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GROWTH PERFORMANCE OF CASSAVA PRODUCTION IN THAILAND

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Abstract:

This study is mainly undertaken to study the growth performance of cassava production in Thailand and covers the period from 2007-08 to 201617. This study is based on secondary data and to analyze the data coefficient of variance, average and compound annual growth these statistical stools were used. It is observed from the study that the production of cassava shows highest compound annual growth rate of 2.16 percent than the compound annual growth rates of 1.84 percent and 1.57 percent of harvested area and planted area respectively during the study period. The average annual growth rate of production (3.45 percent) is also higher than the average annual growth rates of planted area (2.59 percent) and harvested area (2.21 percent) during the study period. It means the production of cassava increased in Thailand due to the advanced techniques used by the farmers of the Thailand for the production of cassava not due to the increase in the planted area under the cassava crop. The average annual growth rate of average yield per planted area of cassava is found to be 0.89 percent whereas, the compound annual growth rate is found to be 0.58 percent during the study period. The average annual growth rate of average yield per harvested area of cassava is found to be 0.67 percent whereas, the compound annual growth rate is found to be 0.32 percent during the study period. So it is cleared that the growth rate in average yield per planted area of cassava is higher than the average yield per harvested area of cassava in Thailand during the study period.

Keywords: Cassava, Production, Planted area, Harvested area, Yield

Introduction:

After rice and maize the cassava is the most important crop which gives the calories in the tropics. The thousands of peoples from Africa, Asia and Latin America are depend on the cassava. The features of Cassava regarding agro-ecological adaptability and ability to produce reasonable yields provide the food security at the household level and an important source of dietary energy. Worldwide the crop cassava is an essential part of the diet of more than half a billion people and thousands of farmers depend on the cassava for their livelihood and many processors and traders engaged in the trade of cassava. Nigeria, Brazil, Thailand, Indonesia and the Congo Democratic Republic these five were countries producing the 60 percent crop of Cassava in the world (Adam Prakash).Cassava is a vital food crops in tropical regions especially those in Africa and South America. In Asia continent that consume cassava more than other centuries are Indonesia and India. Cassava has an enormous ability to adapt to different climates and it can cultivate and can grow in low-nutrient soil and tolerate drought (AFSIS).

Cassava roots can be converted through processing into lot of food and it is capable crop to provide food security. For great value add and profit making the machine application for cassava roots processing has helpful. In case for drying of cassava product the farmers of villages were depend on the sun. The farmers were obtain firewood from forests and use fossil fuel from petroleum to power the tractor and small internal combustion engine (Oladele).

Growth prospects for world cassava sectors appear delimited along the geographical lines that characterize the role of cassava in the agricultural economy. For instance, as cassava is principally a food crop in Africa, the sector is providing a strong stimulus for rural development, poverty alleviation, economic growth and ultimately, food security. There is also wider recognition of cassava as a choice crop in the context of climate change adaptation strategies, particularly in eastern and southern African countries that regularly endure sustained periods of drought. These considerations are providing cassava sectors on the continent with a somewhat assured long-term footing, and are, by and large, behind an annual average production growth rate, which except for 2017 and 2018,has outpaced population growth for the past decade and beyond. The current year anomaly is again on account of policy in Nigeria, which incentivizes the expansion of other crops, resulting in sluggish growth in cassava cultivation. Uncertainty dominates cassava sectors in Asia, as they are strongly susceptible to developments in China, the principal destination for internationally traded cassava products. In fact, almost all cassava sectors in Southeast Asia have been geared to meet China's traditional high import demand, expanding in tandem with trade growth(FAO, 2018).

Thailand is the world leader in the cassava production although cassava is not a native crop, not good collaboration between the private sector and farmers and do not have strong support from the government (Watananonta).Cassava is one of the most important food crops in the humid tropics and called as manioc, tapioca oryuca, being particularly suited to conditions of low nutrient availability and able to survive drought (Burrell). Thought the cassava leaves are sometimes consumed but it is the major harvested organ is the tuber, which is actually a swollen root. The plant is propagated mostly from stem cuttings. A major limitation of cassava production is the rapid post-harvest deterioration of its roots is a major limitation of cassava production which usually prevents their storage in the fresh state for more than a few days (Okezie and Kosikowski).

There are several types of CGPRT crops among the variety of food crops produced in Thailand. The maize, sorghum and Job's tear are the consist grown cereals in Thailand. Among others tubers include cassava, potato, taro and yam. The pulses which are most cultivated in Thailand are soybean, mung bean, peanuts and others. The cassava and maize is the most common grown in Thailand among the CGPRT. Though the Soybean is more widely grown than other pulses in Thailand but the demand is greater than the supply. The cropping pattern in Thailand mostly depends on several supporting factors, like size of farm holdings, agro climatic conditions and water sources, among others (Nareenat).

Review of Literature:

Watana and Reinhardt (2018) have examined the Present situation and future potential of cassava production and utilization in Thailand. The study stated that the cassava is produced mainly by small farmers on marginal land in Thailand. In Thailand the products of cassava are chips, pellets and starch. The exports of cassava by Thailand are mostly to the China and European Countries. The study observed that the cassava growing area was decreased over the past decade from 1.24 to 1.06 thousand hectares. Whereas, the production of total fresh root is increased from 16 thousand tons to 21 thousand tons due to marked increase in the yield of cassava. Renkow and Byerlee (2010) argued that from the many years the crop genetic improvement is the main strategy followed by CGIAR centers and partners that has contributed to increase farm productivity, improve food and nutrition security and increase farm income significantly.

Ricardo, Tesfamicheal and Dung, P. L.(2017) have presented paper on the Adoption of Improved Cassava Varieties in South and Southeast Asia, in the 9th ASAE International Conference on Transformation in agricultural and food economy in Asia, Bangkok, Thailand. The authors observed that in Asian continent the investment on cassava genetic improvement has proven to be effective. The South and Southeast Asian countries were success to the development of a set of improved cassava varieties because of Efforts in establishing functioning and relevant breeding programs. The South and Southeast Asian countries have that currently planted in 83 percent of the total acreage of the region. South and Southeast Asian countries have around 17 percent of the total area of cassava devoted for local varieties for direct consumption. Iyasere (2015) has studied the Cassava production in Nigeria. Nigeria is the world largest producer of the cassava and cassava production playing a vital role in the economy of Nigeria. The average yield of cassava in Nigeria is found to be 10.6 tons per hectare. The 24 states of the country produced cassava crop. During 1999 the Nigeria has produced 33 thousand tons cassava production and in the next decade the production of cassava in Nigeria reached up to 45 thousand tons which is 19 percent of the world cassava production. In Nigeria more than 40 cassava varieties are in use and cassava is the well developed and organized agricultural crop in the country.

Kehinde and Aboaba (2016) has Analyzed the value addition in the processing of cassava tubers to “garri” among cottage level processors in south-western Nigeria. The authors stated that the agricultural economy of Nigeria is still largely rudimentary. The wealth creation potentials of this country have been hampered by inability of cottage level processors to add value to their produce among others. This study examined the value addition to processed cassava tubers among cottage level processors in Ogun state of the South-western Nigeria.

Alyson, Rodrigues, Maria, and Wolia (2018) have reviewed the application of cassava harvest residues in biochemical and thermo chemical conversion process for bio-energy purposes. The author stated that in bio-energy or bio-fuels there were several ways for biochemical and thermo conversion from cassava harvest residues and agricultural residues. The study observed that there were many information and specific applications

for this biomass are still lacking which leads the researchers to the developing of studies by using the more applicable to find the real situations of each Country. Nyerhovwo (2004) has studied the Cassava and the future of starch. The study found that among crops that convert the greatest amount of solar energy into soluble carbohydrates per unit of area cassava commodity have very high ranks. Cassava gives about 40 percent higher than rice and 25 percent more than maize a carbohydrate among the starchy staples. The cassava is the cheapest source of calories as a human nutrition and animal feeding. Cock, (1982) argued that the cassava excels under suboptimal conditions, offering the possibility of using marginal land to increase total agricultural production with compared to other crops. Tonukari (1997) and Fregene (2003) observed that the cassava yields have substantial improvements in the yields because of the Plant breeders, agronomists and recently molecular biologists. Some insights into the molecular nature of cassava has to be revealed by the genetic characterization and mapping. Scott (2000) stated that by 2020 the Sub-Saharan Africa is an experience the most rapid growth in food demand of root and tubers on an average 2.6 percent per annually.

Objectives of the Study:

The basic object of the study is to examine the growth trends in production of Cassava in Thailand. Following are the specific objectives of the present study.

1.To examined the growth trends of cassava production in Thailand.
2.To examined the yield of cassava production in Thailand.

Hypothesis:

1.The yield of the cassava production is decreased.
2.The growth trends of cassava production in Thailand are negative.

Research Methodology:

The present study is based on secondary data. The secondary data relating to growth performance and utilization of cassava production is collated form the annual report of the Food and Agriculture Organization of The United Nations (FAO), October 2018, Thai Tapioca Starch Association, Bangkok, Thailand and from the Thailand Foreign Agricultural Trade Statistics 2017, Published by the Centre for Agricultural Information, Office of Agricultural Economics, June 2018. To analysis the data collected for examine the growth trends and utilization of cassava the statistical stools like compound annual growth rate, simple annual growth rate, standard deviation and coefficient of variation are used.

Planted area of Cassava crop in Thailand:

There is correlation between plant area and production of each crop the cassava is not exempted from this. Planted area of Cassava crop in Thailand is presented in Table no.1. The data regarding trends in planted area of cassava crop in Thailand from 2007-08 to 2016-17 were collected for the study. The total planted area of cassava crop in Thailand was7750 thousand Raisin 2007-08 which increased up to 8918 thousand Rais in 2016-17. The annual average growth in total planted area of cassava crop stood at

129.78 thousand Rais. The total planted area of cassava crop has increased by 1.15 times during the study period. The total planted area of cassava crop have shown mixed trend with an average annual growth rate of 2.59 percent during the study period. The average annual growth in total planted area of cassava crop during the study period was found to be minimum of -10.66 percent in 2009-10 and maximum of 24.89 percent in 2011-12. The coefficient of variation in total planted area of cassava crop is found to be 8.56 percent for the study period showing low variations in the planted area under cassava crop. There has been a mixed trend in the growth of planted area of cassava crop in Thailand due to less intensive given by government of Thailand for the increase the planted area of cassava crop in Thailand. The average annual growth rate of planted area of cassava is found to be 2.59 percent while the compound annual growth rate is found to be 1.57 percent during the period form 2007-08 to 2016-17.

Harvested area of Cassava in Thailand:

Harvested area of cassava in Thailand is presented in Table no.2. The data regarding trends in harvested area of cassava in Thailand from 2007-08 to 2016-17 were collected for the study. The total harvested area of cassava in Thailand was 7397 thousand Raisin 2007-08 which increased up to 8714 thousand Rais in 2016-17. The annual average growth in total harvested area of cassava stood at 146.33 thousand Rais. The total harvested area of cassava has increased by 1.18 times during the study period. The total harvested area of cassava have shown mixed trend with an average annual growth rate of 2.21 percent during the study period. The average annual growth in total harvested area of cassava during the study period was found to be minimum of -10.70 percent in 2009-10 and maximum of 19.97 percent in 2011-12. The coefficient of variation in total harvested area of cassava is found to be 8.50 percent for the study period showing low variations in the harvested area of cassava crop. There has been a mixed trend in the growth of harvested area of cassava in Thailand due to less intensive given by government of Thailand for the increase the harvested area of cassava in Thailand. The average annual growth rate of planted area of cassava is found to be 2.21 percent while the compound annual growth rate is found to be 1.84 percent during the study period.

Table 1.Trends in planted area of Cassava crop in Thailand

Year	Plant Area ('000'Rai)	Increase/Decrease over previous year	Percentage Increase/Decrease
2007-08	7750	--	--
2008-09	8584	834	10.76
2009-10	7669	-915	-10.66
2010-11	7400	-269	-3.51
2011-12	9242	1842	24.89
2012-13	9037	-205	-2.22
2013-14	8976	-61	-0.68
2014-15	9320	344	3.83
2015-16	9315	-5	-0.05
2016-17	8918	-397	-4.26

Average	8621	129.78	2.59
Maximum	9320	1842	24.89
Minimum	7400	-915	-10.66
S.D.	737.89		
C.V.	8.56		
CAGR	1.57		

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Thailand.

Trends in Cassava Production in Thailand:

Growth performance of cassava production in Thailand is presented in Table no.3. The data regarding trends in production of cassava in Thailand from 2007-08 to 2016-17 were collected for the study. The total production area of cassava in Thailand was 25156 thousand tons in 2007-08 which increased up to 30495 thousand tons in 2016-17. The annual average growth in total production of cassava stood at 593.22 thousand tons. The total production of cassava has increased by 1.21 times during the study period. The total production of cassava have shownmixed trend with an average annual growth rate of 3.45 percent during the study period. The average annual growth in total production of cassava during the study period was found to be minimum of -26.86 percent in 2009-10 and maximum of 36.22 percent in 2011-12.

Table 2. Trends in Harvested area of Cassava Production in Thailand

Year	Harvested Area ('000'Rai)	Increase/Decrease over previous year	Percentage Increase/Decrease
2007-08	7397	--	--
2008-09	8292	895	12.10
2009-10	7405	-887	-10.70
2010-11	7096	-309	-4.17
2011-12	8513	1417	19.97
2012-13	8657	144	1.69
2013-14	8431	-226	-2.61
2014-15	8961	530	6.29
2015-16	9065	104	1.16
2016-17	8714	-351	-3.87
Average	8253	146.33	2.21
Maximum	9065	1417	19.97
Minimum	7096	-887	-10.70
S.D.	701.40		
C.V.	8.50		
CAGR	1.84		

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Thailand.

The coefficient of variation in total production of cassava is found to be 13.52 percent for the study period showing low variations in the production of cassava crop. There has been a mixed trend in the growth of production of cassava in Thailand due to less intensive given by government of Thailand for the increase theproduction of cassava in Thailand. The average annual growth rate of production of cassava is found to be 3.45 percent while the compound annual growth rate is found to be 2.16 percent during the study period.

It is observed from the study that the production of cassava shows highest compound annual growth rate of 2.16 percent than the compound annual growth rates of 1.84 percent and 1.57 percent of harvested area and planted area respectively during the study period. The average annual growth rate of production (3.45 percent) is also higher than the average annual growth rates of planted area (2.59 percent) and harvested area (2.21 percent) during the study period. It means the production of cassava increased in Thailand due to the advanced techniques used by the farmers of the Thailand for the production of cassava not due to the increase in the planted area under the cassava crop.

Table 3. Trends in Cassava Production in Thailand

Year	Plant Area ('000' Tons)	Increase/Decrease over previous year	Percentage Increase/Decrease
2007-08	25156	--	--
2008-09	30088	4932	19.61
2009-10	22006	-8082	-26.86
2010-11	21912	-94	-0.43
2011-12	29848	7936	36.22
2012-13	30228	380	1.27
2013-14	30022	-206	-0.68
2014-15	32358	2336	7.78
2015-16	31161	-1197	-3.70
2016-17	30495	-666	-2.14
Average	28327	593.22	3.45
Maximum	32358	7936	36.22
Minimum	21912	-8082	-26.86
S.D.	3830.36		
C.V.	13.52		
CAGR	2.16		

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Thailand.

Average yield per planted area of cassava production in Thailand:

Average yield per planted area of cassava production in Thailand is presented in Table no.4. The data regarding trends in average yield per planted area of cassava in Thailand from 2007-08 to 2016-17 were collected for the study. The total average yield per planted area of cassava in Thailand was 3246 Kg. in 2007-08 which increased up to

3419 Kg. in 2016-17. The annual average growth in average yield per planted area of cassava stood at 19.22 Kg.. The total average yield per planted area of cassava has increased by 1.05 times during the study period. The average yield per planted area of cassava have shownmixed trend with an average annual growth rate of 0.89 percent during the study period. The average annual growth inaverage

Table 4.Average Yield per Planted area of Cassava Production in Thailand

Year	Average Yield per Planted area (Kg.)	Increase/Decrease over previous year	Percentage Increase/Decrease
2007-08	3246	--	--
2008-09	3505	259	7.98
2009-10	2870	-635	-18.12
2010-11	2961	91	3.17
2011-12	3230	269	9.08
2012-13	3345	115	3.56
2013-14	3345	0	0.00
2014-15	3472	127	3.80
2015-16	3345	-127	-3.66
2016-17	3419	74	2.21
Average	3274	19.22	0.89
Maximum	3505	269	9.08
Minimum	2870	-635	-18.12
S.D.	208.86		
C.V.	6.38		
CAGR	0.58		

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Thailand.

yield per planted area of cassava during the study period was found to be minimum of -18.12 percent in 2009-10 and maximum of 9.08 percent in 2011-12. The coefficient of variation in average yield per planted area of cassava is found to be 6.38 percent for the study period which shows narrow fluctuations in the average yield per planted area in Thailand during the study period. The average annual growth rate of average yield per planted area of cassava is found to be 0.89 percent whereas, the compound annual growth rate is found to be 0.58 percent during the study period.

Average yield per harvested area of cassava production in Thailand:

Average yield per harvested area of cassava production in Thailand is presented in Table no.5. The data regarding trends in average yield per harvested area of cassava in Thailand is collected for the period from 2007-08 to 2016-17. The total average yield per harvested area of cassava in Thailand was 3401 Kg. in 2007-08 which increased up to 3499 Kg. in 2016-17. The

Table 5. Average Yield per Harvested area of Cassava Production in Thailand

Year	Average Yield per Harvested area (Kg.)	Increase/Decrease over previous year	Percentage Increase/Decrease
2007-08	3401	--	--
2008-09	3628	227	6.67
2009-10	2972	-656	-18.08
2010-11	3088	116	3.90
2011-12	3506	418	13.54
2012-13	3492	-14	-0.40
2013-14	3561	69	1.98
2014-15	3611	50	1.40
2015-16	3437	-174	-4.82
2016-17	3499	62	1.80
Average	3420	10.89	0.67
Maximum	3628	418	13.54
Minimum	2972	-656	-18.08
S.D.	218.59		
C.V.	6.39		
CAGR	0.32		

Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Thailand.

Annual average growth in average yield per harvested area of cassava stood at 10.89 Kg.. The total average yield per harvested area of cassava has increased by 1.03 times during the study period. The average yield per harvested area of cassava have shown mixed trend with an average annual growth rate of 0.67 percent during the study period. The average annual growth in average yield per harvested area of cassava during the study period was found to be minimum of -18.08 percent in 2009-10 and maximum of 13.54 percent in 2011-12. The coefficient of variation in average yield per harvested area of cassava is found to be 6.39 percent for the study period which shows narrow fluctuations in the average yield per harvested area in Thailand during the study period. The average annual growth rate of average yield per harvested area of cassava is found to be 0.67 percent whereas, the compound annual growth rate is found to be 0.32 percent during the study period.

Conclusion:

After rice and maize the cassava is the most important crop which gives the calories in the tropics. The thousands of peoples from Africa, Asia and Latin America are depend on the cassava. Thailand is the world leader in the cassava production although cassava is not a native crop, not good collaboration between the private sector and farmers and do not have strong support from the government. It is observed from the study that the production of cassava shows highest compound annual growth rate of 2.16 percent than the compound annual growth rates of 1.84 percent and 1.57 percent of harvested area and planted area respectively during the study period. The average annual

growth rate of production (3.45 percent) is also higher than the average annual growth rates of planted area (2.59 percent) and harvested area (2.21 percent) during the study period. It means the production of cassava increased in Thailand due to the advanced techniques used by the farmers of the Thailand for the production of cassava not due to the increase in the planted area under the cassava crop. The average annual growth rate of average yield per planted area of cassava is found to be 0.89 percent whereas, the compound annual growth rate is found to be 0.58 percent during the study period. The average annual growth rate of average yield per harvested area of cassava is found to be 0.67 percent whereas, the compound annual growth rate is found to be 0.32 percent during the study period.

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