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FROM COMPARATIVE TOWARDS COMPETITIVE ADVANTAGE OF PAKISTAN'S AGRICULTURAL SECTOR: THE ANALYSIS OF ONE DECADE

This paper aims at evaluating the performance of Pakistan in agricultural sector during the time period of one full decade from 1995 to 2004. During the study authors have analysed comparative advantage of Pakistan in various agricultural products. The guidelines for the policy makers of Pakistan agricultural sector which could help to convert comparative advantage into competitive one are presented by this paper. Results of the research give information on the export share of agricultural products of Pakistan in international markets, reflecting export trends, as well as comparative and competitive advantage presented by agricultural products for Pakistan. The authors of this research have used methods which are widely applied in international research, such as Balassa index and Vollrath's indices of Revealed Comparative Trade Advantage: RTA, lnRXA and RC. This paper is composed of five chapters. The first chapter contains the introduction part and the second chapter contains a theoretical part with a definition of comparative and competitive advantage. Also, the second chapter includes the description of methodology for measuring the comparative advantage based on analysis of various theories, as well as M. Porter's model of competitive advantage complemented by authors. The third chapter provides information about performance of Pakistan's agricultural sector. In the fourth chapter the results of the authors' empirical research of comparative advantage for all the selected products of the Pakistani agricultural sector are presented. The fifth chapter includes conclusions and authors' recommendations for the Pakistan's government related to conducting the agricultural policy. The novelty of this research is based on the analysis of comparative advantage of Pakistan's agricultural sector in the context of the possibility of its transference into competitive advantage, showing that during the analysed decade the unit weight of agricultural products with comparative advantage is growing, but at the same time these products generally are raw materials with minimal added value which do not provide competitive advantage for Pakistan's agricultural sector. Research findings show that although Pakistan has natural comparative advantage in the agricultural production, still a lot has to be done to transfer its comparative advantage into more competitive one.

Key words: Pakistan, agricultural sector, comparative advantage, competitive advantage, Balassa index, Vollrath indices.

1. Introduction

Pakistan is basically an agricultural country and a significant part of its population is engaged in agricultural activities. Its economy mostly depends upon agriculture and industries related to agriculture. The share of agriculture in GDP in 1950 was about 57% and in 2000 around 26% that declined to 22.3% in 2004 (World Bank report 2005). Pakistan is a country of rapid population growth. Its population is increasing at the rate of 2.75% every year (Internet demographic source 2011). This increasing population has created serious problems of food supply. The declining share of agriculture in GDP and the increasing population have had impacts on the share of Pakistan's agricultural products on international markets.

No one can deny the role of globalization and its impact on transformation of national economies into a global economy. The changing world economic scenario demands trade liberalization, minimization of governments' intervention into economy and elimination of trade barriers under various World Trade Organization's (WTO) agreements. Moreover, the WTO's Agreement on agriculture puts responsibility on regimes of both underdeveloped and developed countries to initiate a process of reforms in their agrarian economies with the objectives of creating a fair and market-oriented agricultural trading system. The WTO's Agreement on agriculture specifically calls for major reduction in export subsidies, domestic support and import barriers on agricultural products and has set quantitative targets for cuts in these sectors (Chishti, Malik 2001). The targets set by WTO and challenges posed by globalization has put great pressure on all governments of developed and underdeveloped countries to search for those areas where they have comparative advantage and make their production and trading systems more efficient so as to maintain their comparative advantages transferring them to competitive ones.

This paper aims to observe the performance of Pakistan in the agricultural sector during one full decade from 1995 to 2004. The authors of the paper analyse comparative advantage of Pakistan in various agricultural products. In the paper, the guidelines to the policy makers for the future policies regarding the comparative versus competitive advantage of Pakistani agricultural sector are drawn up, which could help to convert comparative advantages into the competitive ones. Results of the research present information about the growing products of Pakistan on international market and, also, about the declining ones, emphasising Pakistan's comparative and competitive advantage.

The main question, which this study intends to answer, is whether the comparative advantage of Pakistan in agriculture under strong global adjustment pressure and political instability in 1995–2004 has improved, declined or maintained, and what are the tendencies towards competitive advantage of Pakistan's agricultural sector.

Pakistan is presently in grip of many external and internal problems. The external problems are caused by WTO and its regulations and internal ones – by increasing population, lack of technical know-how, inconsistency in policies and political instability. Despite increased liberalization policies of regimes across the world regarding WTO Agreements, the share of Pakistan products on international markets has decreased substantially over the time (Mustafa 2005). Since Pakistan agricultural production is generally factor-based, there are also effects on the cost of production of agricultural products as the prices of their inputs like fertilizer, fuel and pesticides change due to possible trade liberalization and increase in prices of oil. Trade liberalization may induce some changes in factor markets as well. Up to now, land and labour costs in rural areas have been relatively cheap, but they may become more expensive in future due to increasing demand of agricultural products day by day. The economic reform and trade liberalization will certainly bring changes in macroeconomic policies, such as exchange rate and interest rate policies, etc. All of these changes will affect the comparative advantage of agriculture in Pakistan and hence an analytical comprehensive study on the past and current position of comparative advantage of Pakistan's agricultural sector and its possible transferring into a competitive one is needed indeed.

The first task of this paper is to analyse the changes in comparative advantage of Pakistan's agricultural sector over a certain period in order to make a conclusion that any prospective changes in comparative advantage of Pakistan can be made by exogenous or indigenous factors. The second research task is to explain the tendencies in Pakistan's agricultural sector towards a competitive advantage.

There are many methods of revealing a comparative advantage of a country in a particular sector. The authors of the paper have applied methods, which are widely adopted in literature, i.e. Balassa index and Vollrath's indices of Revealed Comparative Trade Advantage – RTA, lnRXA and RC. In empirical analysis, the authors have used data from the website of UNO Statistical Department FAOSTAT. The website provides an extensive database on agricultural and food commodities. Only 102 products have been selected for the analysis in this research, taking into consideration the value of the products, not the quantity. It is important to mention that Pakistan does not belong to any free trade zone, and the authors have taken the share of it's export on the world market as the basis for the analysis.

2. Defining Comparative and Competitive Advantage in Economic Theory

The notion of comparative advantage was first described by R. Torrens in 1815 in an essay on the Corn Laws (Torrens 1815). However, the term is usually attributed to D. Ricardo who explained it in his book "*On the Principles of Political Economy and Taxation*" (1817), giving the idea of comparative advantage and claiming that a country can still benefit from trade if it has not absolute advantage over other country (Ricardo 1817). The notion of comparative advantage as a determinant of international trade was popularized by D. Ricardo. The basic idea behind the comparative advantage is that nations maximize their material well-being using their resources, which have comparatively best values. In order to know the best value usage for any resource, we must compare the opportunity cost of each resource.

As explained above, the comparative advantage of a country depends upon productivity shown in the production of goods; authors now look into the explanation of trade and its dependence upon productivity. In the 20th century, several economists have developed a more detailed explanation of trade, in which productivity differences of each country depend upon the country's endowments of the inputs (called "factors of production") that are used to produce goods.

The most famous work regarding factor endowment has been written by E. Heckscher and B. Ohlin. They used the idea of comparative advantage as a basis for their work and tried to explain the patterns of international trade based on the factor endowment of trading partners. The Heckscher-Ohlin trade model asserts that nations are endowed with different levels of factors of production and each product requires different combinations of inputs and the model essentially shows that countries will export products that utilize their abundant factors of production and import products that utilize the countries' scarce factors (Heckscher 1965; Heckscher-Ohlin theory 2011). A simple illustration of the Heckscher-Ohlin theory is provided by the

agricultural sector. It can be intuitively assumed that a country that is relatively well endowed with land or/and labour has a comparative advantage in producing agricultural products.

In the later international trade models like Oniki-Uzawa dynamic model comparative statistics of growth and trade have been studied; according to these models, capital-labour ratios of the countries have become the endogenous variables, whose ultimate values are derived from technology, savings functions and population growth. The Oniki-Uzawa models suggested a split of the comparative advantage into a short-term comparative advantage and a long-term comparative advantage. The short-term comparative advantage is determined by capital-labour ratio while the long-term comparative advantage is determined by propensity to save and population growth (Oniki, Uzawa 1965).

The new trade theory developed by P. Krugman does not negate the comparative advantage, but it emphasises that factor endowments themselves are inadequate explanations of international trade. P. Krugman has given a new orientation to the debate of varying nature of comparative advantage of nations. He has pointed out institutions, technological know-how and other historical factors accounted for comparative advantage of a nation (Krugman, Obstfeld 1988; Krugman 1990). In this theory, the authors see the roots of the idea of competitive advantage based on unique competence and knowledge-based technologies versus comparative advantage based on natural and labour resources' endowment.

In modern literature, many arguments in favour of various determinants of the comparative advantage can be found. For example, some economists, who believe the comparative advantage is rather dynamic, not static (Sharma, Dietrich 2004), mentioned some external and internal factors, which function as determinants of comparative advantage. External factors include foreign direct investments (FDI) coming in a country and exchange rate of a country. On the other hand, internal factors include government policies, institutions, internal demand, population growth rate, general economic and business conditions as well as quality of labour and infrastructure of a country (Tariq, Ahmad 2010). Among modern theorists of comparative advantage who are working on the question of why some nations or industries are more competitive internationally than the others, the works of M. Porter cannot be ignored. To complement new trade theories, and believing that trade and specialization take place among firms and not nations themselves, M. Porter, as a critic of the Heckscher-Ohlin model, insists: "The central question to be asked is why do firms based in particular nations achieve international success in distinct segments and industries" (Porter 1990). Providing an answer to this question, M. Porter replaces the notion of the comparative advantage with that of the competitive one. He believes that new trade theories explain only some problems related to international trade. M. Porter even states that these theories are incomplete. As a result, he argues that there is "the need for a new paradigm" (Porter 1990). There has been an opinion, however, that comparative advantage based on factors of production is not sufficient to explain patterns of trade. On this basis he provides his explanation of the way international trade functions and what are the bases for comparative advantage of firms of a particular country, which gain more success than others. His notion of

competitive advantage – his "diamond" model – is based on four different attributes, which appeal to present day realities in international trade. The four attributes include: factor conditions; firm strategy, structure and rivalry; demand conditions; and related and supported industries. M. Porter's analysis of these four attributes should be viewed as a contribution to the pure theory of international trade and an explanation of comparative versus competitive advantage, particularly since they bring realism and relevance to international trade theory. Not only M. Porter's idea of four attributes, but also the analysis of the attributes themselves should be viewed as a contribution to explanation of the competitive advantage of a nation and its subsequent share in international trade. However, most economists have either ignored M. Porter's approach or dismissed it as merely a restatement of the comparative advantage (Warr 1994). Other economists, nevertheless, emphasize the ways in which factor productivity and firm competition interact, posing a challenge to the development of a theoretical framework, which encompasses both comparative and competitive advantage, a challenge which traditional models cannot meet (Neary 2002).

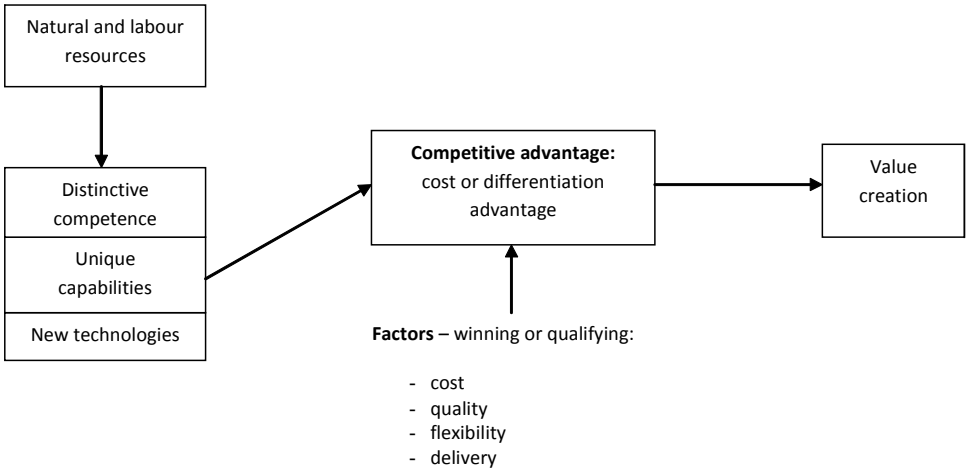
In order to make an in-depth study into comparative advantage of agricultural sector, the authors have to consider many factors, which differentiate agriculture from other industries. It is not possible to apply international trade theories without any modification regarding agricultural trade. Even WTO has made some exceptions in its rules and regulations regarding international agricultural trade, e.g. in the case of subsidies and protection.

The early work on comparative advantage in agriculture was done by P. Abbott and R. Thompson. They mainly focused on the short run rigidity of sector-specific capital stocks, the role of qualitative differences in land endowments, demand related issues (Abbott, Thompson 1987). Their study argues that those nations, which heavily rely on agricultural trade, normally have capital-intensive agricultural systems and the factors, which lead to demand's increase, like population growth and changing income rate. These circumstances differentiate net agricultural exporters from net agricultural importers. Their study further shows that availability of natural resources is not the only source of comparative advantage among the nations unless these natural resources are not complemented with the best production facilities, investments in human and physical capital and the subsequent government policies responsible for general economic conditions of the country and creating investment opportunities (Goldin 1990). The authors can complement this thesis with idea that natural resources can provide enough sources for a comparative advantage, but surely not enough for competitive one (see Figure 1).

Countries with competitive advantages are more successful on the global market than its competitors due to some special factors that no one else possesses. The key to capturing competitive advantage is knowledge what international customers want and possibility to give it to them. However, very few sources of competitive advantage are long-term usable, so countries are engaged in a never ending search to find new ones, e.g. finding some way of differentiating products and services from other offerings. The purpose of the development strategy is to find new sources of competitive advantage.

Figure 1

Model of competitive advantage



Source: the authors' scheme based on Porter 2011.

Figure 1 presents four main determinative factors of competitive advantage, which can be applied both for separate businesses and for whole economic sectors, including agricultural sector. They are as follows: cost of production, its quality, flexibility according to customers' needs and speed of delivery. If economic sector of a definite country is best only in one of them, it still needs to be good enough in all the others. The determinative factor that country's economic sector is the best is the winning factor and all the others are the qualifying factors. The first kind of factors (winning factors) makes a country's economic sector win at the global market and the second one (qualifying factors) "sustains it in the game".

Measuring comparative advantage has remained the major challenge for economists and policy makers, because the notion of the comparative advantage is defined in terms of relative autarkic price relationship and it is difficult to observe relative autarkic prices. However, the first practical attempt to measure the comparative advantage of a country was made by H. Liesner when he attempted by devising indices of relative export performance as proxies for comparative cost so as to measure the effect of an entry into the European market on UK industry (Liesner 1958). But the most important and widely accepted work in measuring comparative advantage is written by B. Balassa and T. Vollrath (Balassa 1977, 1986; Vollrath 1987, 1989, 1991; Vollrath, Vo 1990). In the paper, the authors present an introduction to Balassa index and Vollrath indices.

Balassa index. B. Balassa investigated the possibility of relying on various theoretical explanations of international trade to determine patterns of comparative advantage. According to him, "comparative advantage appears to be the outcome of a number of factors, some measurable, others not, some easily pinned down, others less so. One wonders, therefore, whether more could not be gained if, instead of

enunciating general principles and trying to apply these to explain actual trade flows, one took the observed pattern of trade as a point of departure…" (Balassa 1977). B. Balassa asserts that comparative advantage can be "revealed" through examination of real-world country/commodity trade patterns because actual exchange "reflects relative costs as well as differences in non-price factors" (Balassa 1977). He adjusted the methodology of H. Liesner and thus introduced a Revealed Comparative Advantage (RCA) index, and this assumes that the true pattern of comparative advantage can be observed from post-trade data. This RCA index introduced by B. Balassa is now widely used in economic literature and known as Balassa index (BI). The formula of BI is given below. In this formula, *c* is a specific country, *w* is the world economy, *s* is a specific sector (*S* is the total numbers of sectors considered), and *t* is the time period considered (Balassa 1977).

$$BI_{[cst|w]} = \frac{\frac{X_{cs}}{X_c}}{\frac{X_{ws}}{X_w}} \equiv \frac{\frac{X_{cs}}{X_{ws}}}{\sum_{s=1}^{S} \frac{X_{cs}}{X_{ws}} \cdot \frac{X_{ws}}{X_w}} \equiv \frac{\frac{X_{cs}}{X_{ws}}}{\frac{X_c}{X_w}}. \qquad (1)$$

It is explained that BI is a sectoral relative export measure in terms of share of world exports. The authors can also interpret it as the country's share of sectoral export, $X_{cs}/X_{ws,}$ normalized by a weighted sum of exports shares in all sectors, which is equivalent to $X_c/X_{w.}$ The BI reveals that country *c* has a comparative disadvantage in sector *s* if the value of BI ranges from 0 to 1. The country *c* has comparative advantage if the value of BI is above 1 (Balassa 1977).

During the time that many economists continued experimenting with BI, some economists have found inconsistencies and criticised the results derived from it. But nonetheless nobody has claimed that BI does not reveal comparative advantage. Many economists have worked further on BI and tried to solve the problems arising from BI. The main problems and critics made on BI are given below (Balassa 1977):

- denominator is normalized through weighted average of all the sectors but numerator is not normalized;
- asymmetry – Balassa index ranges from 1 to ¥ for products in which a country has a revealed comparative advantage, but only from zero to one for commodities with comparative disadvantage;
- cross-time ranking (variability of the mean value). If the mean of the BI is higher than its median then the distribution BI will be skewed to right;
- imports are totally neglected hence government intervention could not be explored.

There are many economists who tried to find solutions to these problems, however these solutions are also not free from the problems. K. Laursen focused on the asymmetry of the BI (Laursen 2000) and J. Proudman and S. Redding – on variability of the mean (Proudman, Redding 1998). A. Hillman attempted to observe the impact of government intervention on comparative advantage (Hillman 1980). H. Bowen critically evaluated the BI and asserted that "a trade intensity above (below) unity can not be used to infer a country's relative advantage (disadvantage) in any given commodity" (Bowen 1983). H. Bowen specifically criticized Balassa's intensity index and stated that it treats "exports and imports separately when comparative advantage is properly

a net trade concept" (Bowen 1983). T. Vollrath has developed the H. Bowen's approach and presented three indices – RTA, lnRXA and RC considering imports of the country as well (Vollrath 1991).

Vollrath indices. T. Vollrath presented the idea of revealed comparative advantage and gave three global trade intensity measures. The first measure is called relative trade advantage (RTA), which is derived from the relative export advantage (RXA) and relative import advantage (RMA). RXA substantiated by T. Vollrath is in many respects equal to the BI but it has some major differences with the BI as well. The formula for RXA is unique in its nature and is given below (Vollrath 1987, 1989).

$$RXA = \frac{\dfrac{\text{Export of goods i through country j}}{\text{Export of goods i through rest of the world}}}{\dfrac{\text{Export of all other goods except i through country j}}{\text{Export of all other goods except i through rest of the world}}} \quad (2)$$

RXA differs from the BI in the sense that it eliminates country and commodity double counting attributed to the latter. The value of RXA ranges from zero to infinity. A country has export's comparative advantage if RXA>1 and comparative disadvantage if RXA<1. Vollrath's RMA index actually measures the import comparative advantage of a country. The formula for RMA is the same like RXA; the difference is that instead of export we use import figures. The value of RMA ranges from zero to infinity. A country has import's comparative advantage if RMA>1 and comparative disadvantage if RMA<1. Vollrath's RTA is just the difference of RXA and RMA and its formula is given below (Vollrath 1991):

$$RTA = RXA - RMA \quad (3)$$

The bandwidth of measuring comparative advantage is the following: a country has comparative advantage if value of RTA>0 and comparative disadvantage if RTA<0.

Vollrath's second measure is just the logarithm of revealed export advantage (lnRXA) and the third measure is revealed competitiveness (RC), which is again, like RTA, a difference of lnRXA and lnRMA. The formula is given below (Vollrath 1991):

$$RC = \ln RXA - \ln RMA \quad (4)$$

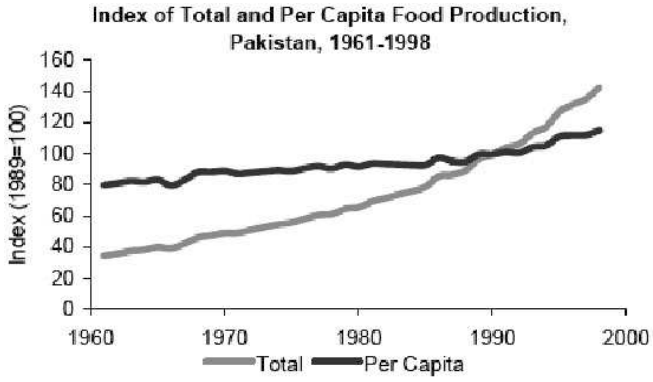
In order to make the two indices symmetric through the origin, T. Vollrath used the logarithm of both indices. The positive value of RC shows comparative advantage while a negative value reveals comparative disadvantage. On the importance and nature of each index T. Vollrath writes the following: "for some purposes lnRXA may be the preferred revealed comparative advantage because it is less susceptible to policy induced distortions than RTA and RC. However it is important to note that RTA and RC adhere more closely to actual comparative advantage than lnRXA when abstracting from distortionary influences. Unlike lnRXA, the measures RTA and RC use export and import data and, therefore, embody both the relative demand and relative supply dimensions. Another attraction is that RTA and RC are consistent with the real world phenomenon of two-way trade" (Vollrath 1991).

3. Economic overview of Pakistan's agricultural sector

Agriculture has always been the back bone for the economy of Pakistan. Almost 22% of total output and 44.8% of total employment is generated in this sector (Pakistan Economic Survey 2005). Referring to the Heckscher-Ohlin theory of factor endowment, Pakistan has a natural comparative advantage in agriculture because of plenty of land and labour. Pakistan is a country with very huge labour force which is increasing by 3% every year. The large labour force has both an advantage and disadvantage. On the one hand, as a factor of production, relatively cheap labour gives the country a comparative advantage for production of agricultural products, hence an advantage. On the other hand it increases the pressure to provide productive employment for increasing labour force, hence a disadvantage. Rapid growth in population also causes increase in internal demand as well. Although increase in internal demand is a good economic indicator, it may pose threats to a country where agriculture is based on uncertain weather conditions and where production efficiency is not consistent. In spite of the fact that Pakistan has the largest single contiguous gravity flow irrigation system in the world, and from once being a granary of the sub-continent, it has become chronically deficient in food grain such as oil seeds, pulses, etc. and food security has become major issue. According to the World Resources Institute's data, Pakistan is facing a decline of per capita food production (World Resources Institute 2011).

Figure 2

Trends of Pakistani index of total and per capita food production



Source: World Resources Institute 2011.

The total area of Pakistan is 59.4 million ha and the landownership is highly skewed. Out of whole area about 24.2 million ha (41%) is not available for cultivation because of mountains and residence. The rest 35.2 million ha (59%) of arable land is suitable for agriculture. Out of total cultivatable land the actual cultivated area is about 22.1 million ha (63%), around 4 million ha (11%) is under forest, while about 9.1 million ha (26%) is unutilized because of limited water supply, water-logging, and salinity. Although since 2000, the area under water-logging is fallen to 50%

because of increased number of tube wells. However, further expansion of the cultivated area is not unlikely because the per capita availability of cultivated land that was about 0.16 ha in 1999/2000 is predicted to decrease to about 0.12 ha per capita in another 10 years because of rapid increase in population (Pakistan Agriculture Census 2000).

There are about 6.3 million farm owners in the country with an average farm size of 3.23 ha. However, land distribution is heavily skewed especially in Sindh Province. About 87% of farmers have small farms of less than 5 ha, owning 39% of the farm land; 8% of farmers are in the medium size category (5–10 ha) while the rest 5% of farmers with more than 10 ha own 45% of the total area. Ownership of land is among major problems in agriculture policy making in Pakistan. Big landlords always influenced government policies and always proved to be rent seeking. The outdated land record and documentation system is also big constraint in this sector. There is no central register of land title. People are allowed to make oral transactions and gift of land, which creates total confusion in the land title and hence force people to go into litigation for their legal title and there are many land title cases in courts, which are pending since years creating serious problems in efficient use of land.

Agricultural sector of Pakistan, including fishing and forestry, maintained an average annual growth rate of 5.4% during the 1980s, 4.4% in 1990s and an average of 3% in the early 2000s. The slowdown in the growth rate during the 1990s was because of floods in 1994 and a prolonged drought and a reduced river flows during the second half of the decade, which continued until 2001/2002. Favourable weather and improved river flows resulted in an impressive growth by 7.5% for 2004/2005 (Pakistan Economic Survey 2005).

Trade balance of Pakistan during the analyzed decade was minus in terms of both total merchandise trade and in terms of total agricultural trade.

Despite being an agricultural country the share of agricultural import in total import is increasing day by day. This shows a clear deficiency in local food production. According to Asian Development Bank's report, growth of exports in 2004 was mainly due to increase in prices. "For four fifth of exports for which quantity and price data are available, prices increased by 8.7%, while volume increased by only 2.8%" (Asian Development Bank 2006). In the authors' opinion, increase in prices might be caused either by the fact that Pakistani export slightly shifted to value added products or by the increasing input costs at home and increasing inflation.

4. Empirical Findings Of Comparative Advantage Of Pakistan's Agricultural Sector

Empirical focus of the paper is on the analysis of changes in comparative advantage of Pakistan's agricultural sector in 1995–2004. For this purpose authors have designed four phases to arrive at more precise results. In first phase, they use Balassa index for the calculation of comparative advantage of selected products for all the analyzed years. In second phase, the authors use Vollrath's RTA, lnRXA and RC for all the selected products within specified time period. In order to proof the consistency of the

results the authors use correlation technique in the third phase. In fourth phase, the authors analyse the comparative advantage situation for various products.

The main tool for analysing comparative advantage is Balassa index; meanwhile RTA, lnRXA and RC are used for verification of the results achieved applying Balassa index. Taking into account the importance of lnRXA according to T. Vollrath: "for some purposes lnRXA may be the preferred revealed comparative advantage because it is less susceptible to policy induced distortions than RTA and RC" (Vollrath 1987), the authors have conducted test of lnRXA on the basis of the acquired data and tried to find out the correlation between BI and lnRXA. Any correlation of marked and moderate category between BI, lnRXA, RC and RTA will justify the results achieved applying the BI.

However, a question arises: how the changes or more specifically the stability and the dynamics of comparative advantage can be analyzed? An easy way of analyzing the changes in comparative advantage is to comprehend the indices and reveal how they change over the time. This is a simple approach. However, the authors can check changes in comparative advantage taking more sophisticated and stochastic approaches. One famous method is a consistency test of the indices. For example, B. Hoeckman and S. Djankov present a straight forward approach for analyzing the changes in comparative advantage determined by means of RCA indices (Hoeckman, Djankov 1997). They computed the simple correlation coefficients between the index in the first year, which is considered as a base year, and the indices of the following years. If correlations are high, it means that the comparative advantage has not changed and vice versa. However, if there is a change in comparative advantage, this method does not give any hint whether this change is upward or downward. To determine the direction of the changes we then have to go into details related to each year. Thus, in this paper the authors are going to conduct two types of consistency tests:

1) to test the correlation between the indices for verification of the results of BI;
2) to test the correlation between the years in order to observe changes in comparative advantage.

Another important method of observing changes in comparative advantage is the study of distribution of the indices (Hinloopen, Marrewijk 2001, 2005). In their research paper, J. Hinloopen and C. Marrewijk studied distribution of BI to observe the stability over time and the persistency of the index (Hinloopen, Marrewijk 2001). Using descriptive statistics i.e. mean, median, maximum, coefficient of variation, skewness, and kurtosis they observed the movement of BI. Only distribution of BI is recommended by them for distribution analysis. In another paper, J. Hinloopen and C. Marrewijk introduced the idea of classification of BI, in which they categorised the products into four classes according to their BI value (Hinloopen, Marrewijk 2005). In their research, the authors used almost the same technique but with a little change – in their analysis the authors classified the following categories of BI:

- products having values $0 \leq BI < 1$ belong to class "D";
- products having values $1 \leq BI < 2$ belong to class "C";
- products having values $2 \leq BI < 4$ belong to class "B";
- products having values $BIe \geq 4$ belong to class "A".

According to this categorization the authors can suggest that products falling in class "D" do not possess comparative advantage while products falling in class "C" have weak comparative advantage, class "B" represents the products with medium comparative advantage and class "A" represents products with strong comparative advantage.

The analysis is based on data from United Nations Organization's (UNO) statistical website FAOSTAT. This website contains an extensive database on agricultural and agricultural related issues regarding land use, yield, and agricultural machinery of all the members of UNO. Along with other tasks FAOSTAT also compiles data about agricultural export, as well as import for all the commodities being traded among the nations. The authors have selected 102 products for which FAOSTAT provides a complete set of data required for further analysis. The selection of the products is carried out systematically – the authors have selected only those products, which are important constituents of Pakistan's export. As this research is focused on the changes in comparative advantage in 1995–2004, the task is to analyse in which products Pakistan had comparative advantage in 1995 and what was the situation in 2004? Did Pakistan retain this comparative advantage in 2004? Whether some new products have been added in 2004 in which Pakistan has comparative advantage? In order to find an answer to the above-mentioned questions, a wide variety of products should be included in the analysis.

The authors calculated comparative advantage of Pakistan's agricultural sector using Balassa index for the first three years of the decade, i.e. 1995, 1996 and 1997, and then for the last three years of the decade, i.e. 2002, 2003, and 2004. After deleting the redundant products, which appeared again and again, the authors got a unique sum of 102 products, which were selected for empirical analysis. The authors assume that Pakistan has shown comparative advantage in these 102 products in 1995–2004. In further calculations, the authors use only these selected 102 products and on this basis check the ups and downs of the comparative advantage of Pakistan's agricultural sector.

The empirical findings are presented in the following sequence: at first, the results of the first consistency test conducted for the verification of outcome of BI are presented. This consistency test has been conducted for the selected 102 products jointly. After that the authors present the year-by-year analysis of change in the comparative advantage of Pakistan's agricultural sector and then, following the B. Hoeckman and S. Djankov, the authors move to the second type of consistency test and reveal the change in comparative advantage from 1995 to 2004. Finally, the authors present the trends of Pakistan's export and look for the products in which Pakistan has star performance.

The results of the first consistency test are given below in Table 1.

This consistency test has been conducted to verify whether comparative advantage shown by BI is also validated by other RC indices. BI has high correlation with RTA, marked correlation with lnRXA and moderate correlation with RC. Correlation of BI with RTA and lnRXA is satisfying but the correlation figures with RC are very fluctuating. This fluctuating might be due to the fact that RC contains values of imports also and for Pakistan for most of the products there were zero or very less

imports. Taking logarithm of these values created error and to avoid these errors the authors did not take these entries in correlation and then tried a correlation with available error free entries. This is the reason that RC correlation in each year has varying figures because each year there was a new set of products. In the lower part of RC row, there is a number of products in brackets for which the correlation is conducted. However, the authors find no solid reason for statement that the results of other indices are not consistent with BI. Hence, BI can be confidently used alone for the further analysis of the changing of comparative advantage.

Table 1

The first consistency test of the indices of comparative advantage of Pakistan's agricultural sector

Correlation BI	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
RTA	0.89	0.99	0.99	0.93	0.99	0.96	0.97	0.99	0.98	0.99
lnRXA	0.72	0.76	0.68	0.64	0.63	0.70	0.70	0.77	0.71	0.72
RC	0.58 (68)	0.68 (71)	0.52 (65)	0.69 (68)	0.53 (70)	0.59 (71)	0.73 (60)	0.72 (65)	0.56 (72)	0.72 (75)

Source: authors' calculations based on FAOSTAT data.

Table 2 shows the list of 26 products of Pakistan's agricultural sector, which appeared in all the years of study as having value of BI>1, i.e. these products present the strengths of Pakistan's agricultural sector; it means that Pakistan has an unmatched comparative advantage in these products.

Data of the Table 2 show that most of the products with comparative advantage fit into cotton, herbs, cereals, vegetables, fruits, and spices categories. Their production is labour-intensive, which gives support to the Heckscher-Ohlin theory that comparative advantage is based on factor endowments, and Pakistan is known as a country where population is increasing rapidly, and as a consequence labour force is also increasing at the rate of 3% thus supporting the agricultural production of labour-intensive products.

Data of the Table 3 show the list of products, which provide comparative advantage for Pakistan in 2004 but not in 1995. The majority of these products are exported without much value addition; it means the export of products which need less processing has been increased in the recent years. These products need less technological advancements in their processing and hence the exports growth of these products faced a huge increase.

Table 2

Pakistan's agricultural products with comparative advantage in 1995–2004, values of Balassa index

No	Products withcomparative advantage	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
3	Anise, Badian, Fennel	3.33	15.22	8.65	6.32	8.25	9.69	4.69	4.11	3.95	6.61
16	Coarse Goat Hair	187.28	172.44	239.78	251.83	274.59	286.46	200.06	191.76	159.19	193.00
20	Cotton Linter	5.06	6.72	7.99	7.82	3.77	58.52	52.05	7.96	5.29	3.41
21	Cotton Waste	103.54	93.22	84.84	69.86	84.70	118.98	101.32	100.78	78.97	70.23
23	Crude Organic Materials 29	2.15	2.91	2.59	2.30	2.52	2.28	1.92	1.46	1.44	1.26
24	Dates	31.40	28.84	73.16	63.64	65.32	85.34	62.59	68.14	50.61	52.40
25	Dried Mushrooms	7.85	13.11	14.01	13.63	12.83	13.06	7.01	11.46	7.77	3.43
35	Fruit Dried nes	18.69	15.14	29.13	27.96	22.58	33.39	19.14	17.21	11.74	15.81
36	Fruit Fresh nes	10.84	9.89	12.79	15.07	12.91	11.10	8.44	10.51	8.47	12.65
44	Kapokseed in Shell	268.14	306.61	272.33	299.34	276.24	298.00	256.47	249.15	229.24	210.46
47	Mangoes	7.15	7.59	11.20	11.01	14.37	29.21	27.34	24.48	20.73	28.14
49	Milled Paddy Rice	47.28	53.45	52.23	47.92	66.68	71.92	71.06	55.48	62.99	58.97
50	Molasses	99.22	67.95	74.20	77.22	91.69	83.83	90.76	92.70	72.19	65.54
66	Sesame Seed	19.35	15.85	10.09	7.44	8.75	6.46	30.89	34.39	7.55	7.73
67	Spices nes	16.36	10.48	15.61	15.56	15.97	19.04	12.30	12.81	13.23	15.01
69	Sugar and Syrups nes	3.99	3.19	4.11	4.51	4.88	5.00	5.00	4.65	3.09	3.07
72	Tang. Mand. Clement. Satsma	2.07	2.18	6.14	3.32	5.15	6.99	8.70	9.15	7.14	9.92
83	Cereals	7.08	6.75	7.76	9.49	11.71	11.13	11.44	10.43	11.78	9.95
84	Cereals and Prep -04	5.23	5.04	5.58	6.66	8.03	7.51	7.67	6.85	7.44	6.20
86	Crude Materials -Ex2	2.36	7.02	1.85	1.96	1.65	3.61	2.23	1.52	1.34	1.32
87	Crude Materials -29	2.15	2.91	2.59	2.30	2.52	2.28	1.92	1.46	1.44	1.26
88	Food and Animals -0	1.68	1.41	1.50	2.15	2.66	2.00	1.96	1.84	1.90	1.71
89	Food Excl Fish	1.71	1.46	1.53	2.17	2.69	2.03	2.03	1.87	1.87	1.68
98	Rice	40.22	43.45	42.89	39.14	54.28	59.41	50.77	45.78	50.63	48.39
99	Sugar and Honey -06	7.60	3.03	2.30	9.56	13.73	2.77	2.83	3.42	2.46	3.31
101	Textile Fibres -Ex26	5.42	24.61	4.21	4.67	2.72	12.90	6.37	3.97	4.35	4.11

Source: authors' calculations based on FAOSTAT data.

Table 3

Pakistan's agricultural products with comparative advantage in 2004 that lacked for such advantage in 1995

S. No.	Prd. No.	Product Name	S. No.	Prd. No.	Product Name
1	1	Abaca (Manila Hemp)	21	54	Onions, Dry
2	4	Beans, Dry	22	59	Potatoes
3	7	Bran of Wheat	23	63	Rice Flour
4	9	Cake of Cotton Seed	24	64	Rice, Broken
5	10	Cake of Sunflower Seed	25	65	Sausages Beef and Veal
6	11	Cakes of Oilseeds	26	68	Straw, Husks
7	13	Cereals nes	27	73	Tobacco Leaves
8	18	Cotton Carded Combed	28	76	Vegetables Fresh nes
9	22	Cow Milk, Whole, Fresh	29	78	Walnuts
10	27	Figs	30	82	Bran+Milling Prod
11	30	Flour of Cereals	31	85	Citrus Fruit, Total
12	32	Flour of Wheat	32	90	Fruit + Vegetables -05
13	33	Flour/Meal of Oilseeds	33	91	Fruit excl Melons, Total
14	40	Goat Meat	34	92	Fruit Primary
15	41	Groundnuts in Shell	35	93	Meat Sheep Fresh
16	43	Honey	36	94	Onions
17	45	Leather Used and Waste	37	95	Oranges+Tang+Clem
18	51	Mustard Seed	38	96	Ovine Meat
19	52	Oils Hydrogenated	39	97	Processed Oils -43
20	53	Oilseeds nes	40	102	Wheat+Flour, Wheat Equiv.

Source: authors' calculations based on FAOSTAT data.

Data of the Table 4 show the list of products, which had comparative advantage in 1995 that disappeared in 2004. Decline of comparative advantage in these products is a matter of deep concern for the policy makers. This provides ample material for discussion upon issues, whether the loss of the comparative advantage occurred due to real changes in factor endowment or due to any failure in the field of commerce and management. Most of these products are not just raw products, but rather semi finished or processed products. The decline of these products might be a result of the failure to follow international standards in the production process or lack of best managerial capacities which help to sell these products on competitive international markets. This decline justifies the arguments of M. Porter regarding competitive advantage.

Table 4

Pakistan's agricultural products losing comparative advantage in 2004

Product number	Products which lost comparative advantage in 2004
2	Almonds
17	Cocoons, Unreelable
26	Dry Apricots
28	Figs, Dried
29	Fine Goat Hair
31	Flour of Pulses
39	Gluten Feed and Meal
56	Other Fructose and Syrup
58	Poppy Seed
61	Raisins
62	Ramie
75	Vegetables Dehydrated
77	Wafers
81	Wool, Scoured

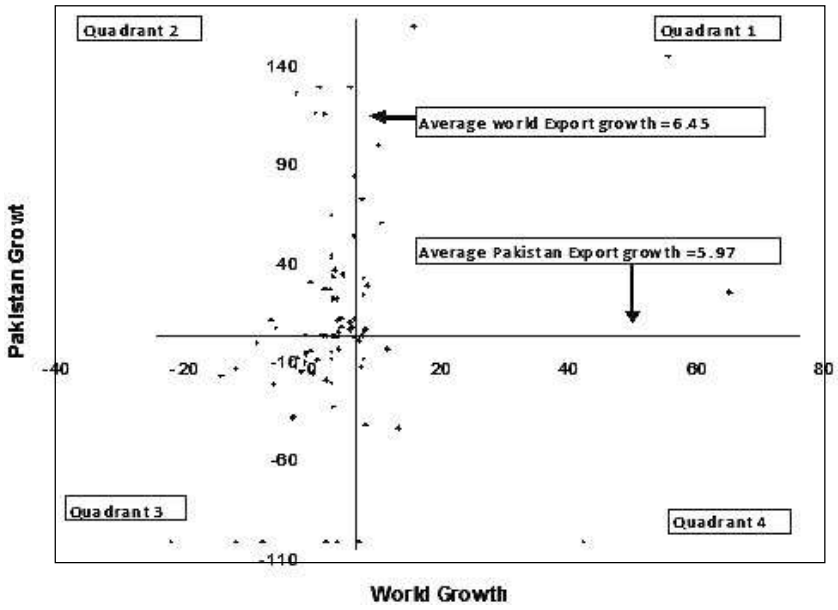
Source: authors' calculations based on FAOSTAT data.

To make this research capable to provide guidelines for policy makers, which products they should promote, the authors find out the future avenues of growth and star performer products. Star performer products are those products, which have shown high growth level in the specified time. To measure the level of this growth the authors take the growth of total export of Pakistan and the world as a criterion of measurement. CAGR (Compounded Annual Growth Rate) of the total export of Pakistan is 5.97% for the decade under study. The CAGR of the total export of the world for the same period is 6.45%. The authors call those products as "star performer products", in sense of growth, which have shown CAGR greater than CAGR of the total export of Pakistan and CAGR of the total export of the world for the same period.

The following Figure 3 makes the idea more clear. In this graph on the x-axis, world export growth is given and on the y-axis – the export growth of Pakistan. Two lines divide the whole graph into four quadrants. The line, which is parallel to the y-axis (the original lines of the y and x-axis are omitted in this graph) is exactly drawn on the average point of the world export growth which is 6.45% thus dividing the graph into right and left areas. The second line, which is parallel to the x-axis, represents average growth of Pakistan and divides the whole graph into upper and lower areas.

Figure 3

Pakistan's agricultural products analyzed in comparison with Pakistani and the world total export growth



Source: authors' calculations based on FAOSTAT data.

The two lines together form four quadrants, which are marked on the graph as well. All products included into the four quadrants are listed below in the Table 5.

Table 5

Pakistan agricultural sector included in different quadrants according to Pakistan and world total export growth

Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4
1	2	3	4
Vegetables Freshness	Fruit Freshness	Cocoons, Unreelable	Poppy Seed
Processed Oils	Castor Beans	Ramie	Wafers
Oils Hydrogenated	Glucose and Dextrose	Fine Goat Hair	Almonds
Oilseeds Freshness	Sugar Confectionery	Figs, Dried	Other Fructose and Syrup
Mangoes	Walnuts	Flour of Pulses	Citrus Fruit nes
Spices Freshness	Anise, Badian, Fennel	Gluten Feed and Meal	Dry Apricots
Honey	Hair Coarse nes	Oranjuice Single-Strengt	Food Wastes Prep Feed

Sequel to Table 5 see on p. 88

Sequel to Table 5

1	2	3	4
Goat Meat	Fruit + Vegetables	Wool, Scoured	Bran of Rice
Cotton Carded Combed	Fruit excl. Melons	Vegetables Dehydrated	Fruit Juice nes
Flour/Meal of Oilseeds	Fruit Primary	Raisins	Fruit Dried nes
Cakes of Oilseeds	Pimento, Allspice	Kapokseed in Shell	
Wheat	Citrus Fruit	Sugar Refined	
	Oranges+Tang+Clem	Sugar,Total (Raw Equiv.)	
	Tang. Mand. Clement. Satsma	Coarse Goat Hair	
	Bran+Milling Prod	Dried Mushrooms	
	Onions, Dry	Wool and Hair Waste	
	Onions	Sugar and Honey	
	Potatoes	Cotton Linter	
	Cow Milk, Whole, Fresh	Sesame Seed	
	Bran of Wheat	Molasses	
	Tobacco Leaves	Cotton Waste	
	Straw, Husks	Textile Fibres	
	Leather Used and Waste	Crude Materials	
	Pulses nes	Cotton Lint	
	Meat Sheep Fresh	Crude Organic Materials	
	Ovine Meat	Macaroni	
	Cake of Cotton Seed	Citrusjuice Single-Stren	
	Beans, Dry	Sugar and Syrups nes	
	Flour of Wheat	Food and Animals	
	Wheat+Flour, Wheat Equiv	Food Excl Fish	
	Beef Dried Salt Smoked	Milled Paddy Rice	
		Rice	
		Dates	
		Cereals	
		Cereals and Prep	

Source: authors' calculations based on FAOSTAT data.

In quadrant 1 there are products, which have CAGR greater than CAGR of the total export of Pakistan and the world (Product's CAGR > 5.97% and > 6.45%).

In this quadrant, all products, with the exception of such products as mangoes, spices freshness and wheat, belong to category of products, which appeared as having

comparative advantage in 2004 but not in 1995 (see Table 3). It means that all the newly entered products in 2004 as having comparative advantage are fast growing products that have huge potential for being star performers. Such products as mangoes and spices freshness belong to the product category of having comparative advantage during the whole decade of the research (see Table 2). Such product as wheat did show comparative advantage neither in 1995 nor in 2004. It appeared in between and then vanished. It should be stressed this interesting situation that Pakistan shows comparative advantage for this product only in some years and in those years Pakistan posted an export growth in this commodity which is greater than total export growth of the world and Pakistan.

5. Conclusions And Discussion

The empirical findings given in chapter four show that the performance of Pakistan has remained fairly good during the analyzed decade. In 1995, almost 50% of Pakistan products had comparative advantage. In 2004, Pakistan has drastically reduced the number of products showing comparative disadvantage. It is a positive fact that Pakistan came up with more products having comparative advantage, more products showing strong comparative advantage and relatively converged results of two statistical tests, used by the authors, thus showing consistency in the comparative advantage of products. There are many determinants of comparative advantage – some of them are temporary, others permanent. However, the presence of a stable comparative advantage product group in Pakistani data gives support to the Heckscher-Ohlin theory that comparative advantage is based on factor endowments. Another support for this theory is that manufacturing of all the products with comparative advantage is labour-intensive and Pakistan is characterized with a fast-growing labour market. Thus, due to enormous labour-force Pakistan still has an unmatched comparative advantage in agriculture.

The authors evaluate this performance within the following three points:

1. Exchange Rate: In 1995, the price for one US dollar in Pakistani Rupee was 34.16 which increased to 58.25 in 2004, i.e. almost by 70% (Asian Development Bank 2006). Authors can explain this significant decline with an attempt of the government to increase the exports. Thus revealed comparative advantage in the case of Pakistan seems not a genuine comparative advantage in the light of huge depreciation. This statement is supported by the data of Table 1 where correlation coefficient between BI and lnRXA fluctuates heavily. The resource allocation and factor endowment in Pakistan seem to be inefficient and detains the general economic development of the country. This significant depreciation in currency also shows mismanagement in fiscal and monetary system of the country and discrepancies in balance of payments. Normally the government of Pakistan plays with exchange rate when it intends to increase its export in some other industry, e.g. textile, carpets or sports items etc., but not especially in the agricultural sector. However, the externalities arising from the exchange rate affect the agricultural export also.

2. Factor Prices: With reference to the Asian Development Bank's Report 2006, increasing of Pakistani export in 2004 is explained not with increase of physical volume of export but rather with increase of prices. It was a manipulation of numbers rather than any genuine improvements in factor endowment of the country. Exactly the same points out T. Vollrath: he notes that government intervention and competitiveness tend to be inversely related (Vollrath 1991). In this way the play with exchange rate, which increased the prices, has caused the growth of agricultural export thus casting a shadow on the natural comparative advantage of Pakistan and especially on competitive one.

3. Marginal Performance: At the third place the authors evaluate the performance of Pakistan at an aggregate level and compare the results of CAGR (Compounded Annual Growth Rate) of Pakistan during 1995–2004 with CAGR of the world. The analysis shows that agricultural CAGR of the whole world is better than that of Pakistan. It means that despite very good performance of Pakistan on the product level, it has just a marginal performance on the aggregate level.

Coming to the topical question of this research paper, are there any changes in comparative advantage of Pakistan at the end of 2004, the authors can conclude that there are positive changes in comparative advantage of agricultural products in Pakistan but this performance is somehow shadowed by depreciation of currency and government intervention to increase exports earnings at any cost. How much exchange rate has influenced agricultural export of Pakistan, is a question for a further study. Despite government intervention to give artificial boom to exports, the authors find no arguments that natural comparative advantage of Pakistan, which is expressed in terms of factor endowment, declined in 2004.

In the course of this research, the authors have found out that agriculture of Pakistan is facing numerous problems, some fatal and some insignificant, however general impact of these problems on the economy is serious. These problems cause a dilution to the comparative advantage versus competitive one. Despite the rapid growth in last years the economy is still vulnerable to exogenous shocks, e.g. oil prices, exchange rate and political situation. Market failure is common for many food markets, e.g. sugar market, wheat market, where the big dealers in cooperation with government agencies create artificial shortage of the commodity and blackmail the producers and consumers. The farmer is great sufferer in the country where he is totally blackmailed by intermediaries and cannot get the right price.

Dilemma of rejection of Pakistani export due to non-conforming with WTO standards is also serious (Mustafa 2005). This is matter of deep concern that a country produces products with comparative advantage (efficiency in labour cost), but these products are going to be rejected on the basis of poor processing, packaging and poor marketing (competitive advantage). This gives the idea of "commercial/marketing comparative advantage", which is as much important as "production comparative advantage". This shows that although Pakistan has natural comparative advantage in production, it has to do a lot to improve its commercial comparative advantage, i.e. competitive advantage.

Agriculture of Pakistan is bearing the burden of more than 150 million people. It is very imperative to build total agricultural structure on modern and scientific ways to increase its efficiency. Most of the people affiliated with agriculture are illiterate and they are till today following the old methods of ploughing and harvesting which is the major cause of inefficiency. To make the agriculture sector more productive the authors recommend to take the following measures:

- consistency in the policy of the government should be implemented and instead of "giant jumps" in setting targets, more realistic and achievable targets should be set in the policy;
- Pakistan's agricultural sector should be planned and internationally demand-driven, rather then supply-driven. Supply-oriented system generates blackmailing and makes a farmer disadvantaged as well as unable to produce efficiently and satisfy the demand of global customers;
- imbalance intervention of government, which creates problems for the agricultural sector, should be prevented. Government intervention is although very necessary but it should be directed to establish a free market and make rules and regulations for a smooth market economy;
- in order to convert the natural comparative advantage into sustainable competitive advantage, the government should put forth special efforts to reshape the agricultural performance of Pakistan. It is a general observation that till now agriculture is a traditional profession. It is not transformed into agri-business in real sense. A farm is a production and commercial entity. It needs exactly the same sort of planning managers which a common factory needs. To make the agricultural production more competitive Pakistan's agricultural sector must follow the M. Porter's diamond model of competitive advantage;
- last but not least, definite institutions should be established which can enhance the competitive advantage of Pakistan and act as a bridge between international demand and domestic production's facilities. Rejection of Pakistani exports shows that Pakistan exporters and producers are totally unaware of the demands of importing countries. Such institutions can keep eyes on changing trends on international market and can suggest corresponding changes in local production facilities.

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Kopsavilkums

Halils Arbi, Vera Boroņenko

No salīdzinošajām uz konkurētspējas priekšrocībām Pakistānas lauksaimniecības sektorā: vienas dekādes analīze

Šī raksta mērķis ir novērtēt Pakistānas lauksaimniecības sektora attīstību vienas dekādes laikā no 1995. gada līdz 2004. gadam. Pētījuma ietvaros autori analizēja dažādu Pakistānas lauksaimniecības produktu salīdzinošās priekšrocības. Šajā rakstā dotas vadlīnijas Pakistānas lauksaimniecības sektora politikas veidotājiem nākotnes politikas attīstīšanai, kas varētu palīdzēt pārvērst lauksaimniecības produktu salīdzinošās priekšrocības par konkurētspējas priekšrocībām. Pētījuma rezultāti sniedz informāciju par Pakistānas lauksaimniecības produktu eksporta pieauguma un samazināšanās tendencēm starptautiskajos tirgos, kā arī šo produktu salīdzinošajām priekšrocībām. Pētījuma autori ir izmantojuši tādas metodes, kuras tiek plaši pielietotas starptautiskos pētījumos, piemēram, Balasa indekss, noteikto salīdzinošo priekšrocību Volrāta indeksi: RTA, lnRXA un RC. Šis raksts sastāv no piecām nodaļām. Pirmajā nodaļā ir ietverta ievada daļa, bet otrā ir teorijas nodaļa, kurā dota salīdzinošo un konkurētspējas priekšrocību definīcija, kā arī analizēta salīdzinošo priekšrocību noteikšanas metodoloģija no dažādu teoriju viedokļa un piedāvāts autoru papildinātais M. Portera konkurētspējas priekšrocību modelis. Trešajā nodaļā sniegta vispārīga informācija par Pakistānas lauksaimniecības sektoru. Ceturtajā nodaļā izklāstīti autoru empīriskās izpētes rezultāti par Pakistānas lauksaimniecības sektora izvēlēto produktu salīdzinošajām priekšrocībām. Piektā nodaļa ietver secinājumus un autoru izstrādātās lauksaimniecības politikas veidošanas rekomendācijas Pakistānas valdībai. Šī pētīju-