International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 7 Issue 5, September-October 2023 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Production and Supply Chain Management of Organic and Inorganic Vegetables in Bengaluru Urban and Rural District of Karnataka- An Economic Analysis

Kavya C.[1], Arjuman Banu[2], Ruqsar Khanum[3], Dattatreya Bhatt[4]

[1,3]Institute of Agri Business Management, UAS, GKVK, Bangalore, Karnataka, India
[2,4]AICRP on Sunflower, UAS, GKVK, Bangalore, Karnataka, India

ABSTRACT

A growing interest in environmentally friendly goods and services has been expressed together with concerns for the risks, and broader environmental problems, associated with intensive agriculture. Today, organic production is a combination of new technology and traditional methods. Numerous consumers confronted with increasing environmental problems, food safety issues, and augmentative health problems increasingly desire to have healthier and more natural foods grown in an eco-friendly manner. The present study was conducted in Bengaluru urban & rural districts of Karnataka because Bengaluru is one of the major vegetable producing districts of south Karnataka. In recent years large numbers of farmers started practicing the organic cultivation of vegetables in the district. The study aims to investigate factors influencing towards adoption of organic farming, costs of cultivation involved in practicing organic & inorganic farming of selected vegetables viz., tomato, brinjal, cauliflower & cucumber, Consumers‟ willingness to pay (WTP) for organic vegetables and relevant factors affecting consumers WTP, different supply chains involved in organic & inorganic vegetables marketing & analysis of marketing efficiency, price spread, producer's share in consumer's rupee in each supply chain and constraints involved in production & marketing of organic & inorganic vegetables. For the study, 45 farmers each practicing organic and inorganic cultivation of cucumber spread over the district of Bengaluru rural were selected randomly. The data collected from respondents was analysed using budgeting technique and Cobb-Douglas Production Function analysis according to the objectives. The results indicated that costs of cultivation of organic vegetables is more compared to inorganic because of increasing costs of organic inputs in all selected vegetables. Resource use efficiency is higher in the case of organic vegetables than that of inorganic. Farmers are realizing high price premium for the organic vegetables and higher net returns. A positive response and willingness to pay for organic vegetables as increasing health conscious of consumers was observed in metropolitan city like Bengaluru. Hence, it is advisable for the farmers to switch over to organic farming which minimizes the environmental degradation and brings higher net returns.

How to cite this paper: Kavya C. | Arjuman Banu | Ruqsar Khanum | Dattatreya Bhatt "Production and Supply Chain Management of Organic and Inorganic Vegetables in Bengaluru Urban and Rural District of Karnataka- An Economic Analysis" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-7 | Issue-5, October 2023, pp.1-7, URL: www.ijtsrd.com/papers/ijtsrd59835.pdf

IJTSRD59835

KEYWORDS: *Organic and Inorganic Vegetables, Consumers" willingness to pay, Cobb-Douglas*

INTRODUCTION

India is known as fruit and vegetable basket of the world. It is the second largest producer of overall fruits and vegetables production in the world, after China and one of the centers of origin of fruits and vegetables with the total production of 107.24 million metric tonnes of fruits and 204.84 million metric tonnes of vegetables in 2021-22 (APEDA 2022). The vegetables sector has been a driving force in stimulating a healthy growth trend in Indian agriculture. Given the rising share of high value

commodities in the total value of agricultural output and their growth potential, this segment is likely to drive agricultural growth in the years to come (ASSOCHAM, 2013).

In India, SCM is at its growing stage in marketing of F&V. Marketing of F&V are challenging because of the perishability, seasonality and bulkiness and consumption habits of the Indian consumers. In addition to this, poor infrastructure, poor equity in SC and conventional small scale unorganized retailers, make state of the art supply chain challenging in the present scenario. India's outlook, culture and economic life have been shaped by organic agriculture over the centuries. People were unaware of chemical fertilizers and pesticides until after India's independence. The use of non-sustainable agricultural practices has resulted in serious environmental degradation and various health hazards to mankind, animal kind, the country's economy and also its biodiversity. Karnataka has therefore adopted organic and sustainable farming policies since year 2005 with great success.

According to International Federation of Organic Agriculture Movements (IFOAM), an international organization established in 1972 for organic farming organizations, "Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved." Comparative perspective of organic and conventional agriculture, while organic agriculture aims to be environmentally sustainable, it has not yet reached its goals and there are issues that still need to be addressed. In Bengaluru, the development of organic agriculture is receiving increasing attention among farmers, producers, processors, traders, exporters and consumers. Growing consciousness of Health hazards due to the possible contamination of farm produce from the use of chemical fertilizers have immensely contributed to the revival of this farming during the last five years.

Karnataka has more than 67 organic farmers registered through 5 farmers‟ local groups. Institute for Integrated Rural Development (IIRD), the Participatory Guarantee System (PGS) Organic Facilitation Council works through Janodaya Trust to facilitate this process. Organic certification in Karnataka following the PGS. The PGS is an internationally applicable organic quality assurance system implemented and controlled by the committed organic farmer-producers through active participation, along with the consumers, in the process based on verifiable trust. The farmer pledges that the production process is free from manufactured chemicals [fertilizers, insecticides, herbicides, hormones, etc] and lives by his word of honour.

METHODOLOGY

The study was carried out in Bangalore urban and rural district of the Karnataka State. The district was selected as the district is successful in implementation of organic village programme sponsored by the Government of Karnataka. A total of 110 farmers (cultivating tomato, brinjal, cauliflower and cucumber crops) were selected by snowball sampling technique, comprising 45 farmers practicing organic farming and 65 farmers practicing conventional/inorganic farming for each crop. The selected vegetables crops were major crops in Bengaluru rural district, 60 organic consumers, 50 market functionaries‟ (20 organic retailers, 10 FPO‟s & company procurement centers, 10 traders/wholesalers/commission agents @ selected APMC and 10 inorganic retailers) involved in organic and inorganic vegetables marketing and one organic Farmer Producers Organisation (FPO) in Bengaluru rural were purposively selected for in-depth analysis in this study.

Analytical tools

Tabular presentation method was followed to study the socio-economic characteristics of the sample respondents and budgeting technique was employed to estimate the cost and returns. Cobb - Douglas production function was employed to analyse resource use efficiency in organic and inorganic tomato, brinjal, cauliflower and cucumber produced in both farming practices.

RESULT & DISCUSSION

The selected vegetables were of major importance in the study area as per higher market potential and higher economic value. Area under Tomato was 63.73 „000 ha with an production of 2138.13 „000 MT, followed by Brinjal with an area of 17.21‟000 Ha and production of 438.87 „000 MT, Cucumber with an area of 8.66‟000 Ha and production of 86.65 „000 MT & Cauliflower with an area of 5.02 „000 Ha with production of 86.65 „000 MT in thorough out the state. From the past 4-5 decades Bengaluru rural district was one of the major vegetable growing belt of the Karnataka state and comprising cultivation of enormous varieties of vegetables. The vegetables which are cultivating in Bengaluru rural district was exported to neighbouring states like, Telangana, Andra Pradesh, Tamil Nadu, Kerala and some parts of northern states too. Now a days as a blooming concept organic cultivation practice in the study area

motivating farmers to shift towards organic with an increasing net returns and price premium for the organic vegetables. The vegetables cultivating in Bengaluru rural district was also exporting to European countries, Latin American countries, UAE"s and also to some of the Asian countries.

The main inputs of organic cultivation is Panchagavya and Jeevamrutha, about 600ltrs of both farm prepared is used in organic cultivation of tomato, brinjal, cauliflower and cucumber. Along with these fish oil extracts, neem seed oil and manufactured bio-pesticides and bio-fertilizers were used in an appropriate quantity. The mulching paper is also used to retain moisture content in the soil. The maximum per ha cost of inputsis mainly on FYM i.e., Rs. 3600/- per tractor load in the study area (**Naik *et al.*, (2012)**).

The type, level, pattern of inputs used and cost involved on each input in organic cultivation of tomato, brinjal, cauliflower and cucumber are presented in the Table 4. It was observed that in the study area about 6000 seedlings of tomato, 4000 seedlings of brinjal and 16,000 seedlings of cauliflower were transplanted for an ha of area. The total cost of inputs in organic cultivation of vegetables was, tomato (Rs.1,13,113), brinjal (Rs.1,14,813), cauliflower (Rs.71,403) and cucumber (Rs.72,313). The return structure is clearly revealed that the gross returns per ha were higher in organic cultivation of vegetables i.e., tomato (Rs. 6,60,000) compared to that of inorganic (Rs. 4,50,000), brinjal (Rs. 6,86,400) compared to that of inorganic (Rs. 5,00,000), cauliflower (Rs. 3,16,000) compared to that of inorganic (Rs. 2,40,000) and cucumber (Rs. 4,50,000) compared to that of inorganic (Rs. 3,00,000) with a positive net return on both the categories of the farms.

The net return in organic practice of tomato was Rs. 3,98,007.30 and Rs. 1,80,955.50 in inorganic practice similarly, it was Rs. 4,26,402.55 in organic and Rs. 2,31,432.75 in inorganic brinjal, Rs. 1,46,766.30 in organic and Rs. 84,699.13 in inorganic cauliflower and Rs. 12,76,632.05 in organic and Rs. 1,43,054.63 in inorganic cucumber. The B:C ratio was also higher in organic farming compared to inorganic farming, Tomato (2.52 & 1.67), brinjal (2.64 & 1.86), cauliflower (per flower) (1.87 & 1.55) and cucumber (2.60 & 1.91).

Cost concepts in organic and inorganic vegetables farming is depicted in Table 6 reveals that cost A_1 was highest in inorganic Tomato farming (Rs.2,44,644.50/ha) compared to organic Tomato (Rs.2,38,092.70/ha). Cost B was highest in organic Tomato (Rs.3,57,144.50/ha) compared to inorganic Tomato (Rs.4,03,092.70/ha). Cost A_1 for organic brinjal, cauliflower and cucumber was Rs.2,38,297.45/ha, Rs.1,47,003.70/ha, Rs.1,50,927.95/ha respectively. Similarly, Cost A_1 for inorganic brinjal, cauliflower and cucumber was Rs. 2,49,407.25/ha, Rs. 1,39,500.88/ha, Rs. 1,35,385.38/ha respectively. Cost B was highest in all organic vegetables compared to inorganic vegetables. The overall costs i.e., Cost C was highest in organic vegetable farming compared to inorganic vegetable farming.

Table 1: Area, Production, and Productivity of selected vegetables in Karnataka during 2016-17

Crops	Area('000 Ha)	Production ('000 MT)	Productivity (yield / Ha)
Tomato	63.73	2138.13	**33.89**
Brinjal	17.21	438.87	**25.43**
Cauliflower	5.02	86.65	**17.43**
Cucumber	8.66	146.02	16.86

Note: Horticultural Statistics at a glance 2017, NHB-2017.

Table 2: Area, Production, and Productivity of selected vegetables in Bangalore ruraldistrict during 2016-17

Crops	Area ('000 Ha)	Production ('000 MT)	Productivity (yield / Ha)
Tomato	2.80	179.85	**64.23**
Brinjal	1.05	32.79	**31.22**
Cauliflower	0.23	5.18	**22.52**
Cucumber	0.24	4.37	18.20

Note: Horticultural Statistics at a glance 2017, NHB-2017.

Table 3: Socio-economic indicators of Bengaluru urban and rural districts

Sl. No.	Important parameters	Bengaluru Rural	Bengaluru Urban
1.	Area (Sq.Km)	2,298	1,741
2.	Total population (in lakhs)	9.87	95.88
3.	Sex ratio (Females per 1000 males)	945	908

4.	According to sex ratio		
i.	Male	5,09,172	50,22,661
ii.	Female	4,81,751	45,98,890
5.	Population of Scheduled Tribe and Scheduled caste		
i.	SC	2,13,700	50,22,661
ii.	ST	52,903	1,90,239
6.	Population Density (persons per sq.km)	441	4,378
7.	Literacy rate (%)	69.70	88.48

Source: Bengaluru rural District at a Glance, District statistical office. Bengaluru (2016-17)

Table 4: Type, level, pattern of input use and costs involved in organic cultivation of vegetables (Rs. /ha)

Sl. No	Type of input	Unit	Tomato			Brinjal			Cucumber			Cauliflower		
			Qty used (per ha)	Cost of input per unit	Per ha cost of inputs(Rs)	Qty used (per ha)	Cost of input per unit	Per ha cost of inputs(Rs)	Qty used (per ha)	Cost of input per unit	Per ha cost of inputs(Rs)	Qty used (per ha)	Cost of input per unit	Per ha cost of inputs(Rs)
1	Seeds/ Seedlings	gm/no.	6000	1.5	9000	4000	5	20000	800	650/100gm	5200	16000	0.5	8000
2	Variety/ Hybrid		Syngenta - Abhinav			Mahyco EE 1, Udupi local, 112 GO			Japaneese long green, ArkaAnoop, Arka Suvidha			Syngenta-Suhasini, Suhasini+		
3	FYM	Tractor loads	6	3600	21600	5	3600	18000	3	3600	10800	4	3600	14400
4	Poultry manure	Tractor loads	1	3500	3500	2	3500	7000	1	3500	3500	2	3500	7000
5	Tank silt / external soil	Tractor loads	2	1000	2000	2	1000	2000	1	1000	1000	2	1000	2000
6	Green manuring	kg of seeds	16	25	400	16	25	400	16	25	400	18	25	450
7	Vermicompost	Tonnes	1	4600	4600	1	4600	4600	1	4600	4600	1	4600	4600
8	VAM	kg	10	40	400	10	40	400	10	40	400	15	40	600
9	urban compost	50 kg bag	8	280	2240	8	280	2240	5	280	1400	4	280	1120
10	Panchagavya	lit	600	5	3000	600	5	3000	400	5	2000	600	5	3000
11	Jeevamrutha	lit	600	5	3000	600	5	3000	600	5	3000	600	5	3000
12	NSKE	lit	1	1500	1500	1	1500	1500	1	1500	1500	1	1500	1500
13	Neem Seed Cake	50 kg bag	2	680 / 50kg bag	1360	2	680 / 50kg bag	1360	1	680 / 50kg bag	680	2	680 / 50kg bag	1360
14	Pongamia Cake	50 kg bag	4	980 /50 kg bag	3920	4	980 /50 kg bag	3920	3	980 /50 kg bag	2940	6	980 /50 kg bag	5880
15	Fish Oil extracts	lit	2	1000	2000	2	1000	2000	1	1000	1000	2	1000	2000

Table 4 Contd.

16	Neem oil	lit	1	450	450	1	450	450	1	450	450	1	450	450
17	Trichoderma	kg	2	140	280	2	140	280	2	140	280	2	140	280
18	Azatobactor	kg	2	120	240	2	120	240	2	120	240	2	120	240
19	Pseudomonas	kg	2	90	180	2	90	180	2	90	180	2	90	180
20	Plant grow	lit	1.25	1997.6	2497	1.25	1997.6	2497	1.25	1997.6	2497	1.25	1997.6	2497
21	Plant bloom	lit	1.25	1997.6	2497	1.25	1997.6	2497	1.25	1997.6	2497	1.25	1997.6	2497
22	Nitroking organic	lit	1	1349	1349	1	1349	1349	1	1349	1349	1	1349	1349
23	Biopesticides (Mfd)	ltr	9.5	400	3800	9.5	600	5700	9.5	600	5700	10	900	9000
24	Wiring	kg	60	80	4800	15	80	1200	40	80	3200	0	0	0
25	Thread	kg	100	80	8000	100	80	8000	50	80	4000	0	0	0
26	Poles	No"s	1500	10	15000	750	10	7500	750	18	13500	0	0	0
27	Mulching paper	kg	100	155	15500	100	155	15500	0	0	0	0	0	0
	Total inputs cost (Rs. / ha)		**Rs. 1,13,113.00**			**Rs.1,14,813.00**			**Rs.71,403.00**			**Rs.72,313.00**		

Table 5: Yield, market price and returns of organic and inorganic vegetables (Rs. /ha)

Sl. No	Particulars	Tomato		Brinjal		Cauliflower		Cucumber	
		Organic	Inorganic	Organic	Inorganic	Organic	Inorganic	Organic	Inorganic
1	Yield (q)	550.00	450.00	312.00	250.00	15,800.00	15,000.00	225.00	200.00
2	Price / q (Cauliflower Rs. / 100 Flowers)	1200.00	1000.00	2200.00	2000.00	20.00	16.00	2000.00	1500.00
3	Gross Returns	6,60,000	4,50,000	6,86,400.00	5,00,000.00	3,16,000.00	2,40,000.00	4,50,000	3,00,000
4	Cost of Cultivation Rs. / ha (C3 cost)	4,69,691.97	4,19,698.95	4,74,757.20	4,32,923.98	2,73,057.07	2,36,830.96	3,14,454.75	2,55,139.91
5	Cost of Cultivation Rs. / ha (cost A1+ imputed value of family labour)	2,61,992.70	2,69,044.50	2,59,997.45	2,68,567.25	1,69,233.70	1,55,300.88	1,73,367.95	1,56,945.38
6	cost of Production Rs. / q (over C3 cost)	853.98	932.66	1521.66	1731.70	17.28	15.79	1397.58	1275.70
7	cost of Production Rs. / q (over cost A1+ imputed value of family labour)	476.35	597.87	833.33	1074.27	10.71	10.35	770.52	784.73
8	Net returns (Rs. / Ha) (over C_3	1,90,308.03	30301.05	2,11,642.81	67,076.03	42,942.93	3169.04	1,35,545.26	44,860.09

	cost)								
9	Net returns (Rs. / Ha) (over cost A_1+ imputed value of family labour)	3,98,007.30	1,80,955.50	4,26,402.55	2,31,432.75	1,46,766.30	84,699.13	2,76,632.05	1,43,054.63
10	B:C Ratio (over C_3 cost)	1.41	1.07	1.45	1.15	1.16	1.01	1.43	1.18
11	B:C Ratio (over cost A_1+ imputed value of family labour)	2.52	1.67	2.64	1.86	1.87	1.55	2.60	1.91

Table 5: Cost Concepts in organic and inorganic vegetables farming

Sl. No.	Cost concepts	Organic				Inorganic			
		Tomato	Brinjal	Cauliflower	Cucumber	Tomato	Brinjal	Cauliflower	Cucumber
1.	Cost A_1	238092.70	238297.45	147003.70	150927.95	244644.50	249407.25	139500.88	135385.38
2.	Cost A_2	238092.70	238297.45	147003.70	150927.95	244644.50	249407.25	139500.88	135385.38
3.	Cost B	403092.70	409897.45	226003.70	263427.95	357144.50	374407.25	199500.88	210385.38
4.	Cost C	469691.97	474757.20	273057.07	314454.75	419698.95	432923.98	236830.96	255139.91

Table 6: Measures of farm profitability in organic and inorganic farming practices

Sl. No.	Cost concepts	Organic				Inorganic			
		Tomato	Brinjal	Cauliflower	Cucumber	Tomato	Brinjal	Cauliflower	Cucumber
1.	Gross Returns	660000	686400	316000	450000	450000	500000	240000	300000
2.	Farm Business Income	421907	448103	168996	299072	205356	250593	100499	164615
3.	Farm Investment Income	355308	383242.8	121942.9	248045.3	142801	192076	63169.04	119860
4.	Net Returns	190308	211643	42942.9	135545	30301.1	67076	3169.04	44860.1
5.	Input – Output Ratio	1.40518	1.44579	1.15727	1.43105	1.0722	1.15494	1.01338	1.17583

Table 5.28: Consumers' Willingness-to-Pay towards Organic Vegetables

Sl. No.	Factors	<5%	5-10%	10-15%	15-20%	>20%
1	Certification	10 (16.67)	31 (51.67)	9 (15.00)	6 (10.00)	4 (6.67)
2	Quality	0.00	0.00	11 (18.33)	42 (70.00)	7 (11.67)
3	Health consciousness	0.00	0.00	6 (10.00)	44 (73.33)	10 (16.67)
4	Higher Price for organic	6 (10.00)	39 (65.00)	10 (16.67)	4 (6.67)	1 (1.67)
5	Higher income	9 (15.00)	11 (18.33)	31 (51.67)	6 (10.00)	3 (5.00)
6	Food safety	0.00	3 (5.00)	44 (73.33)	7 (11.67)	6 (10.00)
7	Good production practices	5 (8.33)	10 (16.67)	13 (21.67)	21 (35.00)	11 (18.33)
8	Environmental concern	0.00	42 (70.00)	8 (13.33)	7 (11.67)	3 (5.00)
9	Regular supply	2 (3.33)	4 (6.67)	31 (51.67)	21 (35.00)	2 (3.33)

Conclusions

There is an increasing yields under organic farming. However, further studies are required to show organic farming is better than conventional farming. Development and strengthening of supporting institutions like FPOs, setting up of norms and standards to popularize the organic farming for inclusion of small-scale farmers, who forms the majority of the farming population. For promoting organic production, specialised and exclusive financing mechanisms with interest incentive schemes from the institutional sources can be better option to support the organic farming instead of

subsidy programmes. The intervention strategies on technology developed on organic farming needs to be disseminated through various agencies like government, Organic farming institutes, SAU‟s and NGOs as many farmers quoted the severity of pest and disease incidence problem; Investigation and dissemination of cost-effective technologies in production, post- harvest handling, marketing, etc. keeping in view the organic certification requirements.

References

[1] AHMED ABU SHABAN, 2015, Factors influencing farmers‟ decision to shift to organic farming: The case of Gaza Strip. British Journal of Economics, Management & Trade, 5(1):78-87.

[2] ALI, Q., M. ASHFAQ AND M. T. I. KHAN, 2017, An economic analysis of off-season tomato production in Punjab. The Journal of Animal & Plant Sciences, 27(1): 294-301.

[3] ASSOCHAM, 2013, Horticulture Sector in India- State level experience. New Delhi: The Associated Chamber of Commerce and Industry of India.

[4] JITENDRA PANDEY AND ASHIMA SINGH, 2012, Opportunities and constraints inorganic farming: an Indian perspective. Journal of Scientific Research, Vol.56: 47-72.

[5] KAMAL SHRESTHA, GAUTAM SHRESTHA, PRADYUMNA R. PANDEY, 2014, Economic analysis of commercial organic and conventional vegetable farming in Kathmandu valley. The Journal of Agriculture and Environment, vol.24:58-71.

[6] MESHRAM, R.R., SHENDE, N.V., AND KATHALE, S.D., 2015, Cost benefit analysis and marketing of Brinjal vegetable in Bhandara district. Asian Resonance, 4(4):85-92.