Foreign policy orientation in each member					
P.1.3.1.	Regional	Ministry of Foreign Affairs by Country				
P.1.3.2.	Global	Ministry of Foreign Affairs by Country				
P.1.4.	Negotiation style	Regional Integration Institutions by region in analysis				
P.2.	**Internal factors**					
P.2.1.	International organizations support	United Nations: www.un.org				
P.2.2.	Intra-Regional institutions number	Ministry of Foreign Affairs by Country				
P.2.3.	Political regime	Central Government Homepage by country				
P.2.4.	Legislative background	Parlament by country				
P.2.5.	Internal security	Ministry of Defence and Police Fources by country				
P.2.6.	Human rights	Human Rights Watch: www.hrw.org				
P.2.7.	Border problems	Haya Court: www.wpc-in.org				
P.2.8.	Political stability	Transparency International: www.transparency.org				
P.2.9.	Public administration	Transparency International: www.transparency.org				
P.2.10.	Army size	NATO: http://www.nato.int				
P.2.11.	Bureaucracy level	Transparency International: www.transparency.org				

OR= Old Regionalism

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FTA= Free Trade Area

CU= Custom Union

D= Democratic

ND= Non Democratic

NE= Non Exist

E= Exist

R= Right

L= Left

U= Unitary

F= Federalism

P= Presidential

Par= Parliamentary

Note: */ We are using in all QT measure, the average variation rate by decade

(e.g. Variation rate between 1960's and 1970's to analyzing decade of 1970's)

TABLE 6

MULTI-INPUT DATABASE TABLE: REGIONAL SOCIAL DEVELOPMENT OF TRADE BLOC "XYZ"

CODE	SOCIAL FACTORS LIST	TRADE BLOC NAME					RESULT	
		COUNTRY						
	VARIABLES	C1	C2	C3	C4	……CN	AS	TPR
S.1.	Literacy	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 1$	5
S.2.	Social problems (crime & drugs)	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 8$	5
S.3.	Health and medical programs	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 9$	5
S.4.	External culture influence	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 10$	5
S.5.	Food security	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 13$	5
S.6.	Public education	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 14$	5
S.7.	Low cost housing projects	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 15$	5
TOTAL							ΣAS	ΣTPR
TOTAL (%)							AP	100%

AS= ACTUAL SITUATION
TPR = TOTAL OF POSSIBLE RESULTS
X_i= Regional Development Indexes

$\Sigma 1 \ldots \ldots N$ = The total sum of all country at the same region
ΣAS = Total of actual situation
ΣTPR = Total of possible results
$X_i = \Sigma AS / \Sigma TPR$

TABLE 7
THE REGIONAL SOCIAL DEVELOPMENT PARAMETERS

CODE	SOCIAL FACTORS LIST	PARAMETERS	
	VARIABLES	LIMIT	Source
S.1.	Literacy	1 = high or 0 = low	> 70% of total population has education
S.2.	Social problems (crime & drugs)	1 = low or 0= high	Out of the country list with higher crime and drugs
S.3.	Health and medical programs	1 = high or 0 = low	> 45% total of population has health care
S.4.	External culture influence	1 = exist or 0 = NE	Cable T.V. Access
S.5.	Food security	1 = Exist or 0 = NE	Programs in food security
S.6.	Public education	1=high or 0 = low	Number of public schools and universities
S.7.	Low cost housing projects	1=high or 0 = low	Number of low cost housing projects

H= Homogeneous
M=Multicultural
W= West
E= East
I= Individual
C= Collective
M= Modern
T= Traditional
NE= Non exist

Note: */ We are using in all QT measure, the average variation rate by decade
(e.g. Variation rate between 1960's and 1970's to analyzing decade of 1970's)

TABLE 8: REGIONAL SOCIAL DEVELOPMENT SOURCES

CODE	SOCIAL FACTORS LIST VARIABLES	Source
S.1.	Literacy	United Nations: www.un.org
S.2.	Social problems (crime & drugs)	United Nations Office on Drugs and Crime: www.unodc.org/unodc/en/crime
S.3.	Health and medical programs	World Health Organization: www.who.int
S.4.	External culture influence	Cable TV. customers per capita
S.5.	Food security	United Nations World Food Programme: www.wfp.org
S.6.	Public education	United Nations: www.un.org and World Bank: www.wb.org
S.7.	Low cost housing projects	World Bank: www.worldbank.org/poverty/

TABLE 9: MULTI-INPUT DATABASE TABLE: REGIONAL ECONOMIC DEVELOPMENT OF TRADE BLOC "XYZ"

CODE	ECONOMICS FACTORS LIST	TRADE BLOC NAME					RESULT	
		COUNTRY					RESULT	
	VARIABLES	C1	C2	C3	C4	……CN	AS	TPR
E.1.	**Production**							
E.1.1.	GDP structure by sector							
E.1.1.1.	Agriculture	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 1$	5
E.1.1.2.	Industry	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 2$	5
E.1.1.3.	Services	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 3$	5
E.1.2.	GDP (%)	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 4$	5
E.1.3.	Natural resources	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 5$	5
E.1.4.	Market location	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 6$	5
E.1.5.	Economic development stage	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 7$	5
E.1.6.	Subsidies level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 8$	5
E.1.7.	Environmental protection	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 9$	5
E.1.8.	Industrial concentration in large cities	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 10$	5
E.1.9.	Export structure	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 11$	5
E.1.10.	Oil production and energy resources	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 12$	5
E.1.11.	Copy right regulations	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 13$	5
E.2.	**Consumption**							
E.2.1.	Income Per-capita	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 14$	5
E.2.2.	Buyer purchase	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 15$	5
E.2.3.	Market size	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 16$	5
E.2.4.	Poverty level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 17$	5
E.2.5.	Inflation rate	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 18$	5
E.2.6.	Wealth distribution	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 19$	5
E.2.7.	Saving rate level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 20$	5
E.3.	**Trade**							
E.3.1.	Intra-regional trade volume	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 22$	5
E.3.2.	Extra-regional trade volume	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 23$	5
E.3.3.	Intra-regional tariff application							
E.3.3.1.	Tariff barriers level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 24$	5
E.3.3.2.	Non tariff barriers level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 25$	5
E.3.4.	Opening Economy to the world	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 26$	5
E.3.5.	Monopoly controls	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 27$	5
E.4.	**Labor**							
E.4.1.	International social division	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 28$	5
E.4.2.	Labor concentration							
E.4.2.1.	Urban	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 29$	5
E.4.2.2.	Rural	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 30$	5
E.4.3.	Immigration level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 31$	5
E.4.4.	Emigration level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 32$	5
E.4.5.	Population growth	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 33$	5
E.4.6.	Labor productivity	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 35$	5
E.5.	**Investment**							
E.5.1.	Domestic Direct investment -DDI-	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 36$	5
E.5.2.	Intra-regional Direct Invesment -IDI-	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 37$	5
E.5.3.	Foreign Direct Investment -FDI-	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 38$	5
E.5.4.	Privatization process	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 40$	5
E.5.5.	Interest rate	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 41$	5
E.5.6.	Exchange rate stability	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 42$	5
E.5.7.	Stock market activity	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 43$	5

CODE	ECONOMICS FACTORS LIST						RESULT	
	MULTI-INPUT DATABASE TABLE: REGIONAL ECONOMIC DEVELOPMENT OF TRADE BLOC "XYZ"							
		TRADE BLOC NAME						
CODE	ECONOMICS FACTORS LIST	**COUNTRY**					**RESULT**	
	VARIABLES	C1	C2	C3	C4	……CN	AS	TPR
E.6.	**Infrastructure**							
E.6.1.	Domestic physical infrastructure	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ44	5
E.6.2.	Transportation system	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ45	5
E.6.3.	Intra-regional physical projects	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ46	5
E.6.4.	Tourism facilities	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ47	5
E.6.5.	Telecommunications	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ48	5
E.6.6.	Electricity production	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ49	5
E.7.	**Government**							
E.7.1.	Taxation							
E.7.1.1.	Indirect	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ50	5
E.7.1.2.	Direct	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ51	5
E.7.2.	Domestic debt	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ52	5
E.7.3.	Foreign debt	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ53	5
E.7.4.	Government expenditures							
E.7.4.1.	Operational and administratives	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ54	5
E.7.4.2.	Investment	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ55	5
E.7.5.	Trade promotion expenditures	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ56	5
E.7.6.	Corruption level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ57	5
E.7.7.	Planning ecomomy (medium run)	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ58	5
E.8.	**International cooperation**							
E.8.1.	Financial	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ59	5
E.8.2.	Technical	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	Σ60	5
TOTAL							ΣAS	ΣTPR
TOTAL (%)							AP	100%

AS= ACTUAL SITUATION

TPR = TOTAL OF POSSIBLE RESULTS

X_i= REGIONAL DEVELOPMENT INDIXES

MEASURES:

$\Sigma 1 ……N$ = The total sum of all country at the same region

ΣAS = Total of actual situation

ΣTPR= Total of possible results

$X_i = \Sigma AS/\Sigma TPR$

CODE	ECONOMICS FACTORS LIST VARIABLES	PARAMETERS	
	TABLE 10: REGIONAL ECONOMIC DEVELOPMENT PARAMETERS		
E.1.	**Production**	Limit	Source
E.1.1.	GDP structure by sector		
E.1.1.1.	Agriculture	1= high or 0= low	Rate variation between two periods
E.1.1.2.	Industry	1= high or 0= low	Rate variation between two periods
E.1.1.3.	Services	1= high or 0= low	Rate variation between two periods
E.1.2.	GDP (%)	1= high or 0= low	GDP real > 2%
E.1.3.	Natural resources	1=high or 0=low	Agriculture line < 50%
E.1.4.	Market location	1=C or 0=Fsr	Gravity model results
E.1.5.	Economic development stage	1=Develped or 0= dev	World Bank Classification based on income
E.1.6.	Subsidies level	1= low or 0=high	Free of subsidies or < 10% of production has subs.
E.1.7.	Environmental protection	1= high or 0= low	Exist a legal framework can protect environmetal
E.1.8.	Industrial concentration in large cities	1=low or 0=high	< 45% of the industry is concetrated at capital city
E.1.9.	Export Gross	1= HAV or 0= LAV	Rate variation between two periods
E.1.10.	Oil production and energy resources	1=high or 0=low	Country can generate 40% of the local energy
E.1.11.	Copyright regulations	1= E or 0= NE	Exist a legal framework can protect copyright issues
E.2.	**Consumption**		
E.2.1.	Income Per-capita	1= high or 0= low	Amount of income > US$ 1,500 per year
E.2.2.	Buyer purchase	1= high or 0= low	Table of buyer purchase by country based on a list
E.2.3.	Market size	1= large or 0= small	> 5 millions Population level
E.2.4.	Poverty level	1= low or 0= high	< 25% in the poverty line
E.2.5.	Inflation rate	1= low or 0= high	rate of inflation < 5% annual
E.2.6.	Wealth distribution	1= low or 0= high	Gini coefficient by country and region
E.2.7.	Saving rate level	1= high or 0= low	Amount of private deposits, variation rate
E.3.	**Trade**		
E.3.1.	Intra-regional trade volume	1= high or 0= low	Variation rate of trade volume (export and import)
E.3.2.	Extra-regional trade volume	1= high or 0= low	Variation rate of trade volume (export and import)
E.3.3.	Intra-regional tariff application		
E.3.3.1.	Tariff barriers level	1= high or 0= low	Percentage of tariiff barriers average variateion rate
E.3.3.2.	Non tariff barriers level	1= high or 0= low	Number of cases apply Non-trade barriers
E.3.4.	Opening Economy to the world	1= high or 0= low	Index of freedom market between the first 50 countries
E.3.5.	Monopoly controls	1= high or 0= low	Index of Anti-trust law report (the first 50 countries)
E.4.	**Labor**		
E.4.1.	International social division	1= high or 0= low	Industrial and Services sector < 60%
E.4.2.	Labor concentration		
E.4.2.1.	Urban	1= high or 0= low	Variation rate of the urban labor concentration
E.4.2.2.	Rural	1= low or 0= high	Variation rate of the rural labor concentration
E.4.3.	Immigration level	1= low or 0= high	Variation rate of the number of Immigrants per year
E.4.4.	Emigration level	1= high or 0= low	Variation rate of number of emigrants per year
E.4.5.	Population growth	1= low or 0= high	Percentage of population growth < 2%
E.4.6.	Labor productivity	1= high or 0= low	Index of productivity first 50 countries arounf the world
E.5.	**Investment**		
E.5.1.	Domestic Direct investment -DDI-	1= high or 0= low	Rate variation between two periods
E.5.2.	Intra-regional Direct Invesment -IDI-	1= high or 0= low	Rate variation between two periods
E.5.3.	Foreign Direct Investment -FDI-	1= high or 0= low	Rate variation between two periods
E.5.4.	Privatization process	1= high or 0= low	Number of privatizations projects
E.5.5.	Interest rate	1= low or 0= high	Rate variation between two periods
E.5.6.	Exchange rate stability	1= high or 0= low	Rate variation between two periods
E.5.7.	Stock market activity	1= high or 0= low	Rate variation between two periods

CODE	ECONOMICS FACTORS LIST VARIABLES	PARAMETERS				
	REGIONAL GLOBAL ECONOMIC DEVELOPMENT PARAMETERS					
E.6.	**Infrastructure**					
E.6.1.	Domestic physical infrastructure	1= high or 0= low	Number of airports, ports, Km.highways and rail			
E.6.2.	Transportation system	1=cheap or 0=exp.	Prices level of basic transportation is using into the region			
E.6.3.	Intra-regional physical projects	1= high or 0= low	Number of projects under regional level			
E.6.4.	Tourism facilities	1= high or 0= low	Number of hotels and travel agencies			
E.6.5.	Telecommunications	1= high or 0= low	Number of telecommunications companies			
E.6.6.	Electricity production	1= high or 0= low	Variation rate of electricity production per year			
E.7.	**Government**					
E.7.1.	Taxation					
E.7.1.1.	Indirect	1= high or 0= low	Rate variation of the total of indirect tax			
E.7.1.2.	Direct	1= high or 0= low	Rate variation of the total of direct tax			
E.7.2.	Domestic debt	1= high or 0= low	Rate variation between two periods			
E.7.3.	Foreign debt	1= high or 0= low	Rate variation between two periods			
E.7.4.	Government expenditures					
E.7.4.1.	Operational and administratives	1= high or 0= low	Rate variation between two periods			
E.7.4.2.	Investment	1= high or 0= low	Rate variation between two periods			
E.7.5.	Trade&Tourism promotion expenditures	1= high or 0= low	Gov. expenditures variation rate			
E.7.6.	Corruption level	1= high or 0= low	Outside from the first 50 countries with higher corruption			
E.7.7.	Planning ecomomy (medium run)	1= high or 0= low	Number of macro-prejects in the medium run			
E.8.	**International cooperation**					
E.8.1.	Financial	1= high or 0= low	Rate variation between two periods			
E.8.2.	Technical	1= high or 0= low	Number of trainig programs			

QL = Qualitative Variable
QT = Quantitative Variable
%= Percentage
S= Strategic
NS= Non Strategic
Dd= Developed Country
Ding= Developing Country
LDC= Less Developed Country
E= Exist
NE= Non exist

Note: */ We are using in all QT measure, the average variation rate by decade
(e.g. Variation rate between 1960's and 1970's to analizing decade of 1970's)

CODE	ECONOMICS FACTORS LIST VARIABLES	Source			
TABLE 11: REGIONAL ECONOMIC DEVELOPMENT SOURCES					
E.1.	**Production**				
E.1.1.	GDP structure by sector				
E.1.1.1.	Agriculture	World Bank: www.worldbank.org/data/			
E.1.1.2.	Industry	World Bank: www.worldbank.org/data/			
E.1.1.3.	Services	World Bank: www.worldbank.org/data/			
E.1.2.	GDP (%)	World Bank: www.worldbank.org/data/			
E.1.3.	Natural resources	Ministry of Trade and Industry by Country			
E.1.4.	Market location	Department of Statistics in each Country			
E.1.5.	Economic development stage	World Bank: www.worldbank.org/data/			
E.1.6.	Subsidies level	World Trade Organization: www.wto.org			
E.1.7.	Environmental protection	Green Peace Organization: www.greenpeace.org			
E.1.8.	Industrial concentration in large cities	Ministry of Trade and Industry by Country			
E.1.9.	Export Gross	World Bank: www.worldbank.org/data/			
E.1.10.	Oil production and energy resources	Oil Producers Organization (OPEC): www.opec.org			
E.1.11.	Copyright regulations	International Federation of Reproduction Rights Organizations: www.ifrro.org			
E.2.	**Consumption**				
E.2.1.	Income Per-capita	World Bank: www.worldbank.org/data/			
E.2.2.	Buyer purchase	World Bank: www.worldbank.org/data/			
E.2.3.	Market size	Department of Statistics by Country			
E.2.4.	Poverty level	World Bank: www.worldbank.org/data/			
E.2.5.	Inflation rate	World Bank: www.worldbank.org/data/			
E.2.6.	Wealth distribution	World Bank: www.worldbank.org/data/			
E.2.7.	Saving rate level	World Bank: www.worldbank.org/data/			
E.3.	**Trade**				
E.3.1.	Intra-regional trade volume	World Bank: www.worldbank.org/data/			
E.3.2.	Extra-regional trade volume	World Bank: www.worldbank.org/data/			
E.3.3.	Intra-regional tariff application				
E.3.3.1.	Tariff barriers level	World Trade Organization: www.wto.org			
E.3.3.2.	Non tariff barriers level	World Trade Organization: www.wto.org			
E.3.4.	Opening Economy to the world	World Trade Organization: www.wto.org			
E.3.5.	Monopoly controls	Ministry of Trade and Industry by Country			
E.4.	**Labor**				
E.4.1.	International social division	Department of Statistics in each Country			
E.4.2.	Labor concentration				
E.4.2.1.	Urban	Department of Statistics in each Country			
E.4.2.2.	Rural	Department of Statistics in each Country			
E.4.3.	Immigration level	Ministry of Foreign Affairs by Country			
E.4.4.	Emigration level	Ministry of Foreign Affairs by Country			
E.4.5.	Population growth	Department of Statistics in each Country			
E.4.6.	Labor productivity	Ministry of Industry and Trade by Country			
E.5.	**Investment**				
E.5.1.	Domestic Direct investment -DDI-	Central Bank by Country			
E.5.2.	Intra-regional Direct Invesment -IDI-	Central Bank by Country			
E.5.3.	Foreign Direct Investment -FDI-	Central Bank by Country			
E.5.4.	Privatization process	Central Bank by Country			
E.5.5.	Interest rate	Central Bank by Country			
E.5.6.	Exchange rate stability	Central Bank by Country			
E.5.7.	Stock market activity	Central Bank by Country			

	REGIONAL ECONOMIC DEVELOPMENT SOURCES				
CODE	**ECONOMICS FACTORS LIST VARIABLES**	**Source**			
E.6.	**Infrastructure**				
E.6.1.	Domestic physical infrastructure	Ministry of Communication by country			
E.6.2.	Transportation system	Ministry of Communication by country			
E.6.3.	Intra-regional physical projects	World Trade Organization: www.wto.org			
E.6.4.	Tourism facilities	Tourism Agency by country			
E.6.5.	Telecommunications	Tecommunications companies by country			
E.6.6.	Electricity production	Electricity Power Companies by country			
E.7.	**Government**				
E.7.1.	Taxation				
E.7.1.1.	Indirect	International Monetary Found (IMF): www.imf.org			
E.7.1.2.	Direct	International Monetary Found (IMF): www.imf.org			
E.7.2.	Domestic debt	International Monetary Found (IMF): www.imf.org			
E.7.3.	Foreign debt	International Monetary Found (IMF): www.imf.org			
E.7.4.	Government expenditures	Ministry of Finance by country			
E.7.4.1.	Operational and administratives	Ministry of Finance by country			
E.7.4.2.	Investment	Ministry of Finance by country			
E.7.5.	Trade&Tourism promotion expenditures	International Trade Promotion Agencies by Country			
E.7.6.	Corruption level	Transperency International: www.transparency.org			
E.7.7.	Planning ecomomy (medium run)	Ministry of Planining and Development by Country			
E.8.	**International cooperation**				
E.8.1.	Financial	Ministry of Foreign Affairs by Country			
E.8.2.	Technical	Ministry of Foreign Affairs by Country			

TABLE 12

MULTI-INPUT DATABASE TABLE:REGIONAL TECHNOLOGICAL DEVELOPMENT OF TRADE BLOC "XYZ"

CODE	**TECHNOLOGY FACTORS LIST**	**TRADE BLOC NAME**						
		COUNTRY					**RESULT**	
	VARIABLES	**C1**	**C2**	**C3**	**C4**	**......CN**	**AS**	**TPR**
T.1.	Technology (R&D) level	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 1$	5
T.2.	Internet hosts	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 2$	5
T.3.	Software production	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 3$	5
T.4.	Internet access	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 4$	5
T.5.	Telecommunications (mobil phones)	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 5$	5
T.6.	Research institutes	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 6$	5
T.7.	Biotechnology advances	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 7$	5
T.8.	Import of new technologies	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 8$	5
T.9.	R&D public investment	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 9$	5
T.10.	Technology information development	1 or 0	1 or 0	1 or 0	1 or 0	1 or 0	$\Sigma 10$	5
TOTAL							ΣAS	ΣTPR
TOTAL (%)							**AP**	**100%**

AS= ACTUAL SITUATION

TPR = TOTAL OF POSSIBLE RESULTS

$X_i=$ **REGIONAL DEVELOPMENT INDEXES**

MEASURES:
$\Sigma 1......N =$ **The total sum of all country at the same region**
$\Sigma AS =$ **Total of actual situation**
$\Sigma TPR=$ **Total of possible results**
$X_i = \Sigma AS/\Sigma TPR$

TABLE 13
THE TECHNOLOGICAL DEVELOPMENT PARAMETERS

CODE	TECHNOLOGY FACTORS LIST VARIABLES	PARAMETERS	DESCRIPTION
T.1.	Technology (R&D) level	1 = High or 0 = low	Number of technological parks and institutes
T.2.	Internnet hosts	1 = High or 0 = low	Number of WEB's
T.3.	Software production	1 = High or 0 = low	Number of software companies
T.4.	Internnet access	1 = High or 0 = low	Internet acces per habitant
T.5.	Telecommunications (mobil phones)	1 = High or 0 = low	Percentage of population using hand phone
T.6.	Research institutes	1 = High or 0 = low	Number of Universities and research inst.
T.7.	Biotechnology advances	1 = High or 0 = low	Number of Universities and research inst.
T.8.	Import of new technologies	1 = High or 0 = low	Percentage of capital goods import
T.9.	R&D public investment	1 = High or 0 = low	Number of Public Universities and Research Inst.
T.10.	Information Technology Development	1 = High or 0 = low	Number of the Home-page Designers Companies

Note: */ We are using in all QT measure, the average variation rate by decade

(e.g. Variation rate between 1960's and 1970's to analizing decade of 1970's)

TABLE 14
THE REGIONAL TECHNOLOGICAL DEVELOPMENT SOURCES

CODE	TECHNOLOGY FACTORS LIST VARIABLES	Source
T.1.	Technology (R&D) level	Technological and Universities by Country
T.2.	Internnet hosts	Internet Suppliers
T.3.	Software production	Companies Homepage
T.4.	Internnet access	Telecoommunications companies by Country
T.5.	Telecommunications (mobil phones)	Telecoommunications companies by Country
T.6.	Research institutes	Universities by Country
T.7.	Biotechnology advances	Biotechnology research centers by Country
T.8.	Import of new technologies	Customs Services Agencies by country
T.9.	R&D public investment	National Budget by Country
T.10.	Technology information development	Home-page Designers Companies

The parameters are divided into two categories. The categories are:

(i)   Quantitative variables

 (i.a.) The measurement of the regional variation rate (RVR) consists of two phases. The first phase is to measure the variation rate by country (VRC). The VRC is calculated based on two periods: present period data minus last period data. The data of each period can be in percentage or absolute values. In the second phase, the sum of all VRC is divided by the total number of countries in the trade bloc. The end result is the number RVR.

> RGR = Σ VRC / total number of countries
>
> RGR = Σ (present period data – last period data) / total number of countries

The RVR can then be compared against each VRC. The final result obtained presents two possible scenarios: first, if RVR ≤ VRC then this specific country in the trade bloc obtains a value of 1; second, if RVR ≥ VRC then this specific country in the regional bloc obtains a value of 0.

(i.b.) the regional average rate (RAR) is obtained by dividing the sum of the local input data of each country in the trade bloc by the total number of countries in the trade bloc.

> RAR = Σ local input data / total number of countries

The RAR is a fixed parameter that can be compared against each local input data by country. The final result of the RAR presents two possible scenarios: first, if the RAR ≥ country value, then the final data has the average rate = 0; second, if the RAR ≤ country value, then the final data has the average rate = 1.

(ii)   Qualitative variables

(ii.a.)   the historical data focalization (HDF) can be classified by existence (i.e. an attempt is made to prove if 1 = existing data or 0 = non-existing data). This type of qualitative variable provides an alternative way to measure non-quantitative variables that affect ranking regional integration process.

(ii.b.) the ranking list (RL) originates from the best results of certain areas (social, economic, political and technological) in some countries. The RL can be found in international organizations such as United Nations, World Bank, International Monetary Fund and etc. The size of the RL is determined by the researcher or policy maker interested in applying the RL.

Once the RL is established, countries in the trade bloc can be compared. The RL can present two possible results: first, if the country in the trade bloc is found in the RL, then this country receives a value of 1; second, if the country in the trade bloc cannot be found in the RL, then this country receives a value of 0.

5.2.1. Steps to Obtain Regional Development Indexes (X_i)

There are four regional development indexes (Xi) to be obtained. These four Xi indexes are: regional political development index (X_1), regional social development index (X_2), regional economic development index (X_3) and regional technological development index (X_4). The first step is to define all variables and parameters. Once all the variables and parameters are defined, all the data based on the variables and parameters is listed in each multi-input database table. The next step is to add the values of all variables in the column of the actual situation (AS) in each multi-input database table. The total possible results (TPR) obtained are then located in the TPR column next to AS column. With the TPR in place, the next step is to compute each regional development index (X_i). The computation is done by applying the expression (1) to the values in the multi-input database tables.

$$(1) \qquad X_i = \sum_{i=1}^{4} X_i = \sum AS_i \times 100 / \sum TPR_i$$

Following the above four steps, the fifth step is the plotting of two graphs: (a) the regional development indexes (X_i) (see Figure 1), and (b) the regional political, social, economic and technological diagnostic (see Figure 2). The latter graph serves as a means to study the balance between achievements and difficulties that any region may experience in its regional integration process (see Figure 2).

5.2.2. Introduction to Analysis of the RD Index and the RIS Index

Each of the regional global indexes ($X_{i's}$) plays an important role in the measurement of the regional development (RD) index and the regional integration stage (RIS) index. These two indexes can be affected by any change in the Xi indexes in the short and long term. The Xi indexes may reflect one of two different scenarios. First, if some or all regional development indexes which are political (X_1), social (X_2), economic (X_3) and technological (X_4) increase, then the RD index and the RIS index may increase. The second scenario is that if some or all regional development indexes (X_i) by area of development (political, social, economic and technological) decrease, then the RD index and the RIS index may decrease.

FIGURE 1
THE REGIONAL DEVELOPMENT (Xi) INDEXES DIAGRAM

FIGURE 2
THE INTRA-REGIONAL POLITICAL, SOCIAL, ECONOMIC AND TECHNOLOGY DIAGNOSTIC
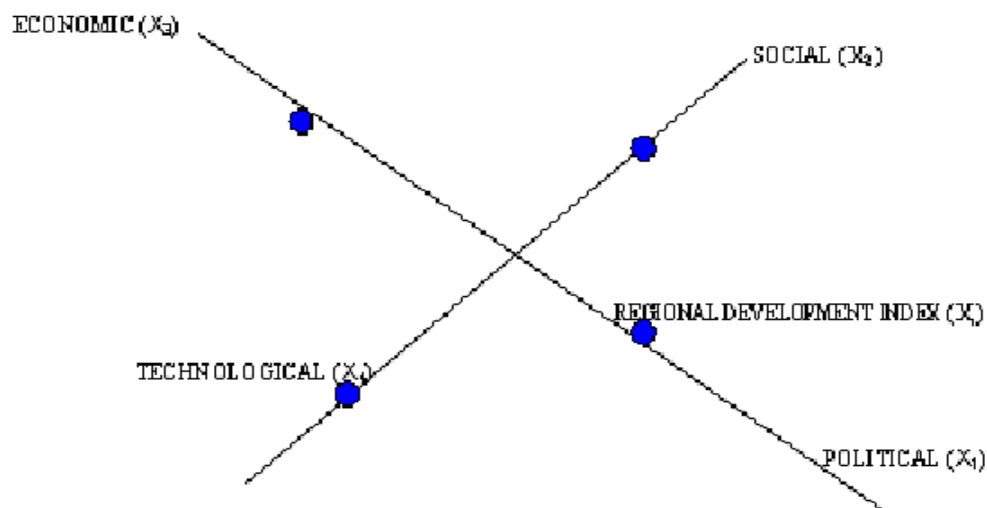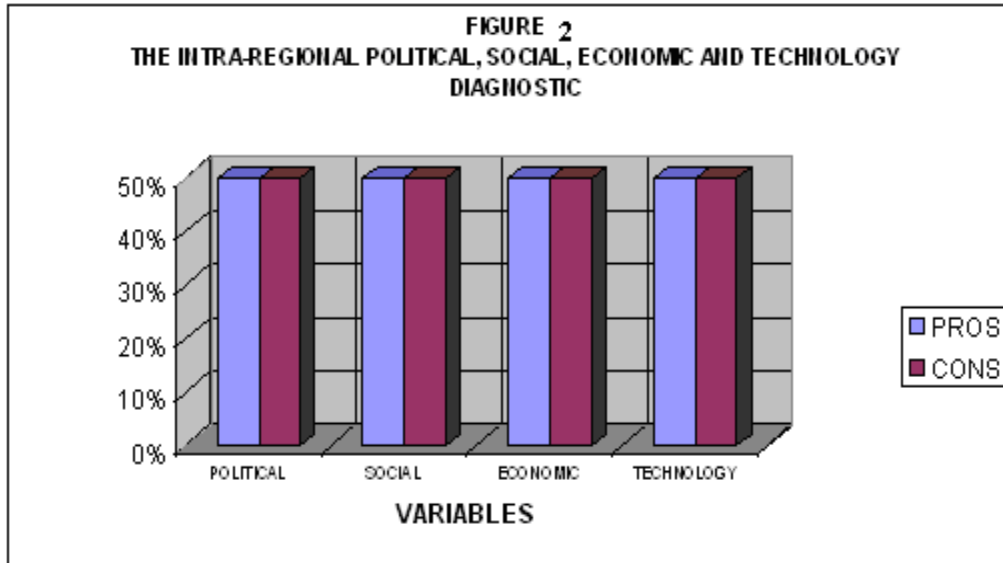
5.3. Phase III: Measurement of the Regional Development (RD) Index

The third phase of the implementation of the GDRI-Model presents a general definition of the regional development indexes (X_i) (see Diagram 1). The RD index is an indicator to compare different historical periods of the regional integration process in any region. It is based on the regional development indexes (X_i) of a region. Therefore, the RD index is a means of analyzing the evolution of any regional integration process from a global perspective.

5.3.1. Steps to Obtain the RD Index

The first step is to plot each (X_i) index: regional political development index (X_1), regional social development index (X_2), regional economic development index (X_3) and regional technological development index (X_4) on the Cartesian plane (see Figure 3 and Figure 5). It should be noted that the RD index value (single percentage) is an approximation of the past and present situations that any trade bloc may encounter in its evolution. The RD index is the summation of all the four regional development indexes (X_i). The second step is to plot the RD graph based on the total value of the four regional development indexes (X_i). This is followed by the calculation of the regional technological index (X_4) based on expression (2). It should be noted that the values of the X_i indexes are independent of one another. The RD graph consists of four different areas, where each area has a limit equivalent to 0.25. The total value of these four areas is equal to 1 as observed in the expression (2.6.)

Each axis of Figure 8 and Figure 9 is either the base or the height of the graph (represented by B and H respectively in the graph). The RD_1 uses the result of the global development index in the axis X_1 which is equal to B_1, and the global development index in the axis X_2 which is equal to H_1, followed by the application of (2.1.) The same steps and expression are used for RD_1, RD_2, RD_3 and RD_4 (see Figure 4). The total RD index for this period is the sum of all the RDs. This is depicted in expression (2.5.) The total area is divided into four dissimilar triangles each with an area equal to {Base $(=B_i)$ x Height $(=H_i)$}/2. Therefore, the triangle areas have to be summed up to derive the total surface area (see expression 2.5.)

$$
\begin{array}{cc}
4 & 4 \\
(2) \qquad \Sigma\, RD_i = \Sigma\, \{Base\,(=X_i)\ x\ Height\,(=H_i)\}\ /\ 2 \\
i=1 & i=1
\end{array}
$$

2.1.) $[B_1 = H_4]$: $RD_1 = \{X_1(=B_1)\ x\ X2(=H_1)\}/2$

2.2.) $[B_2 = H_1]$: $RD_2 = \{X_2(=B_2)\ x\ X3(=H_2)\}/2$

2.3.) $[B_3 = H_2]$: $RD_3 = \{X_3(=B_3)\ x\ X_4(=H_3)\}/2$

2.4.) $[B_4 = H_3]$: $RD_4 = \{X_4(=B_4)\ x\ X_1(=H_4)\}/2$

2.5.) $RD = RD_1 + RD_2 + RD_3 + RD_4$

B= Base   H= Height

The main reason to apply this formula is based on the measurement of the area of the four sided figure on the horizontal plane. Therefore, the value of each area will be used to measure the final result on the origin (Y) or fifth axis. Y is based on the result of the four triangle areas under the horizontal plane.

5.3.2. Analysis of the RD Index

The analysis of the RD index is based on the comparison of two periods or regions. In the case of this thesis, two periods (i.e. first period and second period) are compared. The total RD index may present three possible scenarios, namely (a) expansion (RD´ first period < RD˝ second period), (b) stagnation (RD´ first period = RD˝ second period) and (c) contraction (RD´ first period > RD˝ second period).

In terms of time-span, the RD index can be measured and compared on a yearly basis, five-yearly basis, and by decades. For this research, the time-span is divided into four specific decades (the 1960's to the 1990's), which can later be compared. In terms of space, the RD index can be measured and compared in relation to countries or regional blocs. At any historical moment, the regional integration process in any region is based on the comparison of the size of the regional development index (X_i).
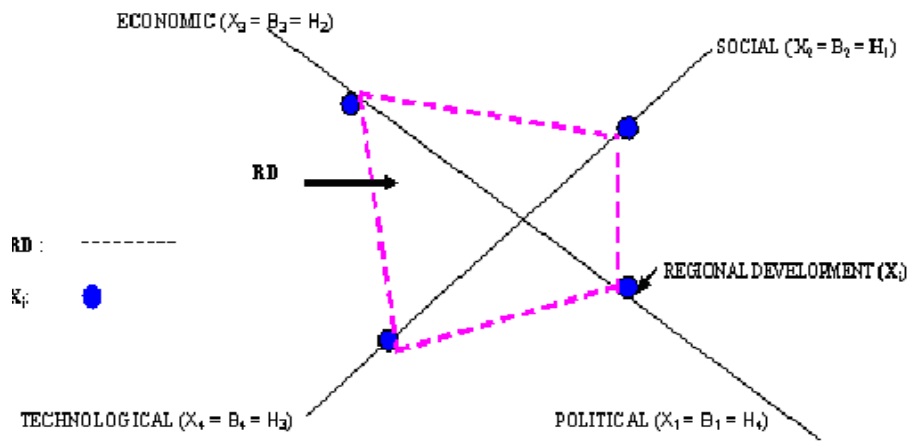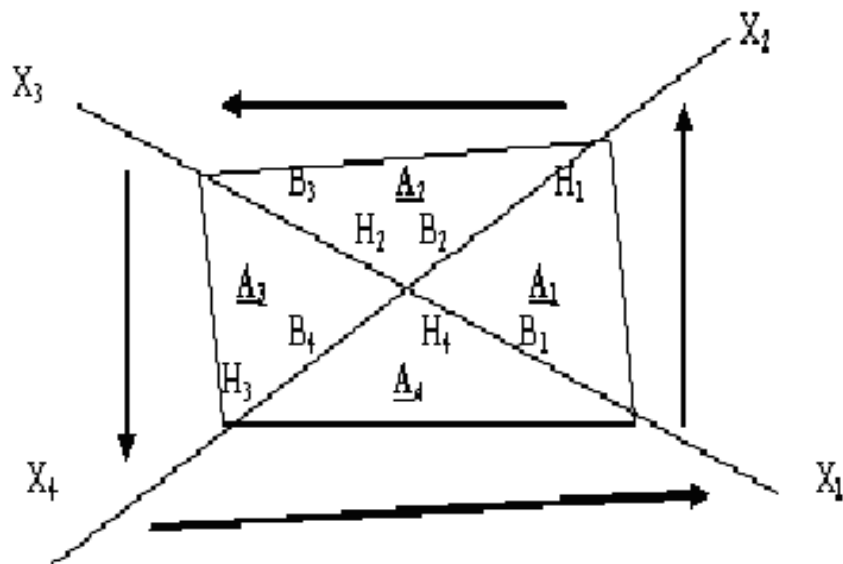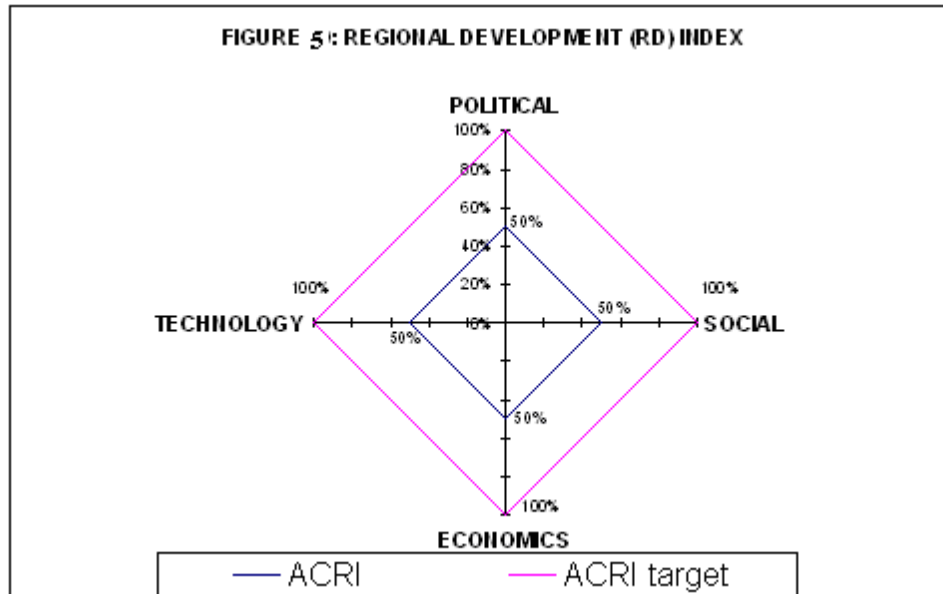
FIGURE 3
THE REGIONAL DEVELOPMENT (RD) INDEX

ECONOMIC $(X_3 = B_3 = H_2)$

SOCIAL $(X_2 = B_2 = H_1)$

RD

RD :   - - - - - - - - -

K_i:

REGIONAL DEVELOPMENT (X_i)

TECHNOLOGICAL $(X_4 = B_4 = H_3)$ POLITICAL $(X_1 = B_1 = H_4)$

FIGURE 4
AREAS OF ROTATION APPLIED TO RD INDEX

X_3 X_2

B_3 $\underline{A_2}$ H_1

H_2 B_2

$\underline{A_3}$ $\underline{A_1}$

B_4 H_4 B_1

H_3 $\underline{A_4}$

X_4 X_1

FIGURE 5: REGIONAL DEVELOPMENT (RD) INDEX

5.4. Phase IV: Measurement of the Regional Integration Stage (RIS) Index

The last phase in the implementation of the GDRI-Model is the measurement of the regional integration stage (RIS) index (see Diagram 1). The RIS index measures the degree or stage of the regional integration development that any region achieves in its different stages of evolution. The RIS index is considered a dependent variable in the GDRI-Model.

In the measurement of the RIS index, four regional development indexes (X_i) are used: regional political development index (X_1), regional social development index (X_2), regional economic development index (X_3) and regional technological development index (X_4). A constant coefficient - regional integration approach inclines (RIAI) - is also used concurrently. The RIAI is represented by a, b, c, and d in expression (3) and is applied to each global development index (Xi). Each RIAI (a, b, c, or d) has a limit that is equal to 1 [Refer to expression (3)]. The weighted sum of the RIAI's cannot be more than 1.

The application of the RIAI is twofold. The first application is the RIAI Homogeneous Interest. In this application, each RIAI has the same level of importance in the analysis [Refer to expression (3.1.)]. The second application is the RIAI Incline. There are four possibilities in this application: political approach incline (3.2.), social approach incline (3.3.), economic approach incline (3.4.) and technological approach incline (3.5.)

Analysis of the RIS Index

After the type of RIAI to be applied is determined, the regional integration stage (RIS) index is measured according to expression (3). The RIS index analysis may reveal one of three different scenarios, namely (a) under-developed stage ($0 \leq RIS \leq 0.33$), (b) developing stage ($0.34 \leq RIS \leq 0.66$) and (c) developed stage ($0.67 \leq RIS \leq 1$). The analysis of the RIS index can provide a general idea or approximation of the stage of regional integration achieved in any region through time and space. The following is a suggested combination of the application of the RIAI in the measurement of the RIS index:

$$(3.) \quad Y = RIS = aX_1 + bX_2 + cX_3 + dX_4 \leq 1$$

(3.1.) $a = 0.25, b = 0.25, c = 0.25, d = 0.25 = 1 \Rightarrow$ RIAI homogeneous interest

(3.2.) $a = 0.40, b = 0.20, c = 0.20, d = 0.20 = 1 \Rightarrow$ RIAI political approach incline

(3.3.)   a = 0.20, b = 0.40, c = 0.20, d = 0.20 = 1 => RIAI social approach incline
(3.4.)   a = 0.20, b = 0.20, c = 0.40, d = 0.20 = 1 => RIAI economic approach incline
(3.5.)   a = 0.20, b = 0.20, c = 0.20, d = 0.40 = 1 => RIAI technological approach incline

It must be highlighted that the above combination represents only several of many possibilities or permutations. This should draw attention to the flexibility of the RIS index in adapting to any situation or chosen policy mode. The RIS index presents an approximation of the global development from the political, social, economic and technological perspectives concurrently based on a new concept of graphic representation. This new concept of graphic representation consists of five axes, each of which has a positive value (in the case of this research, the value in each axis is represented by a percentage). Once the axes of the graph are in place, the next step is to plot the four X_i indexes (political, social, economic, and technological X_i indexes) in four of the axes respectively. These X_i indexes are independent variables. The total value of the four axes is equal to 1 (see Figure 6). The fifth axis, which is represented by Y and positioned in the center of the graph (among the other four axes), represents the dependent variable RIS index. This fifth axis is the convergent point of all the other four axes or more precisely, the four areas - political, social, economic, and technological - of the regional development indexes (X_i). The RIS index (Y) is depicted as follows in expression (4):

$$Y = F (X_1, X_2, X_3, X_4) \leq 1$$

FIGURE 6
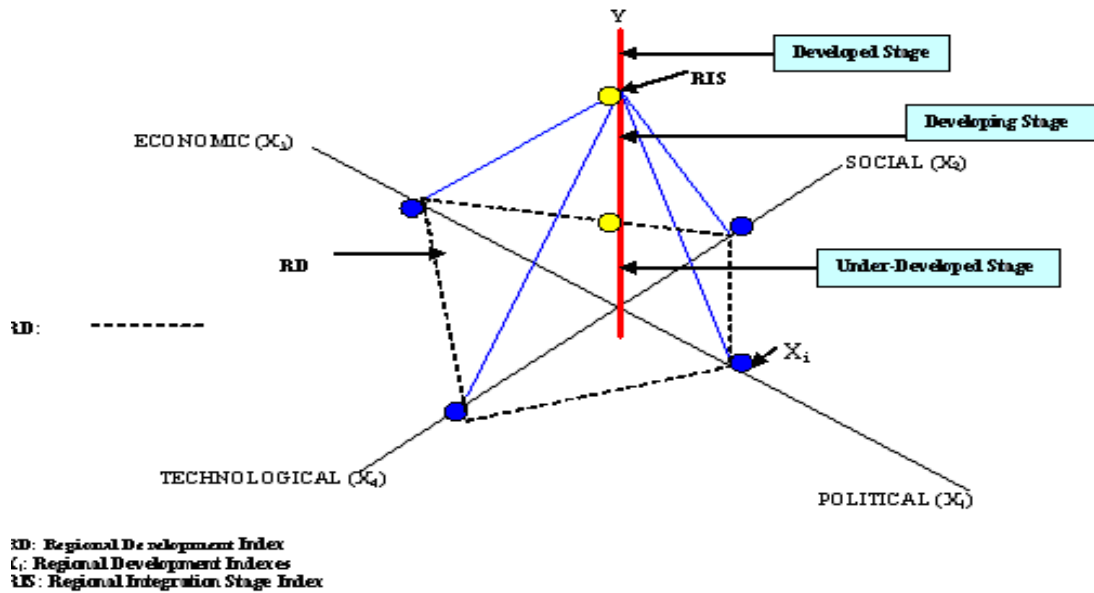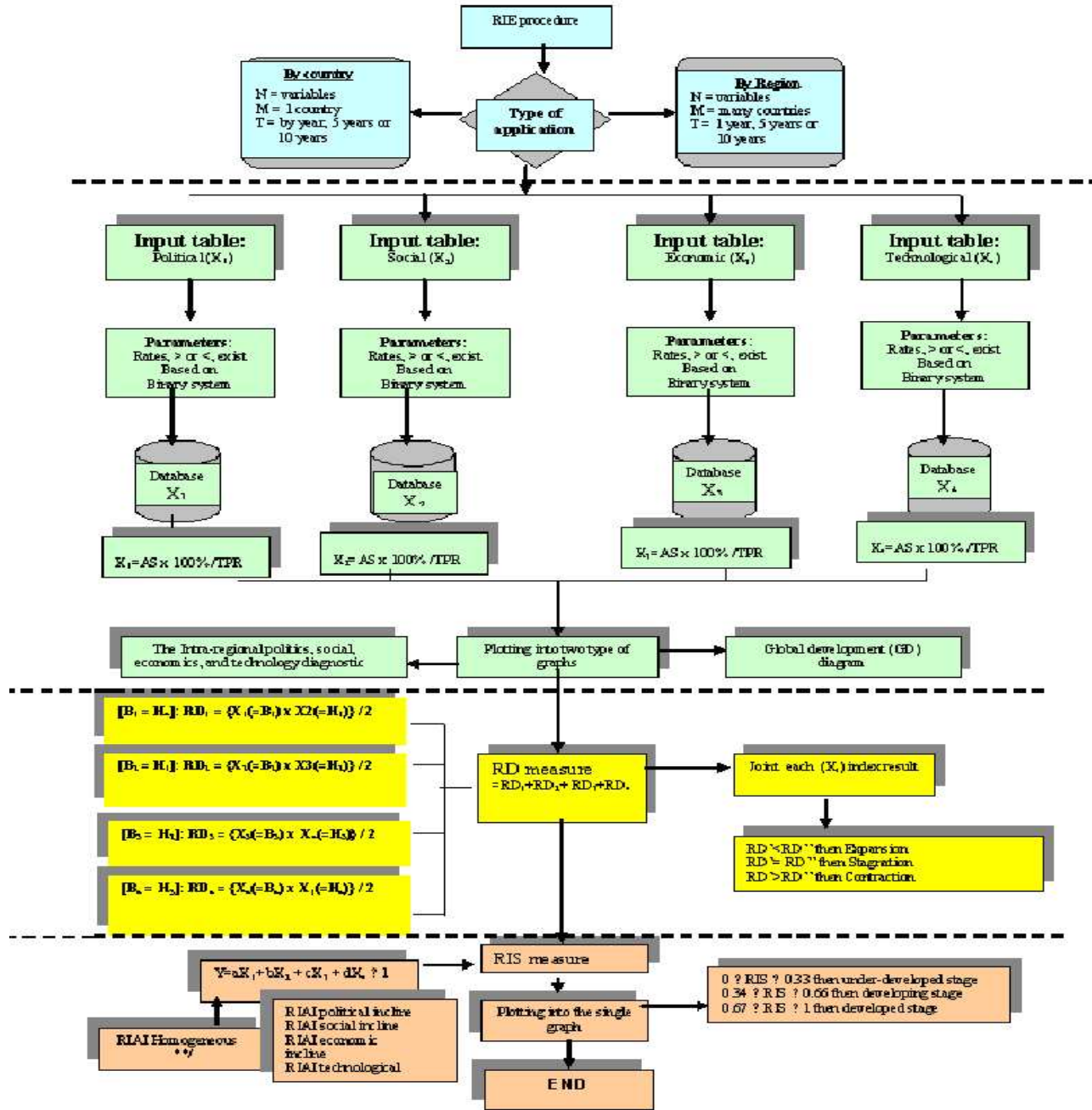**THE GRAPH OF THE REGIONAL INTEGRATION STAGE (RIS) INDEX**

RD: Regional Development Index
X_i: Regional Development Indexes
RIS: Regional Integration Stage Index

DIAGRAM 1: FLOWCHART OF GDRI-MODEL

RIE procedure

Type of application

By country
N = variables
M = 1 country
T = by year, 5 years or 10 years

By Region
N = variables
M = many countries
T = 1 year, 5 years or 10 years

Input table: Political (X_1)

Input table: Social (X_2)

Input table: Economic (X_3)

Input table: Technological (X_4)

Parameters: Rates, > or <, exist. Based on Binary system

Parameters: Rates, > or <, exist. Based on Binary system

Parameters: Rates, > or <, exist. Based on Binary system

Parameters: Rates, > or <, exist. Based on Binary system

Database X_1

Database X_2

Database X_3

Database X_4

$X_1 = AS \times 100\% / TPR$

$X_2 = AS \times 100\% / TPR$

$X_3 = AS \times 100\% / TPR$

$X_4 = AS \times 100\% / TPR$

The Intra-regional politics, social, economics, and technology diagnostic

Plotting into two type of graphs

Global development (GD) diagram

$[B_1 = H_4]$: $RD_1 = \{X_1(=B_1) \times X2(=H_4)\} / 2$

$[B_2 = H_1]$: $RD_2 = \{X_2(=B_2) \times X3(=H_1)\} / 2$

$[B_3 = H_2]$: $RD_3 = \{X_3(=B_3) \times X_4(=H_3)\} / 2$

$[B_4 = H_3]$: $RD_4 = \{X_4(=B_4) \times X_1(=H_4)\} / 2$

RD measure $= RD_1 + RD_2 + RD_3 + RD_4$

Joint each (X_i) index result

RD`<RD`` then Expansion
RD`= RD`` then Stagnation
RD`>RD`` then Contraction

$Y = aX_1 + bX_2 + cX_3 + dX_4 ? 1$

RIS measure

RIAI political incline
RIAI social incline
RIAI economic incline
RIAI technological

RIAI Homogeneous * */

Plotting into the single graph

$0 ? RIS ? 0.33$ then under-developed stage
$0.34 ? RIS ? 0.66$ then developing stage
$0.67 ? RIS ? 1$ then developed stage

END

6.   Application of the GDRI-Model into a Single Trade Bloc:
The GDRI-Model can be also applied to different trade blocs in different regions around the world. The trade blocs under study in this thesis are the European Union (EU), the North American free trade area (NAFTA), the association of Southeast Asian nations (ASEAN-5) and the Market of the South cone (MERCOSUR). The two periods identified in the application of GDRI-Model are the 1980's, 1990's and the period from 2000-2006.

6.1. The European Union (EU): Advanced Regional Integration Development
The regional integration of the EU is based on the old regionalism. The custom union scheme in the EU generated the highest level of regional development indexes (X_i) by area (political, social, economic and technological). The result of the regional political development index (X_1) was 0.80 and the regional social development index (X_2) was 0.71 (see Table 15). These two results locate EU in the top position of the regional integration development stage in the world. Meanwhile, the regional economic development index (X_3) and regional technological development index (X_4) were 0.83 and 0.88 respectively (see Table 15). The X_3 and X_4 were located at the developed stage, but not at the same level as the regional political development (X_1) and regional social development (X_2). While the RIS index of the EU in the 1980's was 0.81, the RIS of the same trade bloc in the 1990's was 0.83. The RIS index in the 1990s was located in the developed stage, as shown in Figure 8.

In the 1990's, all regional development indexes (X_i) of EU (politics, social, economic, and technology) present a stronger growth. The regional political development index (X_1) and regional social development index (X_2) present the highest value ever of 0.81 and 0.78 respectively. The RIS index in the 1990's is located in the developed stage of 0.83 (see Figure 8). It is clear that the strong regional development indexes (X_i) in EU are the regional political development index (X_1) and the regional social development index (X_2). The regional economic development index (X_3) and regional technological development index (X_4) present positive advances of 0.85 and 0.89 respectively (see Table 15). The EU scheme proves that if each member in the same region presents strong regional development indexes (X_i) in each area (political, social, economic, and technological), then regionalism can be successful. At the same time, successful regionalism can generate expansion of the regional development indexes (X_i) in each member.

In the period from 2000-2006, the idea came up to incorporate new members into the EU with less regional development (social, political, economic and technological) such as the Republic of Cyprus (2004), the Republic of Estonia (2004), the Republic of Hungary (2004), the Republic of Latvia (2004), the Republic of Lithuania (2004), the Republic of Malta (2004), the Republic of Poland (2004), the Slovak Republic (2004), the Republic of Slovenia, and the Czech republic (2004). This generated a negative impact on the EU Regional Development Stage (RIS) during this specific period. The regional political development index (X_1) was 0.75, the regional economic development index (X_3) was 0.80, regional social development index (X_3) was 0.73 and regional technological development index (X_4) was 0.85. In this period, the new European Union members saw some amount of negative impact in all regional development indexes (Xi) of EU members. Meanwhile, the regional development stage (RIS) index decreased to 0.78 (see Figure 9). However, the RIS index in the 2000-2006 periods was lower than those of the 1990's due to the introduction of new members into the EU.

6.2. NAFTA: Constant Regional Integration Development

Unlike the EU, the North America Free Trade Area (NAFTA) applies the Free Trade Areas scheme. The regional development in NAFTA in the 1980's saw a high regional economic development index (X_3). X_3 is located in the developed stage with the value of 0.65 (see Table 15). X_3 of NAFTA is a higher value compared to the rest of the regional development indexes (X_i) of other areas: political, social and technological development indexes (see Figure 7).

The regional technological development index (X_4) was in the development stage of 0.90. The regional political development index (X_1) and regional social development index (X_2) have lower results of 0.65 and 0.48 respectively. While the regional integration stage (RIS) index in NAFTA in the 1980's is 0.69, in the 1990's the RIS index experienced an expansion to the level of 0.80. Meanwhile the regional integration stage (RIS) index in the 1980s and the 1990s are both located in the developed stage with the value of 0.69 and 0.80 respectively (see Figure 8).

In the 1990's, favorable conditions resulting from the improvement of the global development of Mexico made it possible for it to join NAFTA. The regional political development index (X_1) of NAFTA was 0.67 and the regional economic development index (X_3) of NAFTA was 0.82. While X_1 continued in the same stage level (developed stage), the regional social development index (X_2) in the 1990's saw a rise compared to 0.76, but continued to be in the developed stage. The regional technological development index (X_4) also observed an expansion to 0.93 (see Table 15). The improvement of X_i originated mainly from a strong regional economic development (X_3).

The expansion of NAFTA in the period from 2000-2006 is constant. The regional economic development index (X_3) then was 0.70 (see Figure 9). It is now being suggested that much of the growth during this period was actually due to export and, more specifically, to exports that were destined abroad rather than among member countries. There are also favorable terms of trade, especially with respect to Mexico. The regional technological development index (X_4) was recorded as 0.93. It is important to note that, in the period from 2000-2006, Mexico presented a better political situation compared to the 1980's and the 1990's. This improvement was reflected in the regional political development index (X_1) of 0.70. The regional social development index (X_2) was 0.76, which moved within the developed stage or level 3. The regional integration stage (RIS) index being 0.81, the NAFTA was in the developing stage of regional integration (see Figure 9). It can be concluded that in the period 2000-2006 NAFTA witnessed strong trade unification in this stage.

6.3. ASEAN: Stagnant Regional Integration Development

The following are the results of the regional development indexes (X_i) by area in the Association of Southeast Asian Nations (ASEAN) in the 1980's (see Figure 7): the regional political development index (X_1) was in the under-developed stage of 0.23; the regional social development index (X_2) was in the developing stage of 0.37; the regional economic development (X_3) was in the developing stage of 0.36 and the regional technological development (X_4) was located in the under-developed stage of 0.22 (see Table 15). The low regional development indexes (X_i) by area in ASEAN originated from the different levels of development in all member countries. There was a large gap in the regional development among most ASEAN members.

However, in the 1990's, the regional political development index (X_1) of ASEAN expanded to 0.33 (see Table 15). X_1 was located in the developing stage. The regional social

development index (X_2) maintained a high rate of 0.46. X_2 is in the developing stage. It is important to note that in the 1990s, the financial crisis of 1997 affected several ASEAN members, especially Indonesia, Thailand and Malaysia. In fact, the financial crisis in these three countries affected the regional economic development index (X_3) of ASEAN in the 1990's, as it was located in the developing stage of 0.41 (see Table 15).

The regional technological development index (X_4) also received a negative impact, with the value of 0.51. It was in the developing stage. The RIS index in the 1980's was located in the under-developed stage with 0.30, but with the value of 0.43 in the 1990's. It continues to be in the developing stage (see Figure 7). From the above, it can be observed that the major factor that contributed to the small improvement of the regional development index (X_i) of ASEAN is the small improvement of the regional political development (X_1).

The ASEAN regional integration process continued to decline in the period from 2000-2006. The average growth rates relative to those achieved in the previous decade declined. The regional economic development index (X_3) of the ASEAN then fell to 0.32. The root of the problem was that ASEAN depended mainly on weak integration models. The regional technological development index (X_4) was then 0.52. Consequently, ASEAN saw a drastic shift in the terms of trade among its members. It generated high levels of inflation and negative payoff trade with the rest of the world, especially from the Philippines, Indonesia and Thailand. Consequently, the interregional system of payments of the region is weak and a foreign exchange vulnerable in these three countries.

There was growing disillusionment among ASEAN members. The constant competition to attract foreign direct investment (FDI) among ASEAN members produced a large obstacle in the regional integration process of ASEAN. Several social problems also started to surface in some ASEAN members in the case of the South Part of Thailand (army forces and Islamic radical groups) during this period. This situation was reflected in the regional political development index (X_2) of 0.32. It was also from 2000-2006 that several political problems in Thailand arose against the former prime minister of Thailand Mr. Thaksin Shinawatra. As a result, the regional political development index (X_1) decreased to 0.32 (see Table 15). Natural disasters were another negative contributory factor to the regional integration process of ASEAN members. Indonesia, Thailand and Malaysia were hit by a massive tsunami in 2004. This tsunami generated a higher social and economic cost for these three countries from 2004-2005. During this period, all regional development indexes (X_i) for ASEAN members were located in the developing stage or level 1 and 2. The regional integration stage (RIS) index was 0.41 compared to 0.44 in the 1990's. Obviously, there was a small contraction in the regional integration process of ASEAN members from 2000-2006 (see Figure 9).

6.4. MERCOSUR: Fast Regional Integration Development

The market of the South Cone (MERCOSUR) followed the NAFTA regional integration scheme (new regionalism). The RIS of MERCOSUR in the 1980's was 0.26, but in the 1990's the RIS expanded to 0.46. The regional global development indexes (X_i) by area of MERCOSUR in the 1980's exhibited these results: the regional political development index (X_1) was in the under-developed stage of 0.11; the regional social development index (X_2) was in the developing stage with a value of 0.36; the regional economic development index (X_3) was located in the under-developed stage of 0.32 and the regional technological development index (X_4) was in the under-developed stage with the value of 0.23 (see Table 15). It can be observed

that X_1 in the 1980's was weak and non-stable. The lower value of X_1 in the 1980's originated from military governments led by dictators and copula military groups.

In the 1990's, the RIS reached 0.46. This is an expansion compared to the RIS of the 1980's. The regional integration stage (RIS) attained the value of 0.46 (see Figure 7 and 8). Thereafter, the RIS in the 1990's was located in the developing stage. The better result of the RIS in the 1990's originated from the improved regional political development index (X_1) of 0.44, which is located in the developing stage. However, the regional social development index (X_2) was in the developing stage with a value of 0.46. The regional economic development index (X_3) moved to the developing stage of 0.41. Meanwhile, the regional technological development index (X_4) was in the developing stage with a value of 0.51 (see Table 15).

Two basic factors that led to the formation of MERCOSUR are: (i) better conditions in external debt and a stable exchange rate in Argentina in the 1990's, and (ii) the strengthening of democracy in the 1990's (democracy is a decisive factor that consolidated the formation of MERCOSUR). Two main reasons for the improvement of the regional economic development index (X_3) among MERCOSUR members in the 1990's were the privatization of public enterprises coupled with the attraction and greater dynamism of foreign direct investment (FDI). Member countries of MERCOSUR encouraged the transfer of technology which then produced a greater dynamism in their market. Transfer of technology also permitted a higher competitiveness and greater productivity among MERCOSUR members. MERCOSUR can be considered the leader of the regional integration process of Latin America. It can be concluded that MERCOSUR has higher regional development indexes (X_i) value compared to the rest of the trade blocs in Latin America (e.g. CACM and AC), especially in the regional political development index (X_1) and regional economic development index (X_3).

The regional integration process of MERCOSUR from 2000-2006 has an RIS index result of 0.51 (see Figure 9). The Xi indexes by area in the period 2000-2006 are as follows: the regional political development index (X_1) in the developing stage with the value of 0.52; the regional social development index (X_2) in the developing stage of 0.50; the regional economic development index (X_3) in the developing stage of 0.48 and the regional technological development index (X_4) in the developing stage of 0.55 (see Table 15). The origin of these better results, especially in the regional economic development (X_3) was high inter-trade exchange, stable exchange rates and improvement of external debts in the major part of MERCOSUR members. The strong trade and investment relationship between Argentina and Brazil was based on a free trade regional agreement that was oriented to the intra-regional trade development adopted by MERCOSUR in the 1990's. The MERCOSUR regional integration scheme is generating positive results among MERCOSUR member countries.

TABLE 15:
Regional Political, Social, Economic and Technological Development
&
Regional Integration Stage (RIS)

	RPD		RSD		RED		RTD		RIS
NAFTA									
1980	0.65	16.25	0.48	12	0.74	18.5	0.90	22.5	69
1990	0.67	16.75	0.76	19	0.82	20.5	0.93	23.25	80
2000-2006	0.70	17.5	0.76	19	0.85	21.25	0.93	23.25	81
MERCOSUR									
1980	0.11	2.75	0.36	9	0.32	8	0.23	5.75	26
1990	0.44	11	0.46	11.5	0.41	10.25	0.51	12.75	46
2000-2006	0.52	13	0.50	12.5	0.48	12	0.55	13.75	51
EUROPEAN UNION									
1980	0.80	20	0.71	17.75	0.83	20.75	0.88	22	81
1990	0.81	20.25	0.78	19.5	0.85	21.25	0.89	22.25	83
2000-2006	0.75	18.75	0.73	18.25	0.80	20	0.85	21.25	78
ASEAN									
1980	0.23	5.75	0.37	9.25	0.36	9	0.22	5.5	30
1990	0.33	8.25	0.46	11.5	0.41	10.25	0.51	12.75	43
2000-2006	0.32	8	0.40	10	0.41	10.25	0.52	13	41

Figure 7: Regional Integration Stage (RIS) in Different Trade Blocs in the 1980s
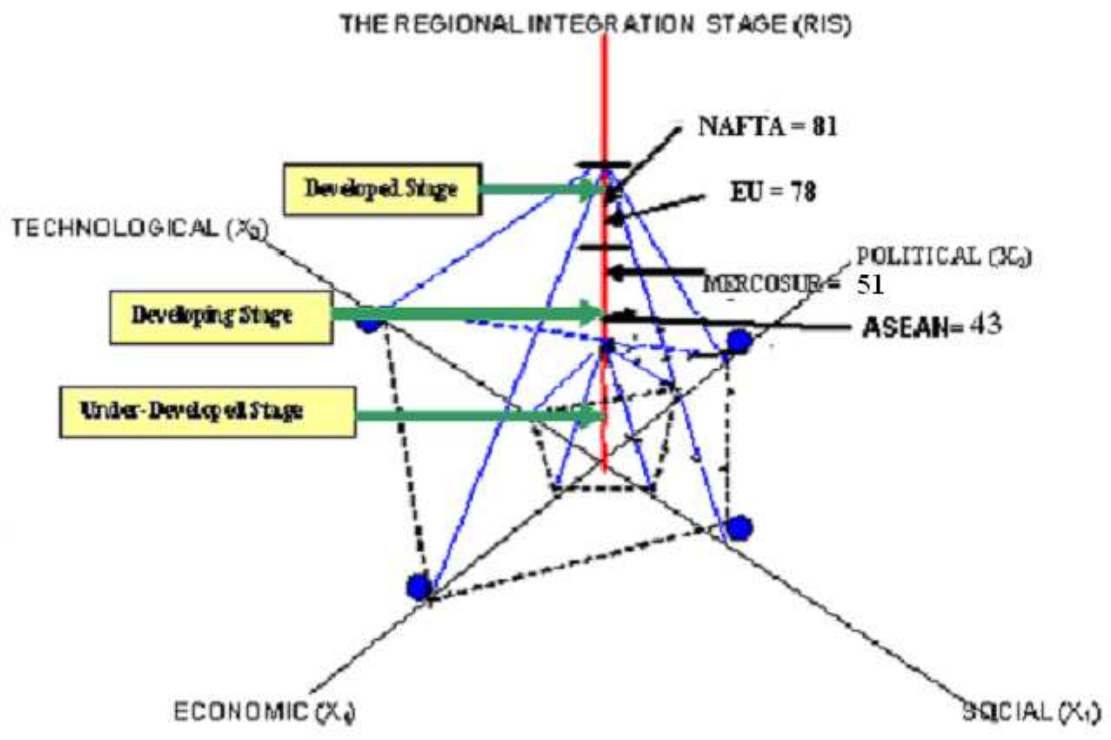
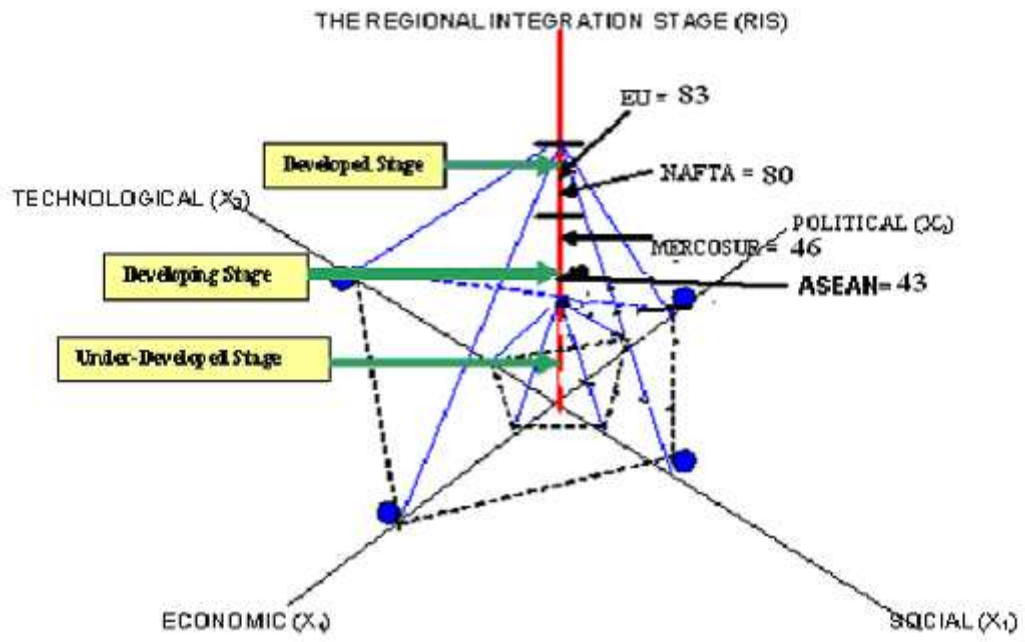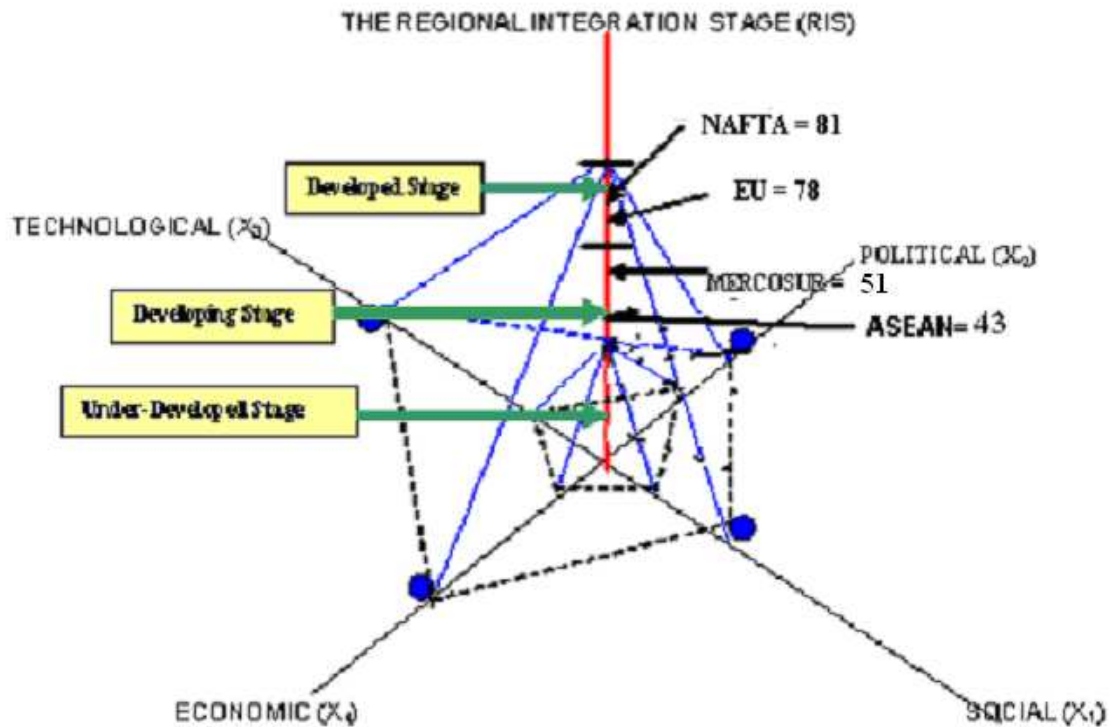Figure 8: Regional Integration Stage (RIS) in Different Trade Blocs in the 1990s

Figure 9: Regional Integration Stage (RIS) in Different Trade Blocs from 2000-2006

7. Concluding Remarks

Regional Integration can be given a new definition. It can be defined as a process that combines different domestic development systems (DDS) (countries) into a single regional development system (trade bloc). Strong regionalism, whether old regionalism or new regionalism, depends on the favorable conditions derived from regional development (RD), where RD is the combined result of all or most individual domestic development systems in the same trade bloc. Meanwhile, growth of RD in a trade bloc can be generated through strong domestic development systems (DDS) in the same region. If the domestic development systems (DDS) in some or most member countries in the trade bloc are weak, then the trade bloc cannot be successful.

This chapter maintains that there is a strong inter-dependency between regional global development (RGD) and domestic development systems (DDS). This can be observed from the application of the RIE-Model (Chapter 3) to different trade blocs (i.e. European Union [EU], North America free trade area [NAFTA], association of Southeast Asian nations [ASEAN] and MERCOSUR).

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