Original Article

Analysis of Growth and Instability of Jute in Bangladesh

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ARTICLE INFO	ABSTRACT
Corresponding Author: M.M.U. Molla mmumolla@yahoo.com **How to Cite this Article:** Molla, M.M.U., & Sabur, S.A. (2015). Analysis of Growth and Instability of Jute in Bangladesh. *The Journal of Agriculture and Natural Resources Sciences,* 2(2), 429-436. 	The study attempts to examine growth and instability regarding various parameters of jute and jute goods in Bangladesh. Time Series data covering the period of 1981-82 to 2009-10 was used for the study. The growth rates were estimated by fitting exponential function and the instability index was used for better reflect the true instability situation. The study found an increasing growth trend of jute production (0.2%) and yield (1.7%) in post-trade liberalization period in spite of significant negative growth of area (1.5%). Growth of harvest time real price of raw jute and quantity exports and prices of raw jute and jute goods at world market showed positive trends in the same period. Moreover, instability in area, production, yield and harvest time price of raw jute also decreased remarkably in post-trade liberalization period. In contrast, internal consumption of jute goods decreased significantly in post-trade liberalization period, which might be due to the wide expansion of cheaper synthetic substitute usage over the previous period. Lower growth was observed for jute goods export compared to raw jute and it might be due to the stiff competition against cheaper synthetic substitutes of the world. Moreover, export prices of raw jute and jute goods in real term found more unstable in post-trade liberalization period. To avoid entire dependency on export market and to ensure more domestic consumption for bringing stability to raw jute and jute goods prices, mandatory use of jute goods in packaging act must be implemented immediately. **Keywords:** Growth, Instability, Jute goods & Raw jute.

INTRODUCTION

Jute is not only the important cash cum industrial crop but also the main raw materials for jute based handicrafts of Bangladesh. In recent years, area and production of jute increased significantly due to increase internal demand. But the producers are profit-maximizers who take decisions based on expected profitability. Generally, while making production decisions, the farmers consider returns against expected cost. Sometimes it is mentioned that the yield they receive does not cover the cost of production. Owing to environmental conditions, scarcity of land for cultivation, high input cost, high profitability of high-yielding variety and hybrid food crops and rapid price fluctuation, jute at present tends to be cultivated in less productive land (Rahman and Khaled, 2011).

So, comprehensive plan is needed to make the crop popular and sustainable. But, the rate of adoption and sustainability of jute depends largely on its profitability against alternative crops. As profitability is certainly an important consideration to the farmer for selection of crops. The production of jute has to be increased and farmers have to be motivated to grow more jute, if the return on investment is higher than other alternatives. Only assured return can motivate a farmer to grow more jute.

The progress of agriculture during recent years is quite impressive. But the growth is not same for all crops. Production of some crops is increasing at a very faster rate, whereas a few crops are showing the decreasing trend. Besides, instability plays a significant role in agricultural production. Farmers have to decide which combination of crops they should choose to reduce income instability. Fluctuation in price is an important factor influencing, directly or indirectly, the level of resource use and consequently the level of production. Especially jute has a fluctuating trend over the past decades in terms of area, production, domestic and world prices, export and exports etc. Unfortunately, the structural arrangement of marketing sector is so defective that the pricing phenomenon cannot be properly identified. The variation of price from time to time and from place to place is a common phenomenon in the country (Akter and Islam, 1986). Risk and uncertainty are central to forecasting and prediction and it is generally considered good practice to indicate the degree of uncertainty attaching to forecast. Therefore, to enrich jute industry it is important to examine the past performance, present status as well future prospects for the researchers, planners and policy makers. The focus of the study is to analyze growth and instability of various parameters related to jute in Bangladesh.

MATERIALS AND METHODS

In order to explore the potentials and possibilities of expansion in the acreage and production of the jute as well as jute goods in Bangladesh, it is therefore, essential to examine the past performance of jute and jute goods. Analysis of growth rates and instability can be most useful for policy making since they help understand both the magnitude and direction of the changes taking place. Growth rates are usually computed by fitting trend

functions using time series data on different variables. Sometimes a best fitting trend is chosen from a pre-specified set of functions of time, so as to answer the question whether trend has or has not taken place over a given period (Krishnaji, 1980). Instability is one of the important decision parameters in development dynamics and more so in the context of agricultural production. Because price and yield instability affects area allocation of farmers to crop production enterprise. Such knowledge of instability will also be helpful to the farmers in making suitable production and making investment decision and to the financing institutions in judging the repayment capacity and risk to the farmers (Gangwar and George, 1971).

Sources of Data and Study period

The present study is based on published and unpublished data of various national and international agencies. For estimating growth and instability, secondary data were collected from Bangladesh Bureau of Statistics (BBS), Bangladesh Bank, Food and Agriculture Organization (FAO) and International Jute Study Group (IJSG).

To study changes in the rate of growth and also in the magnitude of instability, the time period had been divided into different phases in order to calculate the growth rates and to measure instability in different parameters of jute and jute goods in Bangladesh. So, for better understanding, the time period had been divided into three phases: i) pre-trade liberalization period (1981-82 to 1994-95), ii) post-trade liberalization period (1995-96 to 2009-10) and overall period (1981-82 to 2009-10).

Analytical Procedures

There are alternative methods by which the growth rates can be calculated for a specified data series. In this study, the growth rates of were estimated by fitting exponential functions. A simple growth model that relates dependent variable (Y) to time (t) which is independent variable can be represented by the following equation:

$$Y= ae^{bt} \qquad (1)$$

Where, a and b are parameters to be estimated, and e is the natural exponential (2.71828). For simplicity, the error term was excluded. As the equation (1) is nonlinear in the parameters, it is necessary to linearize this

equation in order to apply the classical regression model.

This may be accomplished by taking the log of both sides;

Ln Y = Ln a + bt (2)

Where, Ln Y = Natural log of selected variables

t = Time (1981-82 to 1994-95, 1995-96 to 2009-10 and 1981-82 to 2009-10 referred as pre-trade liberalization, post-trade liberalization and overall period)

a = Intercept, and b = Exponential growth rate When it is multiplied by 100, it expresses the annual percentage growth.

T–test was also performed to examine the significance of results. To test the null hypothesis H_0: b = 0, the following test statistic was used:

$$t = \frac{b}{Se(b)} with (n-2) df.$$

Where, b = Growth parameters, n = Number of observation and Se (b) = Standard error of growth parameter

The equation (2) is generally used on the consideration that the change in a selected variable in a given year would depend upon the selected variable in the preceding year. It has a limitation in that it assumes a uniform rate of growth over the entire period under consideration, which may not be true in reality.

The extent of instability has to be examined in relation to time. A simple instability index (I) had been applied to analyze the nature and degree of instability in a selected variables based on coefficient of variation (CV) and coefficient of determination (R^2). It can be looked at within a day or overnight, season, year, decade or a longer span extending to a century and beyond. The coefficient of variation (standard deviation expressed as percentage of arithmetic mean) indicates the extent of instability in a static sense. In measuring instability in selected variables regarding jute and jute goods in Bangladesh during the above mentioned period, CV and R^2 of the variables was computed for each period separately.

The simple measure of CV is given by

$$CV = \frac{\sigma}{\overline{X}} \times 100$$

Where:

$$\sigma = \sqrt{\left(\frac{\sum x_t^2}{N} - \frac{(\sum x_t)^2}{N} \right)},$$

σ = Standard deviation

$\overline{X}$ = Period mean of X_t and N = Number of year in the period

One important point, which might be noted in connection with the use of CV was that it was the most commonly used index for measuring instability. CV has an easy interpretation in the context of measuring an overall variation in the data not showing any trend. This is unit free and expressed in percentage. But usually when we have a time series for a variable showing some kind of trend which may be linear or non-linear, CV does not take into account any such time trends of the data while measuring instability in the variant values. Thus, it may be desirable for general applicability that an index of instability should be so derived as to contain information about the trend exhibited in the data on the variable under study. One may for general series application considers the following index as a measure of instability in the time series data.

The trend (linear or non-linear) in the time series being determined, the residual sum of squares (RSS) obtained after

$$RSS/\overline{A}^2 = \sum (A - \hat{A})^2 / \overline{A}^2 = (1 - R^2) \times \sum (A - \overline{A})^2 / \overline{A}^2 \quad (3)$$

Where, $\hat{A}$ is the estimated trend and R^2 is the coefficient of determination for the estimated exponential trend, equation (3) implies

$$\left[(100)^2 / n - 1 \right] \times RSS / \overline{A}^2) = (100)^2 \sum (A - \overline{A})^2 / (n-1) \overline{A}^2 \times (1 - R^2)$$
$$= (C.V.)^2 \times (1 - R^2) \quad (4)$$

So, for a general index of instability in a time series, one may also consider an index as follows:

$$I = (C.V.)^2 \times (1 - R^2) \quad (5)$$

Obviously,

$$I \leq (C.V.)^2 \quad [\text{Mitra, 1989, pp. 67-68}]$$

Where, I = Instability Index, C.V.= Coefficient of Variation, and R^2 = Coefficient of determination

The instability of different variables regarding jute and jute goods in Bangladesh was also estimated by using the above index. Thus, instability index captures both explained and unexplained variations of the concerned variable and should better reflect the true instability situation.

RESULTS

Growth Rates of Area, Production and Yield of Raw Jute

The annual growth rates of area, production, yield and export of raw jute in Bangladesh are presented in Figure 1. Negative growth rates were observed in case of jute area for the whole study period (1981-82 to 2009-10). In other words, area of jute in Bangladesh decreased significantly by 2.2% per annum during the whole study period. In pre-trade and post-trade liberalization periods, it decreased by 1.6% and 1.5%, respectively. It shows that area of jute has declined substantially over the periods. It might be the fact that a significant portion of this crop area was replaced by alternative food crops specially aus, maize and vegetables due to increasing population and high demand of food grain in Bangladesh.

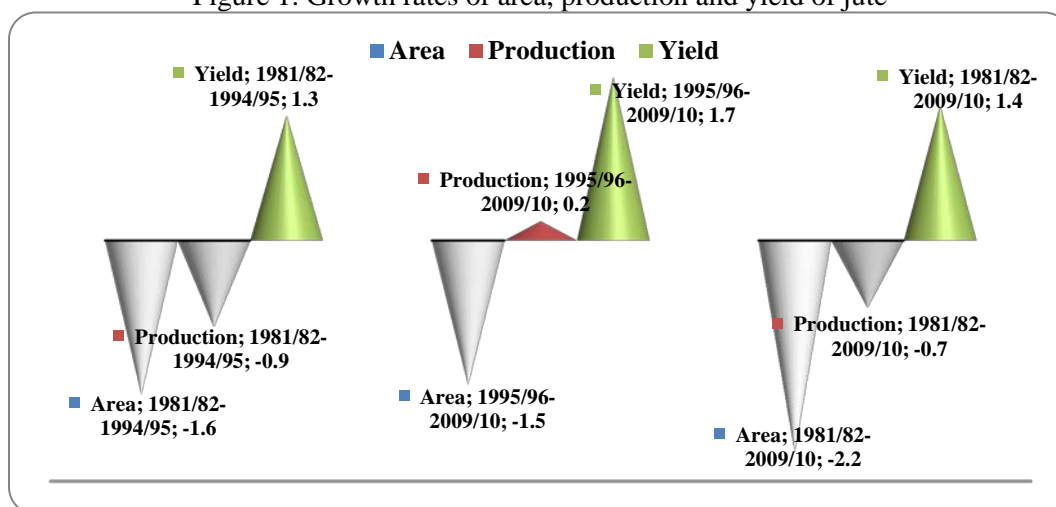Figure 1. Growth rates of area, production and yield of jute

Figure 1: Growth rates of area, production and yield of jute

It is also found that production of raw jute in Bangladesh decreased significantly by 0.7% per annum during the whole study period. It is observed that inspite of significant negative growth rate of area (1.5%) in post-trade liberalization period, production (0.2%) and yield (1.7%) increased significantly in post-trade liberalization period. This is evidently a positive sign for future prospects and sustainability of jute in Bangladesh. In the context of land scarce country like Bangladesh, such a result is really expected, which has taken place mainly due to the intensification of production process including the introduction of high yielding varieties.

Growth Rates of Raw Jute and Jute Goods Prices

The growth rates of raw jute and jute goods real prices in Bangladesh are presented in Figure 2. In the whole study period, the harvest time price of raw jute increased by 0.7% per annum in real term, which was not statistically significant. The significant highest negative growth rate was observed in pre-trade liberalization period (-4.7%), while it was found positive (0.4%) in post-trade liberalization period. Re-opened and newly started some public and private jute mills in post-trade liberalization period have created extra demand of raw jute, which might be a reason for increasing the harvest time real price of raw jute in Bangladesh. It should be noted here that this positive trend is highly expected for the farmers those are not interested to grow jute due to price concern. Expanding world demand in post-trade liberalization might be another reason for increasing harvest time real price of raw jute. In case of export prices of raw jute and jute goods in real term, growth rates were found to increase in post-trade liberalization period due to the increasing trend of world demand. Increase in jute prices in this period could also be due to rising oil prices on world market during this time. Higher oil price mean higher polypropylene prices, which since it competes with jute, means higher jute prices. Prices of natural rubber and oil are also connected in this way. All these indications are very much

expected to an export-oriented jute sector in Bangladesh for its future prospect.
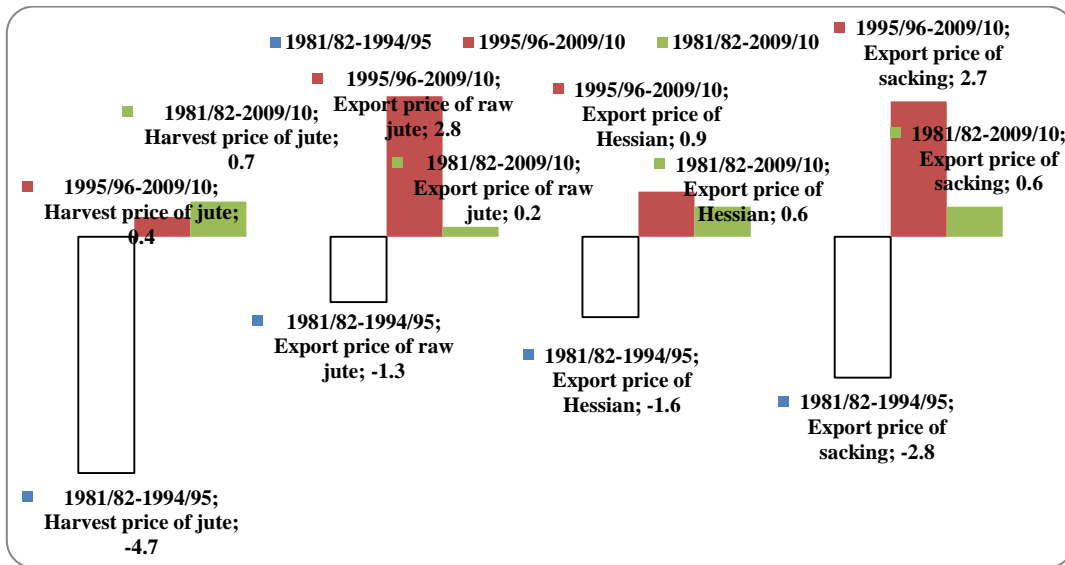

Figure 2: Growth rates of raw jute and jute goods prices

Growth Rates of Export Earnings from Raw Jute and Jute Goods

The growth rates of export earnings from raw jute and jute goods in real term have been shown in Figure 3. Export earnings from raw jute increased significantly by 4.9% per annum during the whole study period, whereas it is computed at 4.1% per annum in case of jute goods export earnings.

On the other hand, export earnings from raw jute and jute goods jointly increased by 4.3% per annum, which was highly significant. Among the different study periods, the higher significant growth rates of raw jute as well as jute goods export earnings, both separately or jointly, observed in post-trade liberalization period. The real export earnings from jute and jute goods were found to increase over the period due to positive growth rates of export prices and quantity export from the country. This is a positive indication for the development of jute sector in Bangladesh.
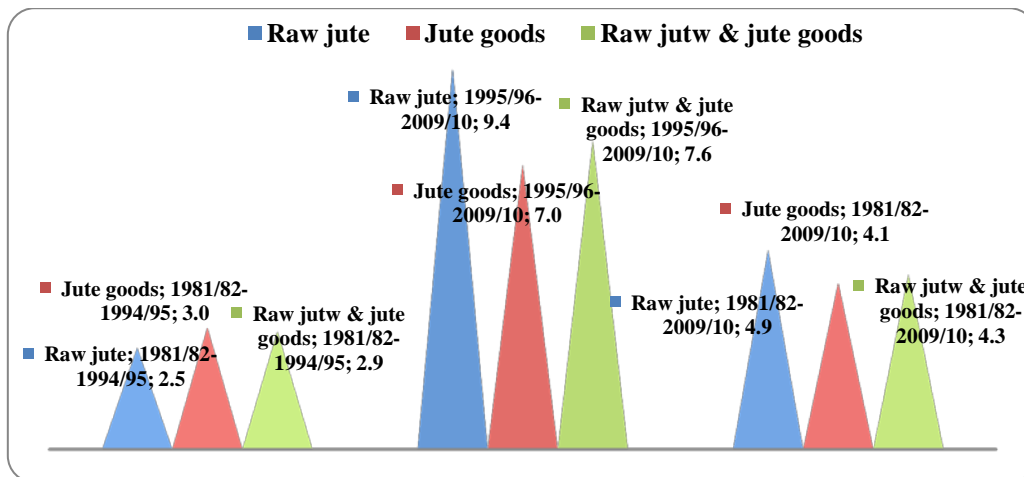

Figure 3: Growth rates of export earnings from raw jute and jute goods

Growth Rates of Production and Consumption of Jute Goods

In post-trade liberalization period, the growth rate of jute goods production was found positive (1.1%), which might be a reason behind the increasing trend of world demand and higher export prices (Figure 4). This picture is promising for the development of our jute manufacturing industry. Internal consumption of jute goods on the other hand decreased (5.1%) significantly in post-trade liberalization period though it increased

significantly by 2.8% per annum during the whole period. This might be due to the wide expansion of cheaper synthetic substitute usage in post-trade liberalization period compared to the previous period.
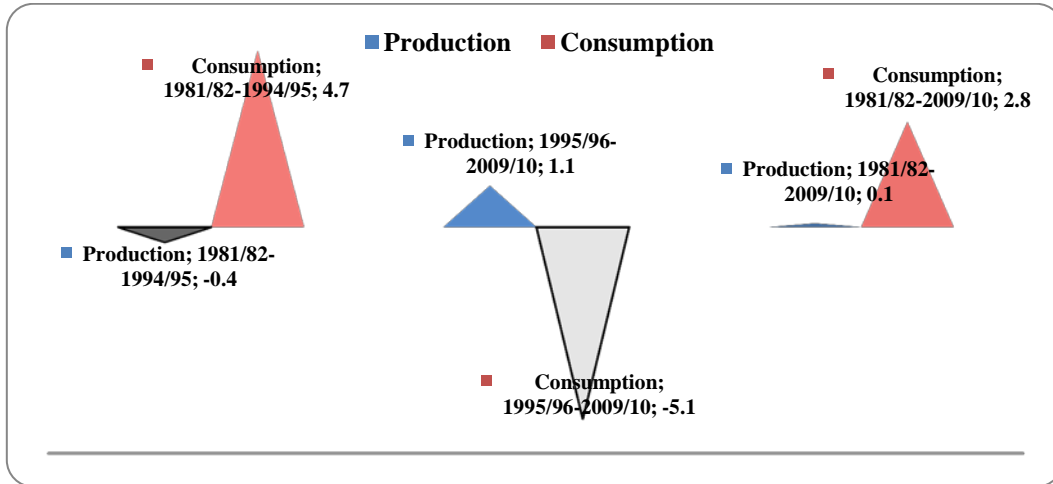

Figure 4: Growth rates of production and consumption of jute goods

Growth Rates of Raw Jute and Jute Goods Export from Bangladesh

The growth rates of raw jute and jute goods export from Bangladesh have been shown in Figure 5. In post-trade liberalization period, export of raw jute and jute goods increased by 4.8% and 0.3% per annum, respectively, which were mainly due to the extended world demand. Lower growth rate was observed for jute goods export compared to raw jute and it might be due to the stiff competition against cheaper synthetic substitutes of the world.
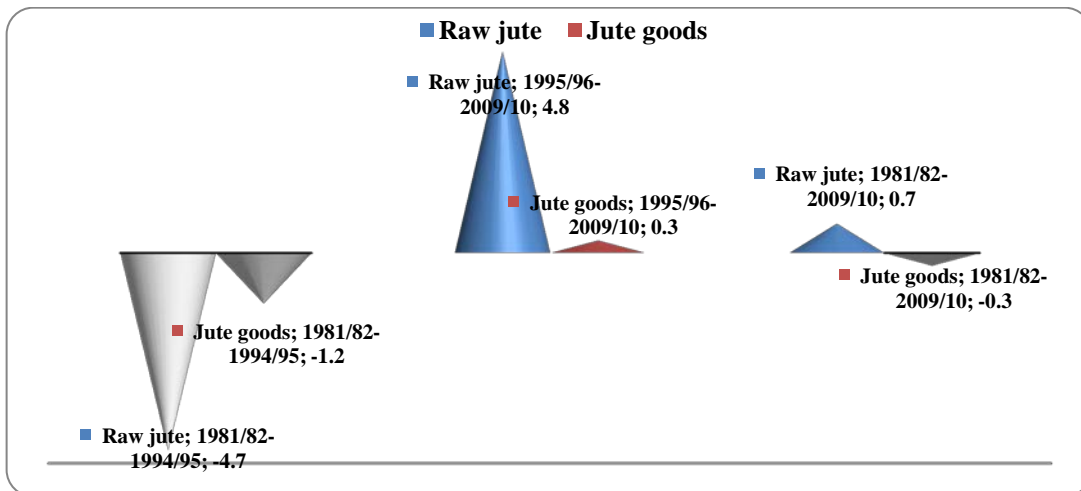

Figure 5: Growth rates of jute goods export from Bangladesh
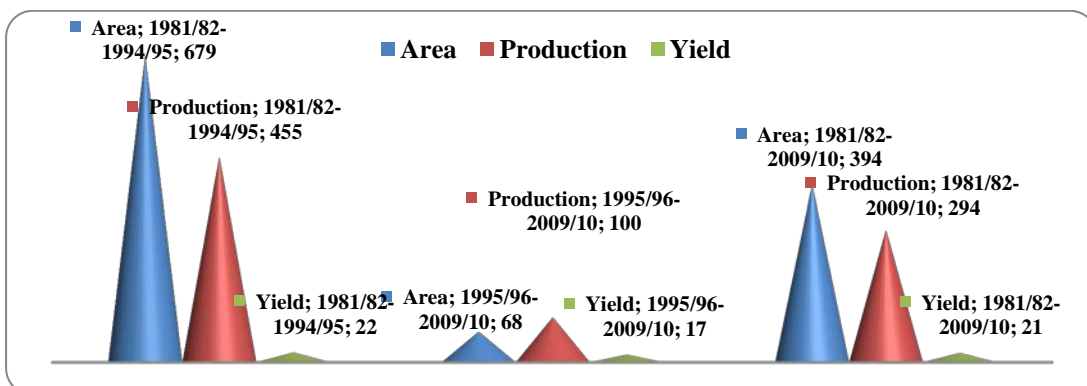

Figure 6: Instability index of area, production and yield of jute

Instability in Area, Production and Yield of Raw Jute

From Figure 6, it seen that area instability of raw jute in Bangladesh was found 394 for the whole study period in terms of instability index. The area instability of raw jute was 679 in pre-trade liberalization period and sharply decreased in post-trade liberalization period (68), meaning that area was more stable in post-trade liberalization period. Area instability was caused due to the technological breakthrough. Instability in production is the result of combined effect of instability in acreage and yield.

It shows that area and yield instability was the highest in pre-trade liberalization period which caused production instability to be the highest (455) in the same period. Production was more unstable than area or yield in post-trade liberalization period. However, instability in area, production and yield of raw jute decreased remarkably in post-trade liberalization period due to more stable prices of raw jutes in domestic markets, which might be an indication of future production stability of raw jute. Because, production stability is essential for price stability of jute and price stability is important for all market participants.

Instability in Raw Jute and Jute Goods Prices

Real price instability of raw jute and jute goods in Bangladesh are presented in Figure 7. Harvest time and export price instability of raw jute was observed much higher compared to export prices of jute goods in real term. It is also showed that harvest time price of raw jute was more stable than export prices of raw jute and jute goods in post-trade liberalization period. In other words, domestic market price of raw jute was more stable compared to world market prices of raw jute and jute goods in post-trade liberalization period, which might be a reason behind the entire dependency on world market.
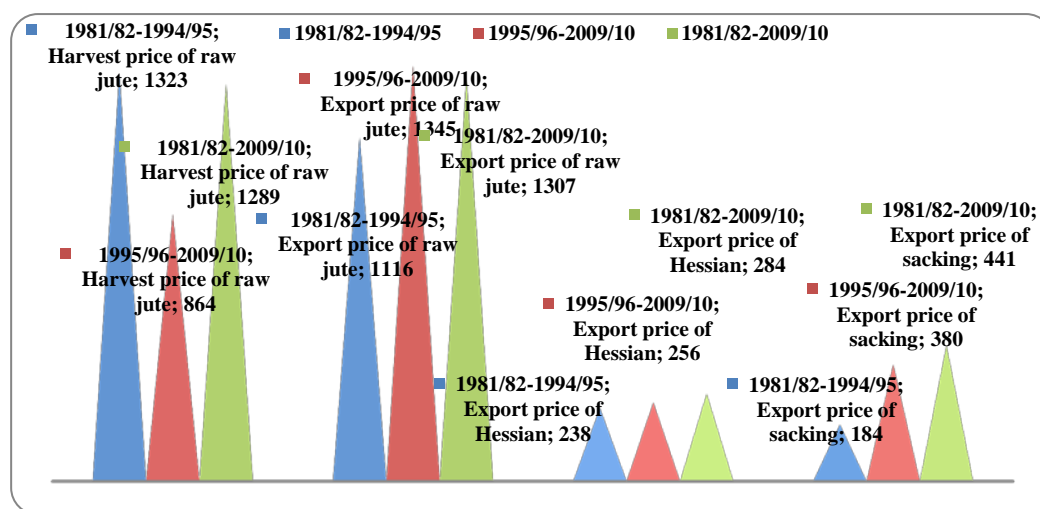

Figure 7: Instability index of raw jute and jute goods prices

DISCUSSION

Though area of jute decreased significantly by 2.2% per annum during the whole study period, it was comparatively low (1.5%) in post-trade liberalization period. It might be the fact that a significant portion of this crop area was replaced by alternative food crops specially aus, maize and vegetables due to additional demand of food grains for increasing population. Production of raw jute decreased significantly by 0.7% per annum during the whole period and in post-trade liberalization period, it increased by 0.2% per annum. Both production (0.2%) as well as yield (1.7%) showed positive growth rate and was higher in post-trade liberalization period in spite of significant negative growth rate of area (1.5%). This is evidently a positive sign for future prospects and sustainability of jute in Bangladesh. It has taken place mainly due to the intensification of production process including the introduction of high yielding varieties of jute.

Harvest time price of raw jute increased by 0.7% per annum in real term during the whole period and it was found positive (0.4%) in post-trade liberalization period. It might be due to re-opened and newly started jute mills

in post-trade liberalization period, which have created extra demand of raw jute. In addition, expanding world demand in post-trade liberalization period might be another reason for increasing harvest time real price of raw jute in Bangladesh. The study also found positive growth rates of raw jute and jute goods export prices in real term during post-trade liberalization period, which might be due to the increasing trend of world demand. The real export earnings from jute and jute goods were found to increase over the period due to positive growth rates of export prices and quantity export from the country. Growth rate of jute goods production was found positive (1.1%) in post-trade liberalization period, which might be the reasons behind the increasing trend of world demand and higher export prices. On the other hand, internal consumption of jute goods decreased (5.1%) significantly in post-trade liberalization period. This might be due to the wide expansion of cheaper synthetic substitute usage in post-trade liberalization period compared to the previous period. Export of raw jute and jute goods increased by 4.8% and 0.3% per annum, respectively in post-trade liberalization period, which were mainly due to the extended world demand. Lower growth rate was observed for jute goods export compared to raw jute and it might be due to the stiff competition against cheaper synthetic substitutes of the world.

The study found that instability in area, production and yield of raw jute decreased remarkably in post-trade liberalization period due to more stable prices of raw jute in domestic markets, which might be an indication of possible future stability in raw jute production. Because, production stability is essential for price stability of jute and price stability is important for all market participants. It is also showed that harvest time price of raw jute in real term was more stable than export prices of raw jute and jute goods in post-trade liberalization period.

CONCLUSION

From the above findings it is mentioned here that there is an ample scope to revive jute as an internationally traded commodity. It has bright future prospect in terms of the growth of yield, world exports, export prices and internal consumption. Although both public and private sectors are engaged in this area, private sector is dominating largely. In a market economy, private sector has to play a vital role for the development of the industry. Government can assure some policy support for producing quality jute with low cost, providing incentives for increasing productivity, ensuring fair prices for the farmers and increasing infrastructural facilities also. But, market stability and market expansion both local and world perspective is largely depends on the rational behaviour of the private sector participants. They can play an active role to capture the opportunity of increasing trend of world demand. For achieving that goal, government has to take necessary supporting programmes through effective policy measures.

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