Value chain and trend analysis in area, production and productivity of Cashew in Cuddalore District of Tamil Nadu

[1]B. Aishwarya and [2]K. Sita Devi

Department of Agricultural Economics, Annamalai University,
Annamalai Nagar - 608002 (India)
E-mail: aishubala221@gmail.com

Abstract

Cashew is a popular horticulture crop that generates a lot of revenue. Despite having the second largest area under cashew farming (18.76 per cent), India only contributes 16.33 per cent to global production. Tamil Nadu stands in sixth position in area and production of cashew nut in India during 2019-20 with 98,000 tonnes of production from an area of 80,143 hectares. Among the various cashew growing districts of Tamil Nadu, Ariyalur district ranks first in area under cashew cultivation (29 per cent), followed by Cuddalore (25 per cent) and Pudukkottai (9 per cent). These three districts occupied around 63 per cent of total cashew area in Tamil Nadu. Based on this background information, this study has been designed to analyse the growth in area, production and productivity of cashew in Cuddalore district of Tamil Nadu. The findings of the study indicated that there is need for farmers to go into processing of RCNs to finished products. Some of these products include edible kernel, fresh cashew apple juice, cashew milk and wine. The products can be sold locally in order to earn extra income and improve their livelihoods. The value addition can be actualized through the effort of group dynamics in producing communities.

Key words : Value chain, Cashew productivity Cuddalore.

The cashew tree (*Anacardium occidentale* L.) is a Brazilian native that belongs to the Anacardiaceae family. During the 16th century, it was brought to India by Portuguese. Furthermore, India was the first country to recognise the value of cashew and began cultivating it as a commercial plantation crop, however cashew plantations are still primarily found on degraded lands in a wild state in Maharashtra, Goa, Karnataka, and Kerala on the west coast, and Tamil Nadu, Andhra Pradesh, Orissa, and West Bengal on the east coast. Cashew is currently cultivated in 1,141 lakh hectares, with 738 lakh million

[1]Ph. D (Agri – Business) Scholar and [2]Professor,

tonnes production (2020-21). In addition to its export potential, cashew's internal demand is steadily rising, necessitating more production and productivity. Apart from production management, another viable strategy is to strengthen crop improvement efforts and the development of high yielding varieties, as the risk of production is increasing under the scenario of climate change, which is linked to biotic and abiotic elements.

Cashew is a popular horticulture crop that generates a lot of revenue. Despite having the second largest area under cashew farming (18.76 per cent), India only contributes 16.33 per cent to global production. In terms of raw cashew nut productivity, India trails Vietnam (3,041.2 kg/ha) by 761.2 kg/ha (FAO, 2017). Raw nut processing capacity in India is estimated to be between 15 and 20 lakh tonnes. However, in addition to export revenues, domestic demand has increased dramatically. To suit the need of domestic cashew processing businesses, India has been importing raw nuts from African countries. Later, as different countries keep putting up processing facilities, the ability to import from many other countries is diminishing. In Quilon, W.T. Anderson established the Indian Nut Company, which was his first business endeavour. The cashew kernels were mostly supplied in the United States by Indian Nut Company. Around 1939, India began importing raw cashew nuts from African countries as demand for Indian cashew kernels increased on the worldwide market. The "Cashew Export Promotion Council (CEPC)" was established by the Indian Ministry of Commerce in 1955 to promote the export of cashew kernels and related products. Consequently Directorate of Cashew Nut Development was established by

the government of India in 1966. Cashew development projects were included in the five-year plan owing to the Directorate of Cashew Nut Development's efforts. Tamil Nadu stands in sixth position in area and production of cashew nut in India during 2019-20 with 98,000 tonnes of production from an area of 80,143 hectares. Among the various cashew growing districts of Tamil Nadu, Ariyalur district ranks first in area under cashew cultivation (29 per cent), followed by Cuddalore (25 per cent) and Pudukkottai (9 per cent). These three districts occupied around 63 per cent of total cashew area in Tamil Nadu. Based on this background information, this study has been designed to analyse the growth in area, production and productivity of cashew in Cuddalore district of Tamil Nadu. The main objective of the study are to analyse the trend and instability index in area, production and productivity of cashew in the study area, to analyse the effective value chain of cashew in Cuddalore district and to analyse the trend in import and export of cashew in India.

Sampling Design :

Cuddalore district was purposively selected for the study as it ranks second in the area coverage of cultivation Cashew nut (898,031ha) in 2019-20. With this regard Panruti block was selected bases on the area and production wise, For the purpose of this study, secondary data were collected for the period of 2010 – 2020 (10 years) from authenticated source like Ministry of Indiastat and were collected from the office of the Assistant Director of Statistics of Cuddalore district and primary data were collected through pre-tested interview schedule method. This study

is also based on the time series data on total area, production, productivity of cashew obtained from various published sources. The compound growth rate analysis was carried out to ascertain the growth trends of cashew in Tamil Nadu for ten years period and the instability in area, production and productivity of cashew was estimated using Coppock's instability index.

Statistical tools :

Compound growth rate analysis :

Compound growth rates of area, production and productivity of Cashew were estimated to capture the changes in the trend in Cashew. Exponential function of following form will be used to estimate the growth rates

$$Y_t = Y_o \ (1+r)^t \qquad (1)$$

Where,

Y_t = Area / production / productivity of cashew at time t

r = Compound rate of growth of Y_t

Y_o = Initial year area/production/productivity of cashew

By taking natural logarithm of (1),

$$In \ Y_t = In \ Y_o + t \ In \ (1+r) \qquad (2)$$

Now letting,

$$\beta_1 = In \ Y_o$$
$$\beta_2 = In \ (1+r)$$

Equation (2) can be written as

$$In \ Y_t = \beta_1 + \beta_2 t \qquad (3)$$

Adding the disturbance term to (3), it can be written as

$$In \ Y_t = \beta_1 + \beta_2 t + U_i$$

Y_t = Area / production / productivity of cashew at time 't'

t = time in years

β_1 = constant term

β_2 = regression co-efficient

This log linear function will be fitted by using Ordinary Least Square (OLS) method. The compound growth rate (r) will be obtained using the formula.

$$r = (Antilog \ of \ \beta_2 - 1) \times 100$$

Instability Index :

Instability in area, production and productivity of cashew is expected to hamper the process of economic development. This analysis was used to find out the fluctuations in area, production and productivity of cashew as done for growth rate analysis. To study instability index, Coppock's instability index (Coppock, 1962) was used to estimate the variation in the area, production and productivity which is algebraically expressed in the following form:

$$V \ = \ \frac{1}{N} \ [\log \frac{X_{t+1}}{X_t} - m]^2$$

The instability index is $= (Antilog \ of \ \sqrt{V} - 1) \ X \ 100$

Where,

X_t = Value or area, production and productivity t

n = Number of years

$N = n^{-1}$

$$m \ = \ \frac{1}{N} \sum_{t=1}^{n-1} (\log X_{t+1} - \log X_t)$$

Value chain analysis :

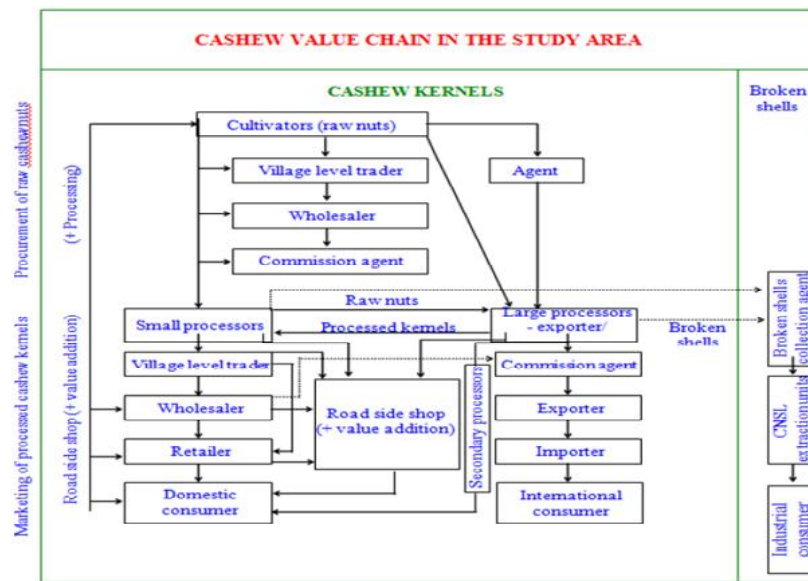The value chain of cashew was identified in cuddalore district based on the

Fig. 1. Value chain of cashew in cuddalore district

informations collected from the farmers, processors, market intermediaries, importers and exporters.

Trend in area, production and productivity of Cashew nut :

The trend line in area, production and productivity of cashew nut are presented in Figures 1,2 and 3. The exponential trend line witnessed that there is a declining trend in area, production and production in cuddalore district during 2010-11 to 2019-2020.

Table-1. Area, Production, Productivity of Cashew Cultivation in
Cuddalore District of Tamil Nadu (2010-2020)

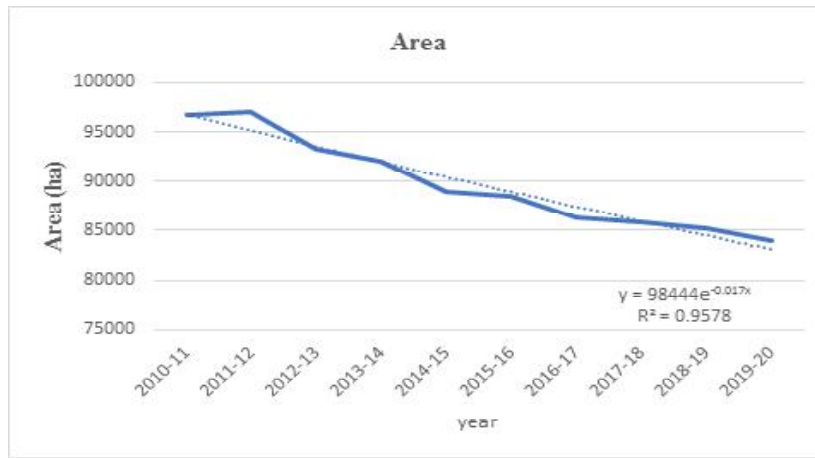| S. No	Year	Area (ha)	Production (tonnes)	Productivity (tonnes/ha)
1.	2010-11	96710	39996	0.41
2.	2011-12	97033	25532	0.26
3.	2012-13	93302	19730	0.21
4.	2013-14	92138	26273	0.29
5.	2014-15	89021	36561	0.41
6.	2015-16	88415	27094	0.31
7.	2016-17	86280	10247	0.12
8.	2017-18	85883	19279	0.22
9.	2018-19	85272	19701	0.23
10.	2019-20	83977	25690	0.31
	CAGR (%)	**-1.68**	**-5.35**	**-3.63**

Figure 1. Trend in Area under Cashew cultivation in Cuddalore District (2010-20)
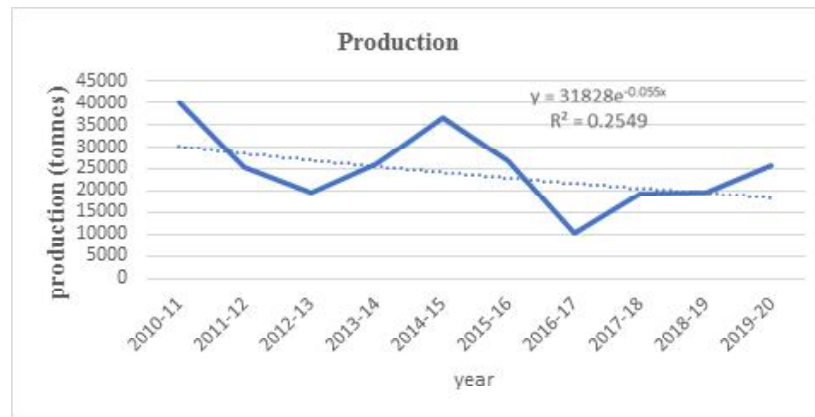
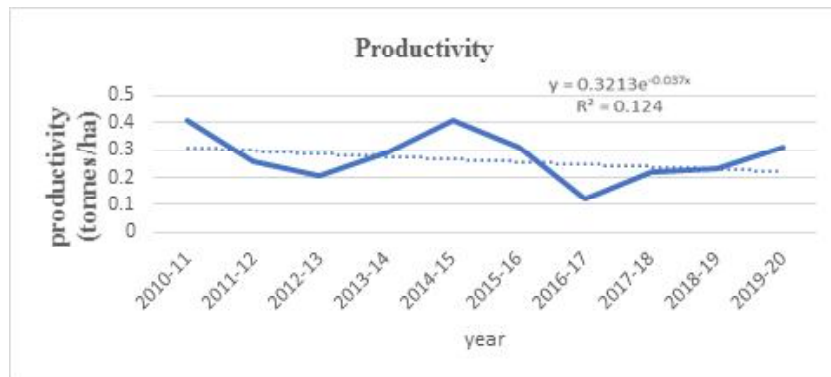Figure 2. Trend in production under Cashew in Cuddalore District (2010-20)

Figure 3. Trend in productivity under Cashew in Cuddalore District (2010-20)

It could be seen from the Table-1 that the compound growth rate of area, production and productivity of Cashew in Cuddalore district of Tamil Nadu were -1.68 per cent, -5.35 per cent and -3.63 per cent, respectively. The downward trend showed that there had been negative growth in area, production and productivity of cashew in Cuddalore district of Tamil Nadu. The highest area was recorded in 2011-2012, *i.e.*, 97033ha, and production was the highest in 2010-11. It shows that there is need for increasing the area, production and productivity of cashew in Cuddalore district, to compensate the declining trend over the years.

Coppock's Instability Index in area, production and productivity of Cashew in Cuddalore District of Tamil Nadu (2010-20):

The instability index in area, production and productivity of cashew is computed by using Coppock's instability index and the results are presented in the Table-2. Coefficient of instability is another measure of instability besides coefficient of variation. The coefficient of instability also known as instability index measures the variation around the trend. It is a close approximation of the average year to year percentage variation adjusted for trend thus variations around the trend are more pronounced than the absolute variation.

The instability in cashew nut was assessed by estimating Coppock's instability index in area, production and productivity from 2010-2020 which is presented in Table-10 in which area constitutes about 40.65 per cent, production 50.31 per cent and productivity 44.83 per cent.

Trend line for import of Cashew by India:

The compound growth rate was calculated for import of Cashew by India in terms of quantity and the results are presented in the Table-3.

Table-2. Instability in Area, Production, Productivity

S. no.	Year	Area	Production	Productivity
1.	2010-20	40.65	50.31	44.83

Table-3. Import of Raw Cashew by India

S. no.	Year	Quantity (mt)
1.	1985-86	21900
2.	1986-87	49100
3.	1987-88	42609
4.	1988-89	45150
5.	1989-90	59591
6.	1990-91	82639
7.	1991-92	106080
8.	1992-93	134985
9.	1993-94	191322
10.	1994-95	228109
11.	1995-96	222819
12.	1996-97	212863
13.	1997-98	224484
14.	1998-99	186000
15.	2001-02	355556
16.	2002-03	400659
17.	2003-04	452398
18.	2004-05	578884
19.	2005-06	565400
20.	2012-13	898521
21.	2013-14	776334
22.	2014-15 (P)	940813
23.	2015-16- upto August 2015	647653
	CAGR (%)	**16.82**

It could be seen from the table-3 that compound growth rate in the Import of raw Cashew Nuts by India, was 16.82 per cent. The upward trend showed that there had been positive growth in the import of raw Cashew nuts by India. This might be due to the declining area, production and productivity of Cashew nut in India over the years.
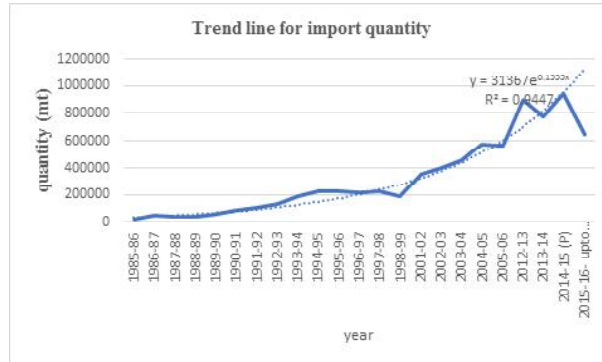

Figure 4. Trend line for import quantity of Cashew by India 1985-86 to 2014-15

The trend line for import of cashew nut by India in terms of quantity are presented in Figure 4. The exponential trend line witnessed a positive trend line in quantity in import of cashew nut by India during 1985-86 to 2014-15.

Trend line for export of Cashew nut from India :

The compound growth rate was calculated for export of cashew nut from India both in terms of quantity and value terms and the results are presented in the Table-4.

Table-5. Export of Cashew Kernels (Broken and Whole) from India

S. no.	Year	Quantity (mt)	Value (Rs. in lakhs)
1.	1990-1991	49874	44224
2.	1991-1992	47738	66909
3.	1992-1993	53436	74549
4.	1993-1994	69884	104602
5.	1994-1995	77000	124602
6.	1995-1996	70334	124050
7.	1996-1997	68663	128550
8.	1997-1998	76593	139610
9.	1998-1999	75026	160990
10.	1999-2000	92461	245145
11.	2000-2001	89155	204975
12.	2001-2002	97550	177680
13.	2002-2003	104137	193302
14.	2003-2004	100828	180442
15.	2004-2005	126667	270924
16.	2005-2006	114143	251486
17.	2006-2007	118540	245515
18.	2007-2008	114340	228890
19.	2008-2009	109522	298840
20.	2009-2010	108120	290582
21.	2010-2011	105755	281939
22.	2011-2012	130869	438380
23.	2012-2013	100105	404620
24.	2013-2014	114791	505870
25.	2014-2015	118952	543290
26.	2015-2016	96346	495210
27.	2016-2017	82302	516880
28.	2017-2018	84352	587100
29.	2018-2019	66693	443400
30.	2019-2020	67124	385558
	CAGR (%)	**0.10**	**5.81**

It could be seen from Table 4 that compound growth rate in the export of raw cashew (broken and whole) by India, were 0.10 per cent in terms of quantity and 5.81 per cent in terms of values. The upward trend showed that there had been a positive growth in the export of cashew kernels in India.

The trend line for export of cashew nut from India both in terms of quantity and values are presented in Figures 5 and 6. The exponential trend line in both quantity (0.001) and value (0.056) in export of cashew nut from India during 1990-91 to 2020-21. It showed a minimal increase over years. Also, it could be seen that there was a drop in the export of Cashew after 2017-18.
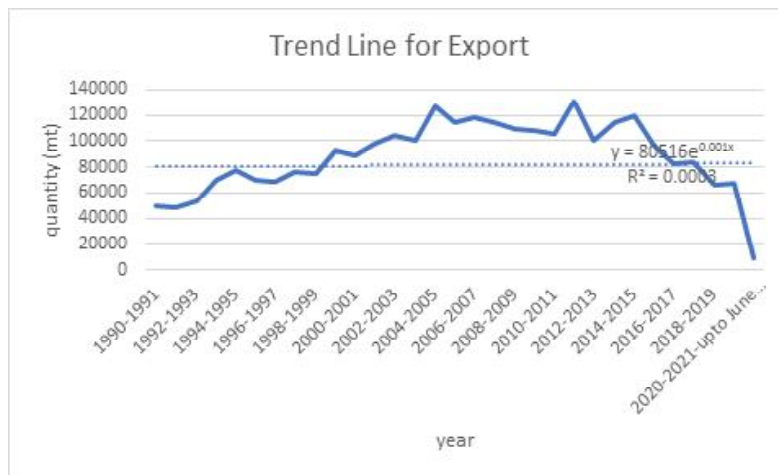

Figure 5. Export of Cashew kernels (Broken and whole) from India (quantity mt) (1990-2021)
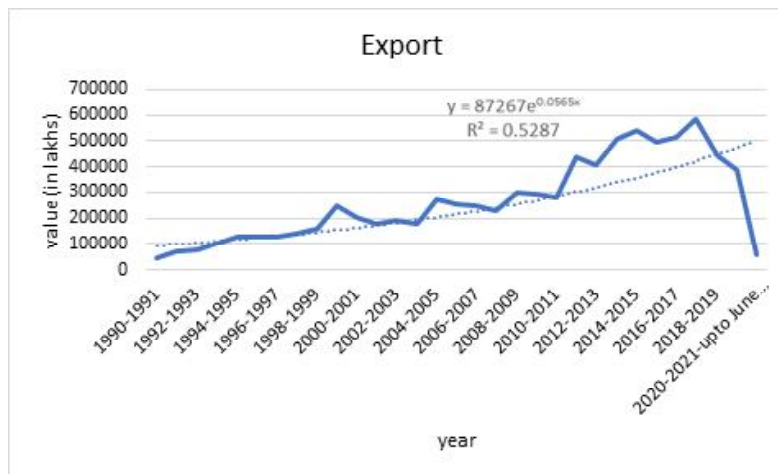

Figure 6. Export of Cashew Kernels (Broken and whole) from India (value Rs. In lakhs)

The findings of the study indicated that there is need for farmers to go into processing of RCNs to finished products. Some of these products include edible kernel, fresh cashew apple juice, cashew milk and wine. The products can be sold locally in order to earn extra income and improve their livelihoods. The value addition can be actualized through the effort of group dynamics in producing communities. On the part of government, there should be a centrally controlled Cashew Marketing Board or agency fully backed by law to regulate the activities of all marketing agents. Such policy will invariably reduce the sharp practices of middle men. It will also help local farmers to earn substantial income from the sales of RCNs. The Cashew Producer's Societies (CPS) should be started with collection centres wherever they are required so that the farmers could become members and market their produce in the form of raw nuts / kernels. This system of largescale processing of raw nuts/kernels by CPS will also help to produce higher grade cashew nut kernels with uniform quality and reduce the cost of processing.

References :

1. Acchukatla, M. and G. Srinivasan, (2019). *International Journal of Research and Analytical Reviews, 6*(1): 472-475.
2. Elakkiya, E., P. Sivaraj, and A. Vijayaprabhakar (2017). *International Journal of Current Microbiology and Applied Sciences*, *6*(6): 1817-1823.
3. http://www.cashewinfo.com/more_news.aspx ?pageid=Dtcashew2_101819 Accessed on 15.06.2020
4. http://www.fao.org/faostat/en/#data/QC Accessed on 15.06.2020
5. https://dccd.gov.in/Content.aspx?mid=1075&t id=1 Accessed on 15.06.2020.
6. Loganathan, R., K. Mani, V. S. Suganthy, N. Yuvaraja, and R. Sudha (2017). An Agricultural Economic Analysis of Marketing, Trade Performance of Cashew Nut in Tamil Nadu.
7. Murugamani, P., and G. Ravi, (2015). An Assessment on Cashew Nut Production in Cuddlore District, Tamil Nadu.