

# Potato Glut in Bangladesh: Forecasting Potato Production and Marketing Implications for Future

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**Abstract:** Due to favorable conditions, Bangladesh observes huge surplus in potato production but potatoes are wasted for lacking capacities in storage. Besides, the export market is not in favorable condition for the potato market in Bangladesh. Hence, the surplus of potatoes has become a tale of woe. Therefore, the aim of the study is to forecast the potato production by the year 2029-30 and analyze market system, storage and the export of those potatoes. However, the major findings are: Firstly, by the end of the year 2030, the production of potato will raise more than 300 lac metric tons and definitely, there will be huge surplus of potatoes as is in current time. Secondly, we should take necessary steps to (i) facilitate accredited lab facilities to promote disease free potato export and (ii) set up a separate agricultural processing zone in Chittagong to expedite export facilities. Thirdly, under public private partnership (ppp) more cold storages need to be established with higher capacities and lastly, alternative crop like maize can be popularized in place of potatoes among farmers.

**Keywords:** Potato, Surplus, Forecasting, Singular Spectrum Analysis (SSA), Marketing, Export.

**JEL Classification:** C14, C22, M11, M31, M38, Q13.

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## I. Introduction

Potato is a very popular vegetable in Bangladesh. For the whole year, it is used as main vegetable and this has become very familiar in the form of French fries/ potato wedges/chips among young population. It is a *rabi* crop and requires less irrigation than the production of *Boro*. Besides, producing potato has become more profitable than producing other crops in the *rabi* season. So farmers are producing potatoes in the quest of more profit in their agricultural land resulting in excess of potato production than the target set for each year. Currently, with an annual average demand of around 70 lakh tones, the country witnessed a surplus of about 40 lakh tones, most of which is wasted (The daily star, 2019).

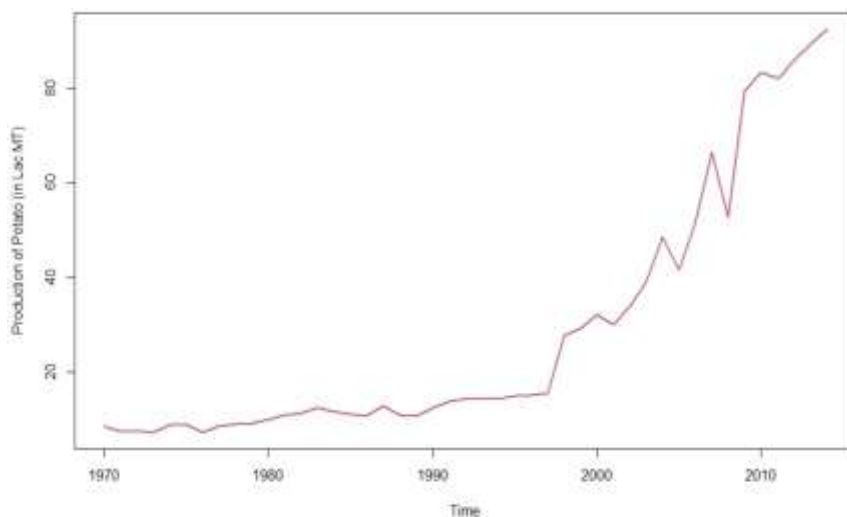
In this back drop of potato glut in the case of Bangladesh, it warrants the insight what is going to happen in potato production in the business as usual scenario to make suggestions for the policy makers. It is already apparent that due to lack of capacities in the available cold storage, not all of the surplus can be stored in the cold storage. So in the coming days ahead, production of potato needs to be assessed using forecasting methods.

One can perform time series forecasting using different classical parametric models ranging from Box-Jenkin's ARIMA (p,d,q) to most naïve model like moving average or smoothing. But doing that requires following several stringent assumptions like stationary data and choice of appropriate parameters. On the other hand, unlike ARIMA models, non-parametric or data driven singular spectrum analysis (SSA) doesn't require an appropriate degree of differencing or stationary data. SSA is especially useful for analyzing and forecasting series with complex seasonal components and non-stationary (Hassani et al., 2009). The data considered in this study has a complex structure of this kind (non-stationary); as a consequence, we find SSA to be superior to classical techniques.

This study uses 45 years of time series data for potato production in Bangladesh started from 1970 to 2015, previously analyzed by (Hossain & Abdulla, 2016). Hossain & Abdulla (2016) have considered the extent of stationarity and tried to forecast the same data based on ARIMA (0,2,1) model. But, here we have examined the forecasted value using data driven non-parametric SSA technique which is robust in nature and can give insights for more time horizons for the FY 2029-30.

## II. Overview of Potato Production

Potato is a *rabi* crop and it likes cool climate to produce. Today it has become a highly successful October-March winter crop in Bangladesh and it has become the seventh largest producer of the tuber crop (The daily star, 2019). It is clear from the figure-1 that the production of potato has sharpened trend after the year 1997-98 with unstable variance.



**Figure 1:** Production of Potatoes over the years in Bangladesh (in Lac M.T.)

The production of potatoes is increasing gradually in Bangladesh, and so is the surplus. Not all of the surplus can be stored in the cold storages for low capacity. For a lack of better use of the surplus, farmers are left with no option but to feed these potatoes to cattle (The daily star, 2019).

### **III. Source of Data**

This study considered the published secondary data of yearly potato production in Bangladesh which were collected over the period of FY 1970-71 to 2014-15 from the published report of Bangladesh Bureau of Statistics(BBS, 2018).

### **IV. Statistical Tool Employed**

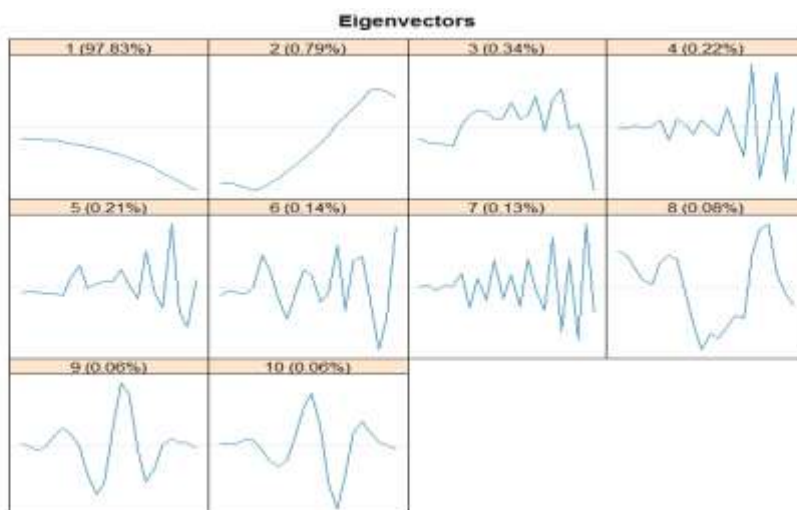
Singular spectrum analysis (SSA) is newly developed non parametric or data driven technique to model non-linear and/or non-stationary as well as noisy short time series (Hassani, 2007). This forecasting method, in comparison with Box jenkins's ARIMA or other methods, gives much more accurate forecast. So, in forecasting the production of potato in Bangladesh, SSA has been chosen.

The main idea of SSA is to make a decomposition of the original time series into the sum of independent components, which represent the trend, oscillatory behavior (periodic or quasi periodic components) and noise. Some of these components are selected and then used to forecast (Claudia, 2013).

Let,  $y = [y_1, y_2, \dots, y_T]$  be a time series of length T. The SSA technique consists of two stages: decomposition and reconstruction. Decomposition stage consists of two stage- embedding and singular value decomposition. On the other hand, reconstruction stage is also consisted of two stages- grouping and averaging. In this study, however, to analyze the data, R software has been used with its Rssa package.

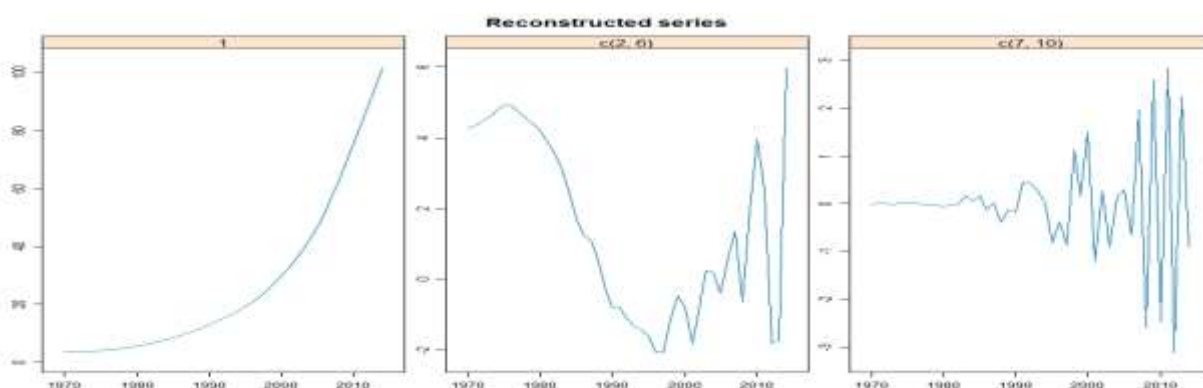
### **V. Empirical Findings**

Decomposed data into its several (in fact 10) components have been presented in figure-2. It is observed that most of the components behave as an oscillating process. The frequency for component 1 is different. But, frequency for 2 to 7, and 8 to 10 are almost same and so could be grouped.



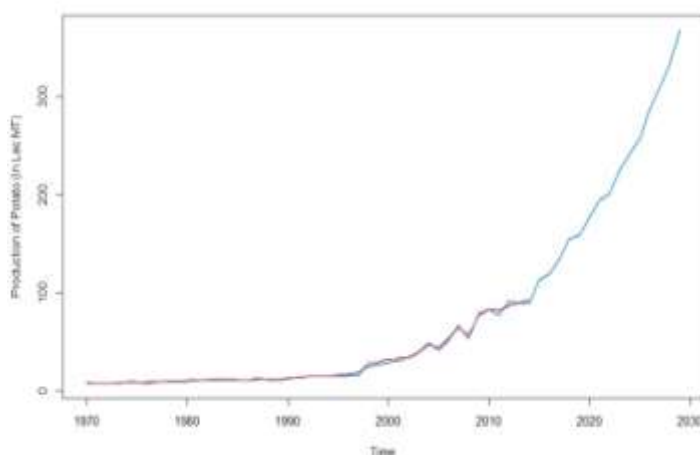
**Figure 2:** Decomposition of time-series data into its components

So the grouped data have been presented in the figure-3. It is clear from the figure-3 that series-1 is the trend component and series-2 and series-3 are harmonic components.



**Figure 3:** Reconstruction of series from decomposed components

Figure-4 shows the original time series data with forecasted time series for the FY 2029-30 (Red line is the actual and the sky blue line is the forested time series). From the figure-4, it is evident that in the business as usual scenario, the production of potato will increase rapidly with an estimation of more than 300 lac Metric Tons by the year 2030.



**Figure 4:** Potato Production (Actual and forecasted) (in Lac M.T.)

## VI. Conclusion and Marketing Implication

Potato is the most consumed vegetable in Bangladesh throughout the year. Due to the suitable environment and climatic conditions, potato production is increased day by day and in the FY 2019-20, Bangladesh has become the seventh largest potato producing country in the world. But, in recent years the amount of production is more than the demand and the sufferings of the potato cultivators are growing day by day. The cultivators are stuck with surplus stocks and low exports. Though, Bangladesh started its exports of potato and its by-products to the different countries in the world, the export started to struggle when our potential potato buyer, the Russia, issued a temporary ban finding fungal diseases in the exported potatoes. In recent years, most of our potatoes are exported in Malaysia and in other countries like Vietnam, Maldives, Sri Lanka, and Singapore.

It is found from our study that in the coming days ahead, for example, by the year of 2030, our potato production will rise more than 300 lac metric tons. It will surely, suppress the demand as is the case right now and if we can't manage such huge production in an effective manner, it will be a woeful tale for us. We must find a tangible solution for the potato market glut and find out alternative markets for that surplus. We may establish accredited lab facilities and ask exporters to maintain good agricultural practice so that disease-struck potatoes are not shipped to export destinations. As 95% of potatoes are exported through our Chittagong port, a separate agricultural processing zone may be set up in the Chittagong. Besides, a good number of cold storages should be established, may be under public private partnership (ppp). Besides, our potato growers can be encouraged to go for alternative cropping pattern e.g. they can be encouraged to produce maize in place of potatoes in the *rabi* season which is also profitable to cultivate.

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