FORECASTING MODEL FOR THE PRODUCTION AND CONSUMPTION OF COTTON FIBER VERSUS POLYESTER

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- Most of the cotton production in Brazil was in the Southeast and Northeast in the early 90's;

- With the expansion of agriculture in the Brazilian cerrado Mato Grosso State has consolidated as the largest producer of raw cotton in Brazil since 1997;

- By 2013 1.2 million tons of raw cotton was produced in Brazil and Mato Grosso was responsible for 53% of this volume.

Source: Conab

- Bahia from 2000 became the 2nd state in production;

- Goiás and Mato Grosso do Sul follow behind in the rankings.

- Another highlighted region is the Mapito (Maranhão Piauí Tocantins) which are advancing in agriculture also betting on cotton.

- Cotton production began to contribute from the year 2000 to a positive trade balance of Brazil according to the Ministry of Agriculture Livestock and Supply (MAPA);

- Brazil started to supply the need of the domestic market and export cotton other countries;

- In 2012/13 crop was consolidated as the third largest exporter of cotton (USDA).

Source: MAPA, USDA

- Economic changes in the textile industry caused changes in major cotton producing regions and also in the consumption of the commodity in the Brazilian domestic market.
- Since then producers oscillate acreage of the crop depending on market conditions.

Source: Conab

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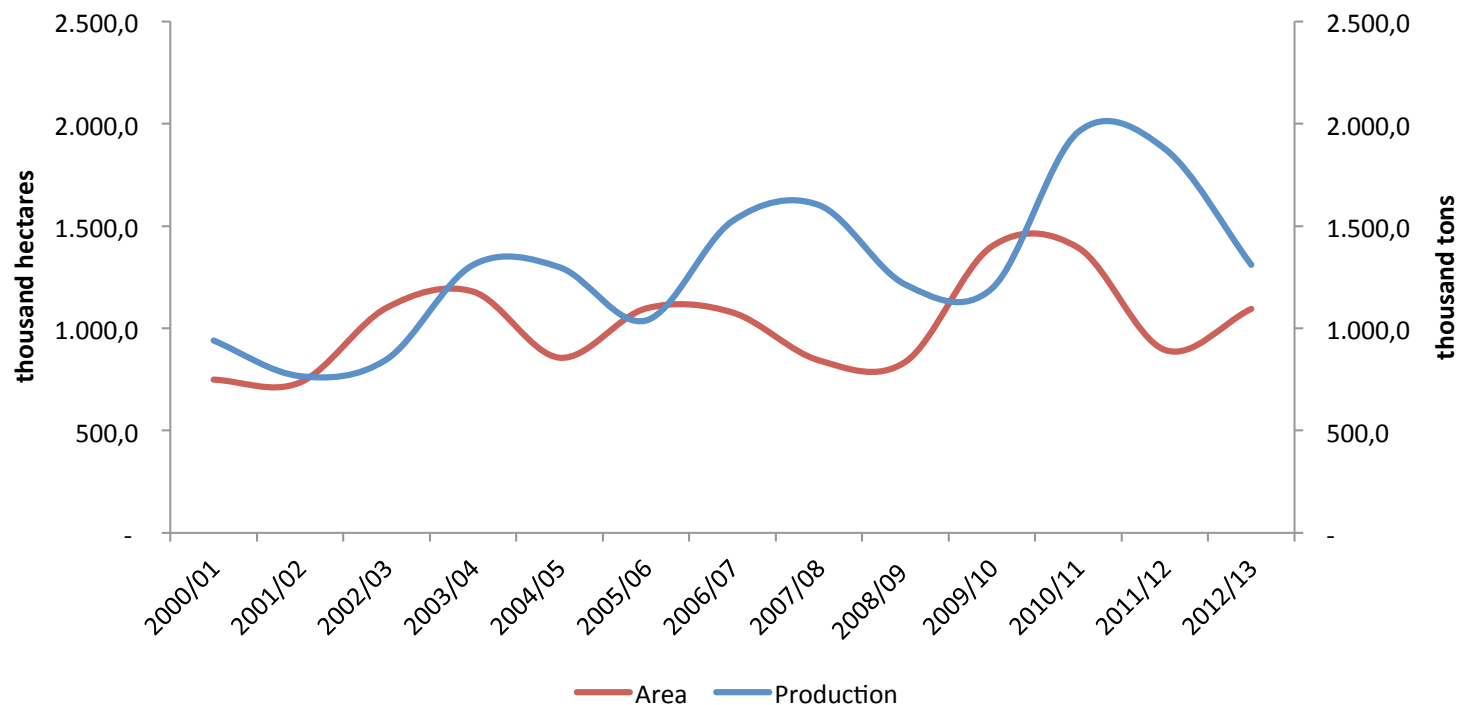
- Therefore it is understood that it is necessary to consider how the demand of the plume by the domestic textile industry in the coming years;

- What would be the potential for expansion of the Brazilian production of the plume;

- Moreover Estimate how the consumption of synthetic fibers can grow.

Objective

To steer the producers and the demand of natural fiber the objective was to find:

1. A model to forecast planted area and yield of cotton in major producing States

2. Project the demand of cotton and polyester in the Brazilian domestic market.

With this you can estimate what the growth potential of the market for the cotton in Brazil to estimate the excess production of the fiber which possibly should be exported contributing to a positive balance of trade.

Methodology

With the time series trend lines were determined for each variable. The choice of the trend line was based on the accuracy test called MAPE (Mean Absolute Percent Error) following steps:

1. The first step was to create a line graph with the time series of each variable in Microsoft Excel;
2. After it was selected 75% of the initial values of the time series hiding the 25% later.
3. We adopted the trend lines to find the hidden values and see which trendline that found closest recorded values so the variation of the recorded values and the values found at the trend line was given by the following equation:

$$\Delta v = (v_{ltn} - v_{vrn})/v_{vrn}$$

Where:
V = variation among the registered number and the number found in the trend line;
V_{ltn} = value found in the trendline;
V_{vrn} = value recorded in the time series.

4. Then the average of the changes was made:

$$\mu\Delta = \sum\uparrow\boxtimes\Delta \; 1/number\; of\; values$$

Where
μ Δ = average variations of 25% of the hidden values.

5. Therefore R^2 divided by the average of the variations to give the MAPE (accuracy meter).

$$Mape = R\uparrow2 \;/\mu\Delta$$

6. The higher the MAPE the greater the precision of the trend line. Thus it was possible to select the trend line by its MAPE indicator.
With Mape was possible to calculate the projected production for polyester and cotton from 2013 to 2023.

FORECASTING MODEL FOR CONSUMPTION PRODUCTION AND SURPLUS

Year	Cotton fiber consumption	Polyester fiber consumption	Production of cotton in Brazil	Production surplus
2013	974	444	1.280	306
2014	982	453	2.011	1028
2015	991	462	2097	1106
2016	999	471	2185	1185
2017	1007	479	2273	1266
2018	1015	487	2363	1348
2019	1023	495	2454	1431
2020	1031	503	2546	1514
2021	1039	510	2638	1599
2022	1047	518	2732	1685
2023	1054	525	2826	1772

Unit: thousands tons

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- The area of cotton production is expected to grow in the states of Mato Grosso Bahia Maranhão Piauí and Tocantins following the trend of expansion in recent years;

- Area reduction must occur in the states of Goiás Mato Grosso do Sul and the average of the other states of Brazil;

- Despite the downward trend of the area in some regions productivity tends to grow in all regions of the country;

- Consumption feather by industry should continue to grow but at a slow pace;

- The substitution of polyester for cotton should continue occurring since the nylon tends to grow at a higher rate if purchased at the growth of the cotton.

- Despite the increased consumption of industry the surplus production should continue to grow from just over 30% of consumption to more than 170% of consumption in 10 years;

- With the estimated surplus production it is essential to encourage the development of national industry and at the same time improving access to international markets;

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