SUPPLY CHAIN MANAGEMENT OF ORGANIC PRODUCTS IN KARNATAKA

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Dedicated to

My Late Grandfather &

Beloved Parents

In

Humble reverence

To

Lord Almighty

DEPARTMENT OF AGRICULTURAL MARKETING, COOPERATION AND BUSINESS MANAGEMENT
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CERTIFICATE

This is to certify that the thesis entitled "**SUPPLY CHAIN MANAGEMENT OF ORGANIC PRODUCTS IN KARNATAKA**" *submitted by* **Ms. Y.P. GAYATRI, ID No. 5113** *in partial fulfillment of the requirements for award of degree of* **MASTER OF SCIENCE (AGRICULTURE)** *in* **AGRICULTURAL MARKETING AND COOPERATION** *to the UNIVERSITY OF AGRICULTURAL SCIENCES, BANGALORE, is a record of bona-fide research work done by her during the period of her study in this university under my guidance and supervision, the thesis has not previously formed the basis of the award of any degree, diploma, associateship, fellowship or similar titles.*

Bangalore
August 2007

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Thesis Abstract

Supply Chain Management of Organic Products in Karnataka

Increased awareness about the ill effects of synthetic chemicals in the food chain, the falling dividends from conventional production system and increased consumer preference for pesticide free food have paved the way for 'Organic Agriculture' as an alternative production management system that promotes and enhances health of agro-ecosystem, including bio diversity, biological cycles, and soil biological activity; which in India has been followed from time immemorial. The market for organic products in India is export oriented with domestic market still at its infancy. Against this backdrop, the supply chain management of organic products is studied in terms of the profitability of organic cultivation of paddy, tomato, banana and red gram, production practices, supply chain mechanism employed by exclusive organic firms, consumer preference for organic foods and the constraints faced by the growers. The study is based on data for 2005-06 collected from 90 organic farmers, four organic firms and 50 organic consumers. Organic farming is found to be profitable owing to the low input costs due to the traditional practices followed, and premium prices for organic produce that compensate the yield reduction. The supply chain of Nesara is adjudged as efficient because it offers the farmer, a major share in consumer's rupee with least market margin for the selected commodities and establishes a direct link between the grower and the consumer. Organic consumers were found to be well educated with high incomes who preferred organic products for the health benefits associated with their consumption. High labour requirement and lack of assured market are found to be the major constraints in organic production and marketing. The study has revealed that organic farming has enormous potential that needs promotion by the Government with the involvement of NGOs, cooperative organizations and agricultural universities to facilitate the production and marketing of organic products.

Signature of the student Signature of the Major Advisor

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CHAPTER I
INTRODUCTION

Agriculture and food security are the most important concerns of the 21st century for a developing country like India (Thakur and Sharma, 2005). Agricultural production, especially food grains has increased over the last few decades in India. With the increase in population there is compulsion to stabilize agricultural production but to increase it further in a sustainable manner. The scientists have realized that the 'Green Revolution' with high input use has reached a plateau and the returns have started to diminish resulting in falling dividends. Therefore alternative agricultural practices and methods of production are evolving as coping strategies to sustain agriculture. Of late, an increasing concern on environmental pollution owing to increased application of fertilizers for maintaining long term soil productivity is being expressed. This has necessitated the quest for searching alternatives for modern farming methods. In the context of globalization and WTO regime, Indian agriculture must become efficient, competitive, cost effective and sustainable. The new thinking is towards quality agriculture production to meet niche domestic as well as export markets through organic agriculture. The growing health concerns and increasing non-tariff barriers like Sanitary and Phyto Sanitary (SPS) measures in the international market, coupled with non-viability of modern farming on a small scale, are some of the other factors behind the move from chemical based to organic production and consumption systems.

CONCEPT OF ORGANIC FARMING

Organic farming is a traditional method of cultivation practiced since time immemorial and dry land crop production in India is considered near organic. It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way,

as to keep the soil alive and in good health by using organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (biofertilizers) to release nutrients to crops for increased sustainable production in an eco friendly manner. The concept of organic farming originated in the U.K. during the 1930s and certified organic produce has been available since the 1970s. Organic quality standards apply both to crop and animal production and the processed foods. Sustainability and organic farming are closely linked as organic farming incorporates human (social), economic and environmental aspects of sustainability. In fact, organic farming is one form of sustainable agriculture with maximum reliance on self-regulating agro ecosystem. The other alternatives include Low External Input Sustainable Agriculture (LEISA) and Integrated Farming Systems (IFS).

FAO defined organic agriculture as *"a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs*". The organic farming involves IPM practices like use of bio-pesticides, bio-fertilizers and vermicompost. The offshoots of organic farming are termed as biological farming, regenerative farming, bio-dynamic farming, and low input sustainable agriculture.

World Organic Scenario

Organic agriculture is developing rapidly and is now practiced in more than 120 countries of the world. Its share of agricultural land and farms continues to grow in many countries. Furthermore, it can reasonably be assumed that uncertified organic farming is practiced in even more countries. According to the latest survey on organic farming worldwide, almost 31 million hectares are managed organically by at

least 6,33,891 farms. In total, Oceania holds 39 per cent of the world's organic land, followed by Europe (23 per cent) and Latin America (19 per cent). Currently, the countries with the greatest organic areas are Australia (11.8 million hectares), Argentina (3.1 million hectares), China (2.3 million hectares) and the US (1.6 million hectares). The number of farms and the proportion of organically managed land compared to conventional is the highest in Europe. There has been major growth of organic land in North America and in Europe; both continents have half a million hectares more each compared to the end of 2004 (Yussefi and Willer, 2007).

Global sales of organic food and drink have increased by 43 per cent from 23 billion US-Dollars in 2002 with sales reaching 33 billion US-Dollars in 2005. Organic Monitor expects sales to have approached 40 billion US-Dollars in 2006 (Yussefi and Willer, 2007). Although organic agriculture is now present in most parts of the globe, demand remains concentrated in Europe and North America. Among the countries, USA stands first with total organic food sales of 8000 million US Dollars followed by Germany, UK, Italy, France and Switzerland (Bhattacharya and Chakraborty, 2005). Premiums on most organic products range between 35-100%. Organic products are almost entirely (over 95%) consumed in developed countries. The major producers and importers of organic products are EU, USA and Japan. Categories of major organic products include fresh fruits and vegetables (non tropical and tropical), cereals (wheat, rice, com, maize), coffee, tea, cocoa, spices, herbs, oilseeds, pulses, milk product, honey, meat, edible nut, semi-processed fruits etc.

Today, 395 organizations worldwide offer organic certification services. Most certification bodies are in Europe (160) followed by Asia (93) and North America (80). An important initiative for international

harmonization is the IFOAM Accreditation Program, which assesses certification bodies against the IFOAM norms. Currently 32 certification bodies operating in over 70 countries around the world have voluntarily submitted themselves to the IFOAM accreditation process (Yussefi and Willer, 2007).

Indian Organic Scenario

Major organic produces in India include plantation crops i.e. tea, coffee, and cardamom, spices i,e. ginger, turmeric, chillies and cumin, cereals i.e. wheat, rice, jowar, and bajra, pulses i.e. pigeonpea, chickpea, green gram, red gram, and black gram, oilseeds i.e. groundnut, castor, mustard and sesame, fruits i.e. banana, sapota, custard apple and papaya, and vegetables i.e. tomato, brinjal, and other leafy vegetables, besides honey, cotton and sugarcane especially for jaggery (GOI, 2001). India being a country of different agro climatic zones has a comparative advantage in the production of tea, coffee, spices, fruits, vegetables, rice, wheat and cotton. In India at present organic crops are cultivated in hardly 37000 ha which accounts for 0.03 per cent of the agricultural area which is very low compared to other countries (Bhattacharya and Chakraborty, 2005). Currently, 2.5 million hectare land area is certified in India, which includes 2.4 million hectare of forest land, producing about 0.12 million tons (Ganguly, 2006).

According to APEDA, a total quantity of 6792 metric tonnes valued at Rs. 712.3 million was exported from seven states with Kerala in the lead, exported 1232 metric tonnes followed by West Bengal, Karnataka, Tamilnadu, Punjab, Himachal Pradesh and Maharashtra during 2004 (Table 1.1). The major organic products being exported from India are Basmati rice, Tea, Cotton, Mango pulp, Cashew nut, Sesame, Pineapple pulp, Spices and various herbs.

Table 1.1 : Present status of organic production and export

1.	Total production	119656 Tons + 1657000 nos. of seedlings & cuttings + 264000 litres effective micro organisms
2.	Total quantity exported	6792 Tons
3.	Total quantity exported	Rs.7123 Lakhs
4.	Total area under certified organic cultivation	2508826 ha (This includes wild herbs collection from forest area of MP & UP of 2432500 ha)
5.	Number of items exported	31

Source: APEDA Website, (www.apeda.org) 2007

Organic agricultural export market is one of the major drivers of greening of agriculture in India. The current production of organic crops is around 14,000 tons. Out of this production, tea and rice contributes around 24% each, fruits and vegetables combined makes 17% of (Garibay S.V. and Jyoti K, 2003). Major export market for Indian producers are Australia, Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Singapore, South Africa, Saudi Arabia, UAE, UK, and USA. Estimated quantity of various products that are exported from India in 2002 is shown in Table 1.2. According to Org-Marg Survey 2002, the future export demand is likely to reach 21523 tonnes by 2006-07 (Subrahmanyam and Nagasree, 2005). The organic products available in the domestic market are rice, wheat, tea, coffee, pulses and vegetables.

Table 1.2 : Major organic products exported from India

Product	Sales (Tons)
Tea	3000
Coffee	550
Spices	700
Rice	2500
Wheat	1150
Pulses	300
Oil Seeds	100
Fruits & Vegetables	1800
Cashew Nut	375
Cotton	1200
Herbal Products	250
Total	**11,925**

Source: Garibay and Jyoti, 2003

There are three types of organic producers in India – traditional organic growers who grow for their subsistence needs, commercial farmers who have surplus and export their produce through different channels, and private companies which either have their own farms or organise large conversion programmes with growers. The rainfed regions accounting for about 70 per cent of the total arable land, is still subjected to very low external input usage which offers a very big potential for "Certified Organic Agriculture". The rich biodiversity in various agro-climatic regions gives India a competitive edge for a large basket of products in the world market. The growing demand of organic

products in the world market has prompted Indian government to take measures to promote organic farming.

The 10th five year plan had specific policies to promote organic farming with the use of organic waste, Integrated Pest Management (IPM) and Integrated Nutrient Management (INM). Many public and private agencies are involved in promotion of organic farming in India. These include various ministries and departments of the government at the central and the state levels, universities and research centres, Non-Government Organisations (NGOs), producer organizations and certification bodies like INDOCERT, ECOCERT, SKAL, and APOF besides various processors and traders.

In 2001, the National Programme for Organic Production (NPOP) which aims at establishing national standards for organic products, based on IFOAM standards, was launched. A National Steering Committee (NSC) comprising Ministry of Commerce, Ministry of Agriculture, APEDA, Spices Board, Coffee Board, Tea Board and various other Government and private organizations associated with the organic movement is monitoring the overall organic activities under NPOP. For successful operation of NPOP, documents like national standards, criteria for accrediting, inspection and certification agencies, accreditation procedure, inspection and certification procedures have been prepared and approved by NSC. These documents were prepared on the basis of the guidelines evolved by the representative international organization, International Federation for Organic Agricultural Movement (IFOAM), EU Regulations and Codex standards. To regulate the export of certified organic products, the Director General of Foreign Trade, Government of India has issued a public notice according to which no certified organic products may be exported unless they are certified by an

inspection and verifying agency duly accredited by one of the accreditation agencies designated by the Government of India.

National standards for organic production

National standards for organic production are grouped under six categories namely conversion, crop production, animal husbandry, food processing and handling, labeling, storage and transport.

Accreditation agencies

At present there are six accreditation agencies in India approved by the Central Government's Ministry of Commerce according to the Central Steering Committee. These agencies accredit the certifying agencies.

- Agricultural and Processed Food Products Export Development Authority (APEDA)
- Coffee Board
- Spices Board
- Tea Board
- Coconut Development Board
- Directorate of Cashew and Cocoa Development

Certification and inspection agencies

The production process of organic agricultural production is certified rather than product certification, the role of certification agencies is very critical. The certification agency has to be impartial and a Non-Government agency. Its accreditation by an authorized accreditation agency is mandatory. There are 12 accredited certifying agencies in the country (Appendix I).

Certifiers charge inspection and certification fees depend on the number of persons-days involved, plus fees for the issue of certificate.

Sometimes, different fees are applied for small farmers, large farmers, and processors or traders. Tentative tariff structure for certification is as below:

a. Travel and Inspection: Rs.12000 -Rs.19000 per day (depending on small farmers, cooperative, estate manufacturers, large and medium sized processors).
b. Report preparation: Rs.5000/-
c. Certification: Rs.5000/- (Bhattacharya and Chakraborty, 2005).

Organic Logo

A trademark – "India Organic" will be granted on the basis of compliance with the National Standards for Organic Production (NSOP) (Appendix II}. Communicating the genuineness as well as the origin of the product, this trademark is owned by the Government of India. Only such exporters, manufacturers and processors whose products are duly certified by the accredited inspection and certification agencies, will be granted the licence to the use of the logo which would be governed by a set of regulations.

The organic agriculture in India is export oriented. Domestic marketing is still in its infancy. However, five-star hotels and airline caterers have shown considerable interest in fresh organic fruits and vegetables. A regular supply, however, has proved extremely difficult so far. There are farmers groups and NGOs who have organized marketing for the rural/tribal farmers with whom they work. Very few alternative marketing channels have been tried. The Indian Institute for Rural Development organizes weekly markets and direct producer consumer marketing. Retailing efforts are thwarted by insufficient product range, irregular quality supply of organic products and inconveniently located outlets. The growth in domestic market is very critical for creating the

necessary impetus, whereas export supply chain can focus only those products having competitive advantage.

Supply Chain Management

The term 'Supply chain' was originally associated with classical multinational enterprises that were vertically integrated. But, now supply chain management has become relevant in situations in which there is more than one autonomous player. In such cases, there is often a dominant enterprise that uses its power to organize and plan the chain by involving customers and suppliers. Supply chain management involves an organizational or institutional perspective involving collaboration, business environment, power and trust; a performance perspective involving performance measurements and consumer behaviour; and a process perspective involving process management issues such as costing, supply chain organization, targets, throughput time and decision making. Basically supply chain management is demand driven i.e. the overriding criterion is the satisfaction of the client (Singh, 2006).

A supply chain refers to different actors being linked from farm to fork to achieve more effective and market oriented flow of products. The supply chain may include growers, pickers, packers, processors, storage and transport facilitators, marketers, exporters, importers, distributors, wholesaler and retailers. The development of supply chains requires knowledge and expertise about chains and within chains. The knowledge about chains is about chains strategy, chain formulation, chain organization, chain design, chain management and partnership. On the other hand, knowledge within chains is about chain marketing, chain logistic, quality assurance, information flows, added value, technology and interaction. Managing supply chains requires an integral approach in which chain partners jointly plan and control the flow of goods,

information technology and capital from farm to fork and vice versa. Various innovations in supply chain management include efficient consumer response (ECR), information and communication technology (ICT) and new generation cooperatives (NGCs) besides strategic partnering and vertical alliances, which create more sustainable partnership in supply chain.

The concept of supply chain has many variants such as commodity chain, value system, value chain, production network, value network, "complex" and "filerie" which are also, sometimes, used interchangeably. A value system is a set of interlinked complete firms, which have all the business functions. Alternatively, a commodity chain is a network of labour and production processes whose end result is a finished commodity. It is the series of relations through which an item passes from extraction through conversion, exchange, transport, distribution and final use. The actors in a value chain can be integrated firms, retailers, lead firms, turn key suppliers, and component suppliers. Global value chain or commodity chain analysis (CCA) highlights the levels of integration between suppliers, producers, and consumers for a given commodity.

Agri food supply chains are more concerned with control of food quality and safety and supply variability which is unique to this sector. Perishable goods like food require a time efficient supply chain even if rapid delivery is costly. Seasonality of agricultural production can affect supply chain approaches. There have been studies on the governance of conventional supply chains in India e.g. in cashew, and fruits and vegetables. The newly emergent organic produce supply chains across the globe have also been found to be excluding small producers due to reasons of high certification costs, smaller volumes they produce, and

tighter control by the chain leaders in the absence of any local market outlets for the organic producers.

Organic food chains are often considered alternative food chains, characteristic to which is close connection between the consumers and the producers of the food. Close connection is enabled by the short chain with few or no intermediaries, and therefore often considered also the most suitable for marketing organic products. Nevertheless, the involvement of conventional supermarkets stretches the chain and merges the organic chain into the conventional food chain.

The domestic market for organic products in India has a small customer base, which is limiting the entry of entrepreneurs. Limited working capital and reach to 'Shelf space', of the small-scale entrepreneurs, farmer societies and the producer company has restricted the growth beyond the production bases. Many marketing enterprises have taken lead in the distribution of organic food products. Organized retail, which can be the major driver for the rapid growth, is yet to involve directly in the supply chain. The demand of organic products by restaurants and star-hotels, in the metros, has remained partially exploited, as they have limited business mandate to develop and invest in direct supply chain.

In this context, the study is conducted to explore the organic farming scenario in Karnataka and the existing marketing network for organic products in the state. Karnataka is often called as state with "Cafeteria of Crops" as it has an average annual rainfall of 1130 mm and moderate temperature that provide ideal conditions to grow a variety of crops throughout the year. The organic movement is silently taking place mostly due to self motivation and NGO initiatives in select pockets in the state. This is not because fames foresee a definite market for organic produce, but for production oriented reasons like reduction in use of

external inputs, and improvement of soil fertility. The total certified area in Karnataka is 1513.25 ha while non certified area is 4750.00 ha in the year 2005. Organic export from Karnataka was 476 MT in 2004-05 (Bhattacharya and Chakraborty, 2005).

Recognising the potential of organic farming in the state, the state government has brought out Karnataka State Organic Farming Policy during March 2004. The policy envisages converting one village in each Hobli into an organic village by encouraging conversion of 200-500 acres into organic production in a phased manner. As a first step towards promotion of organic farming in the state organic village/site programme is being implemented since 2004-05. Under this programme 28 model Organic Village/Sites are being created one each in all the districts of the State comprising total area of about 3080 ha. Further, this programme is being extended to taluk level from 2006-07 and will be extended to hobli level in a phased manner.

To create local market for organic produce in the state, the state government has identified and supported Jaivik Krishik Society, which is a federation of organic farmers and farmers' groups. During 2006-07 an amount of Rs. 984.30 lakhs under State sector and Rs. 509.16 lakhs under Macro Management programme has been provided for organic promotional programmes in the state.

This study is a modest attempt to know the supply chain management of organic products and the policy needs for popularizing organic production and trade in Karnataka. The specific objectives of the study are:

1. To study the cultivation practices and profitability of organic cultivation.
2. To study the supply chain management of organic products.

3. To assess the consumer preference for organic products.
4. To study the constraints in production and marketing of organic production.

Significance of the study

Organic farming has become important and necessary in the context of agricultural problems of high costs, environmental pollution, the need for improving public health, food quality and food safety. There is an increasing awareness, preference and demand for organic foods from consumers. There is a burgeoning niche market for organic products in the national and international arena. In order to capture the existing marketing arrangement for organic products and the consumer preference for these products, this study is an earnest attempt to understand the supply chain management of organic products. The results of the study will be indicative of organic movement in select pockets of the state. The results will be useful for framing suitable organic farming policies.

Limitations of the study

The monetary aspects of the supply chain management could not be captured as the firms had not maintained the database regarding the costs incurred at each link of the supply chain specific to individual commodity.

Review of Literature

CHAPTER II

REVIEW OF LITERATURE

The review of past studies gives directions for framing objectives, developing research design, variable selection and for interpretation of results to draw meaningful conclusions. In accordance with the objectives of the study, a brief review of earlier work is presented here under the following headings.

2.1 Cultivation practices of organic cultivation
2.2 Profitability of organic cultivation
2.3 Supply chain management
2.4 Consumer preference
2.5 Constraints in marketing and production of organic products

2.1 Cultivation practices of organic cultivation

Nagaraj (1991) substituted N:P:K with compost from cowdung, grass and dry leaves. Biospray of neem, glyricidia were successful against pests. Cow's or ox's urine spray served as a good source of growth promoter or control of insect and disease. Application of decayed material of glyricidia, touch-me-not weed, transplanting paddy on full moon day and spraying 10 per cent cow's urine solution once in fifteen days helped to get 680 kg of paddy per acre.

Shantimole (1991) reported that Glyricidia was applied for vegetables and good crop was obtained. Similarly dry leaves, crop residues, and cut grass was applied to plant's base. Mud from forest and tanks were mixed and applied to plants. Neem cake was used for slow wilt of pepper. Mixture of garlic and sesame was used to control yellow leaf disease of areca.

Vivek and Julie (1991) reported about the use of garlic solution against aphids, fungal and bacterial attack on turmeric. Garlic solution was also successful against cotton and fruit trees curl but growing trap crop was much better. Nutrients were supplied using cowdung, leaf compost, grass crushed and dried sugarcane, glyricidia, neem leaves, pulse plants and mulch crops such as redgram, horsegram and groundnut. Growing intercrops such as coriander, garlic and onion controlled many insects and diseases.

Baphna (1992) reported that with the use of organic fertilizers such as oil cakes and mulches, the sapota plantation which was very weak due to the use of chemical fertilizers and pesticides, became healthier.

Gupta (1992) reported the results of experiments conducted by Gangopadhyay and Das on the bacterial leaf-blight of rice. Cow dung slurry was found effective in reducing the disease incidence to 20-37 per cent when stale cow dung was used. Disease incidence of only 4.5 per cent was observed when fresh cow dung was used.

Bhaskar and Ashok (1993) found that application of cow dung, poultry manure, home and town compost maintained soil fertility. Weeds were not uprooted as they protected the moisture in the soil by preventing strong sunlight to fall on soil and when decomposed it became additional manure. They reported that pests like spiders, red ants, some birds, etc., did not harm the plants but acted as predators for harmful pests and rodents.

Budathoki (1993) examined that the application of cattle urine in the form of top dressing was a traditional practice used by farmers in Nepal to manure vegetable crops. The diluted solution (1:1) of fresh (preferably 7-10 days old) animal urine was applied at the Rate of 50 ml

per plant which was found to be as good as urea or ammonium sulphate application.

Balasubramanian *et al.* (1995) identified that farmers followed cow dung coating for cotton seeds, soaking sorghum seeds in cow urine, soaking Bengal gram seeds in water and soaking sorghum seeds common salt water. Regarding plant protection measures, cow dung cake was used as burrow fumigant, displaying crow's carcass for scaring birds and beating empty iron drums to ward off birds.

Gothi (1996) reported the effect of buttermilk on some crops. Buttermilk sprayed on twenty five day old rain fed crop of groundnut resulted in the higher yield of pods and fodder compared to the control. On cotton and sesamum crops, it helped to survive the water stress period of 47 days caused by delayed rains.

Shinde *et al.* (2000) noted that seeds were treated with cow urine, soil and dung slurry followed by sowing in the east-west direction in kharif and north-south direction in rabi season.

Singh and Kumar (2007) opined that host crops should be established to build a population of beneficial insects that combat harmful pests. Organically approved insecticides like neem products should also be used against pests.

Meena *et al.* (2007) found that bio-degradable materials of microbial, plant or animal origin like compost, vermicompost, FYM, sheep penning etc. should be used as manures. Products collected from the local farm, animal plants and micro-organisms and prepared at the farm (eg. Neem seed kernel extract, cow urine spray) were allowed for control of pests and diseases.

Ramesh *et al.* (2007) reported that farmers used FYM as the predominant source of organic manure followed by Narayan Devaraj Pandey (NADEP) compost, biogas slurry, green manure and cow horn manure, bone meal, poultry manure, neem cake and karanjee cake were used as manures from off-farm resources. Spraying of neem oil (32.6%), cow urine (18.4%), and fermented butter milk (16.3%) were the most frequently used methods of pest control by organic farmers.

2.2 Profitability of organic cultivation

Reinken (1987) reported that a study conducted for eight years of comparative growing of apples and vegetables following biodynamic and inorganic rules at the experimental station proved that the yield levels were lower in biodynamic farming by 19 per cent for vegetables and 33 per cent for apples.

Huang *et al.* (1992) conducted field trials to compare conventional, organic and intermediate farming systems for 2 crop rotations in sweet corn, vegetable soybean and phaseolus. It was found that yields and gross income in organic farming were low.

Rozyspal *et al.* (1993) compared the economic results of winter wheat and spring barley production in organic and conventional farming in first and second years of the conversion to organic farming and concluded that the net income per hectare was higher in organic farming compared to conventional farming.

Vivek and Julie (1993) reported that average yields of ragi and paddy in initial year of switching over to organic farming was less but gradually increased and was comparable with the yield levels in inorganic agriculture.

Smolik *et al.* (1995) compared the agronomic, economic and ecological performance of alternative (organic) and conventional (inorganic) farming systems and sustainability of various systems was evaluated with regard to soil erosion. Pollution potential, whole farm productivity, energy use, environmental stress, economic performance and farm size and concluded that alternative system was most productive both agronomically and economically and year to year variability in production was lowest in organic farming system and more sustainable.

In Gujarat, organic production of chickoo, banana and coconut had higher profitability but field crops and mango had both lower input costs as well as yields (Naik, 2001).

Singh (2003) reported that the cost of production was lower and net returns higher (2-3 times) in basmati rice, soybean, arhar and wheat because of 25-30% price premium on organic produce and lower cost of production and marketing. The farmer's returns ranged from a low of Rs. 8-9 thousand on traditional vegetables and as high as Rs. 17-28 thousand in the case of baby corn and exotic vegetables like broccoli and red and Chinese cabbages.

Singh (2003) found that the farmers preferred organic cotton for risk aversion and lower cost of production (30%).The yield was lower by 20% though the price was higher than that of conventional cotton. Thus, the cost benefit ratio of organic cotton was 1:1.63 as against 1:1.47 for conventional cotton. The major problems were non-availability of suitable varieties and certification agencies, and delayed procurement and payment by the buyers.

Thakur and Sharma (2005) in a study conducted in Himachal Pradesh quantified economic returns from organic agriculture and

indicated that the gross profit of different crops increased significantly 2-3 times under organic farming when compared to conventional farming. In addition, the cost of production per hectare and per quintal was lower in organic farming. He concluded that organic farming was more remunerative as the produce fetched 3-4 times higher price than the conventional. The quality attributes in the order of importance to the consumers were taste, freshness, attractiveness, and toxic chemical free nature of the produce.

Raju *et al.* (2005) reported that the yield reductions in organic cotton production were anticipated to the tune of 25 per cent in hybrids and 11 per cent in varieties due to switching over to organic production from conventional system. He opined that shifting from hybrid cultivation to hardy varieties under organic farming can reduce 20 per cent cost of cultivation with 20 per cent higher seed cotton yield which can improve the present B:C ratio from uneconomical (1.67) to internationally accepted economical standards (3.05).

Singh *et al.* (2006) reported that revealed that the cost of cultivation for organic paddy was lower than that of inorganic paddy in Uttaranchal. Although the yield was relatively low for organic (26.86 q/ha) than non-organic (32.74 q/ha) paddy, the price received by the farmers was considerably higher for organic (Rs 1380/q) than non-organic (Rs 1161/q) paddy which favoured to compensate the difference in yield. On the other hand, the net returns were found to be considerably higher for organic than inorganic paddy.

Kshirsagar (2006) studied the economics of organic sugarcane farming (OSF) and inorganic sugarcane farming (ISF) in Maharashtra. He reported that OSF was labour-intensive but, its cost of cultivation was lower due to savings on chemical fertilizers, irrigation, seeds and agrochemicals. The study showed that profits were higher by 10.82 per

cent from OSF than ISF and the profitability was much more stable also, under OSF than ISF.

A study in the US examined the economic and financial feasibility of organic farming during the transition phase and found that, among the three components of the organic farm system analyzed (vegetable crops, field crops and livestock) only the vegetable crops component was profitable even on a small-scale. It was found that a market garden (vegetable crops) can be operated as a stand-alone activity, or as an "add-on" in conjunction with livestock enterprise (D'Souza and Baer, 2007).

Ramesh *et al.* (2007) conducted a study on feasibility of organic farming in central Madhya Pradesh and reported that there was a reduction of yield under organic farming by 7.4 and 5.6% in soybean and wheat crops, respectively. Though the cost of cultivation of soybean-wheat cropping system was lower by 3.52% in organic farming compared to the conventional farming, the gross and net returns of this system was lower by 5.88 and 7.92% respectively.

2.3 Supply chain management

Wilson (1996) in his study on supply chain of perishable products in northern Europe found that, the super market chain was more important in the retail marketing of fresh products and he suggested that the increased use of supply chain management techniques could increase the margins of the innovative and competitive firms that remain in the chain. Also he found that the inherent cost of distribution networks and channels of fresh produce could be reduced substantially by using supply chain management. The fruit and vegetable supply chain has traditionally been fragmented. Some links have performed well but others have caused bottle necks.

Ricks (2000) in his study on chain management and marketing performance in fruit industry revealed that the important area of need for fruit industry supply chain was consistent but not excessive supply of products to meet the market demand. This involved the supply of products balanced with demand in the same seasonal year and over a period of several years.

Glenn *et al.* (2002) in his study on Florida dairy marketing co-operative (FDMC) found that, the supply chain improvement reduced the inventories, wastes and costs incurred in the co-operative and so it increased the efficiency with in the firm and in the market channel.

Wermund *et al.* (2002) in his study on key challenges facing the cherry supply chain in the U.K found that irregular cropping, sophistication of export countries specification, high investment costs are the key challenges faced by the growers, irregular cropping pattern, too many sales desks, lack of response interims of uniform marketing strategies, lack of cooperation with the retailers and growers were the key challenges based by the marketing agents. Five weeks of U.K cherry season, unreliable supply and customer pay premium for U.K cherries were the key challenges faced by the retailers and differences in purchase and consumption behaviour were the key challenges based by the consumers in the U.K cherry supply chain.

Subha (2004) examined the ways of managing a supply chain and reported that the requisites to manage a supply chain were creation of a logistics vision, tackling conventional organizational problems and developing a supply chain. She also indicated that open communication with the advent of information technology between supply chain partners would help in better management of supply chain.

Kledal and Paul Rye (2005) studied the retailer growth prospects for organic food chains in Denmark and concluded that for the organic vegetable chain the retailers were in search for new products, and new ways of creating outlets that can enhance or boost their image in an increasing international competitive environment. The organic products had a well-respected brand of trust and quality, and thereby a very strong position to create new possibilities of gaining store space and growth among supermarkets and discounters.

Monteny *et al*. (2005) observed that the organic sector needed to grow in a balanced fashion, by matching supplies to consumer demand. Further, it was reported that new chain structures would be required to supply products efficiently at a low cost price, and with sufficient attention to quality and food safety. These were precisely the aspects that were focused on in the 28 projects of the Dutch co-innovation programme 'Professionalizing organic sales chains', which ran from 2001 through 2005.

Singh (2006) studied organic cotton supply chains in India with the example of Pratibha Syntex's organic project which was a completely verticallty coordinated supply chain from raw cotton production to garment manufacture in Madhya Pradesh. He reported that 80 per cent farmers shifted to organic farming due to land improvement and least 36 per cent due to assured market. As per company perception, the major problem in the organic market was lack of regular supply and quality besides the problem of storage. He further added that for the sustainability of company-farmer partnership schemes, it was important for the company to successfully market its products so that the farmers do not suffer from lack of markets. He concluded that market access for small producers depended on understanding the markets, organization

of the firm or operations, communication and transport links and an appropriate policy environment.

Kottila, Riitta and Rönni (2006) conducted a study in Finland and found that the lengths of organic supply chains had been increased by the emergence of intermediaries between consumers and organic farmers. The small segment of organic products and consumers created a challenge for the performance of the organic chain. Considering the nature of food as commodity, it was rather difficult to increase the flexibility of the supply chain. The quality of organic produce decreased the flexibility even further due to the required conversion period, great fluctuation of yields, relatively high price of organic raw material, as well as restrictions and requirements set by the regulation concerning organic. Due to the low flexibility of the organic chain, it was important to create long term commitment as well as collaborative forecasting concerning the volume and quality of the demand. Growth in demand of the organic might increase commitment, but growth cannot take place without the availability of good quality organic products to the consumers. If company image was the main reason for being involved with the organic chain, performance measures other than profitability was to be seriously considered for the organic products.

Singh (2007) examined the organic basmati paddy contract farming operations of the three players (Agrocel, Satlej and UOCB) in the northern region of India (Punjab, Haryana and Uttaranchal) in terms of the nature of contracts, pricing mechanism, quality and certification issues, input supply and networking among agencies, based on case studies of the entire supply chains of organic basmati rice. These chains like their conventional basmati counterparts excluded small and marginal growers everywhere except when it was a developmental project run by an international or national agency. It was found that prices

offered were in reference to conventional produce price, certification was with the agencies and the governance of the chain was totally with the companies. The contracts protected the company's interest at all costs to the farmer and did not cover farmer's production risks, e.g., crop failure.

2.4 Consumer preference

Gluckman (1986) studied the factors influencing the consumption and the preference for wine. The explicit factors identified were the familiarity with the brand name, the price of wine, quality or the mouth feel of the liquid, taste with regards to its sweetness or dryness and the suitability for all tastes. Some of the implicit factors identified through extensive questioning were colour and appearance. Most consumers preferred white wine to red. Packaging, appearance, colour, ornate ness, use of foreign language and graphics were taken as important clues for quality and price. Consumers preferred French or German made wines to Spanish or Yugoslavian wines.

Kumar *et al.* (1987) examined the factors influencing the buying decision making of 200 respondents for various food products. Country of origin and brand of the products was cross tabulated against age, gender and income. Results revealed that the two considered factors were independent of age, education and income. The brand image seemed to be more important than the origin of the product, since the consumers were attracted to the brands.

Bahe *et al.* (1992) surveyed 510 floral product consumers in Ohio supermarket and identified 34 factors that affected floral purchases. Response of 160 survey questions with the varimax rotate that yielded 34 independent factors accounting for 64 per cent of the total variance. Factors were grouped into five major categories based on product, consumer, and store, use (gifts) and place (location) attributes. These

factors were subsequently used for market segmentation and five segments were identified.

Shaw (1993) studied the consumption pattern of processed food in Delhi. Results showed that easy availability, taste and easy to store qualities of the processed products were more popular. Major factors which influenced buying decisions of consumers were brand name, government certification and price of the product. He noticed that processed food products were boon to busy housewife as it made cooking simple and saved time.

Singh *et al.* (1995) considered factors namely quality, availability, convenient pack size, flavour, colour, freshness and mode of payment to study the preference for a particular source of milk namely, rural milk vendors, privately owned city dairies and dairy factories. 70 per cent of the respondents preferred milk supplied by city dairies. The least preferred was that sold by dairy factories.

Gerhardy and Ness (1995) employed conjoint analysis to know the consumer preference for eggs in United Kingdom. A sample of 160 respondents was interviewed in five locations. The average relative importance given for production method was 30.4, price and origin were 25.6 and 25.06 per cent respectively. Freshness indicators (egg laid date, packed date etc.) received an importance of 18.9 per cent.

Huang and Fuj (1995) used conjoint analysis to assess Taiwanese consumer's preferences for Chinese Sausages. The survey was aimed at identifying consumers' decision making and choice behaviour. Taste and brand had highest influence on consumer's overall judgment of the product.

Wandel (1995) used multivariate analysis to study factors influencing the consumption of vegetables and fruits among Norwegian consumers. The factors, which determined consumption, were sex, age, income and household structure. Further it was reported that health conscious consumers used more fruits and vegetables, whereas those who and a preference for quickly prepared food tended to have a low consumption of vegetables.

Sharma (1997) explained the factors determining consumer's acceptance and preference for food in general. Many factors combine and interact to make buying a complex process. Price was identified as an important factor; however it had some limitations on the consumer's choice. Factors like sensory attributes regional preference, age, sex, interest, motivation, discrimination and income also influenced food consumption.

Shukla *et al.* (1998) conducted a survey to know the consumer response to green market opportunities. It was found that the customers were appraising the organic products on safety to nature and human health and that their brand awareness was generally low. They observed that eighty four per cent respondents were willing to buy organic products, twenty nine per cent were willing to pay premium of about five per cent and forty five per cent people were willing to pay 6-10 percent premium in case of environment friendly processed food.

Magnusson *et al.* (2001) reported demographic differences with respect to Swedish consumers' attitudes towards organic foods (milk, meat, potatoes, and bread), purchase frequency, purchase criteria, perceived availability, and beliefs about organic foods. The majority of consumers, and particularly women and young respondents (18-25 years) reported positive attitudes, but purchase frequency was low. A total of 13 per cent stated that they regularly bought organic milk.

Corresponding figures for organic meat, potatoes, and bread were 13, 16, and 8 per cent respectively. The most important purchase criterion was good taste, and the least important was organically produced. Approximately half of the respondents were satisfied with the availability of the organic foods. The organic foods were perceived to be more expensive and healthier than conventionally produced alternatives. A major obstacle to the purchase of organic foods was reported to be premium prices.

Cicia and Giudice (2002) studied the preferences of an important category of consumers of organic products (regular consumers of organic food or RCOF) allowing for preference heterogeneity. A survey instrument was developed to elicit preferences fro important qualitative and quantitative attributes of extra virgin olive oil. Each respondent made eight choices to rank-order nine product profiles in terms of their individual preference. Product attributes included price, origin of production, type of certification and visual appearance. Results displayed significant preference heterogeneity for origin of production and price. It was also found that price played an important role as quality proxy, while visual appearance was not significant in preference modeling and the type of certification programme had a fixed effect.

Jyrki *et al.* (2006) examined the kind of views and attitudes consumers and other food chain actors have, concerning organic food and its production and how these views and attitudes differ. The main methods used in the analysis of survey responses were factor, cluster and discriminant analyses. The discriminant analysis was based on respondents' attitudes towards organic food and organic food production. As a result of the analysis, five differing attitudinal groups, Believers, Committed, Neutrals, Doubters and Negatives were identified among the consumers. In addition, six differing attitudinal groups, Believers,

Supporters, Weak Doubters, Strong Doubters, Unsatisfieds and Negatives were identified among the other food chain actors. It was found that the products and information in the organic food chain did not flow smoothly from producers to consumers. Consequently, both consumers and other food chain actors wanted more information about organic food production and more visibility and public sales promotion activities for organic products.

2.5 Constraints in marketing and production of organic products

Shivaram (1991) felt that farmers basically lack information about organic or natural farming. There were no ready packages for growing crops, applying manure, controlling insects, pests and diseases. Organic farming was a way that had no strict obligations and formalities. Farmers must learn from their own experience and examination. Even Fukoka had warned that imitation won't find place in natural farming. Before one takes up organic farming, it is needed to know the pros and cons of both chemical and organic farming methods, make visits to practicing farmers, exchange ideas and also make efforts to read relevant literature.

Vivek and Julie (1991) reported that unavailability of local variety of seeds, no good markets for organic produce, problem of termites, and lack of native seed drills were some of the major constraints faced by the organic farmers.

Levin and Panyakul (1993) observed that complicated production technology, alienation of farmers from the concept, lack of standards, and lack of large market opportunities comparable to those for non-organic produce markets were the constraints in organic farming.

Jha (1999) studied the production and trade in organic agriculture products to report that one of the major bottlenecks for producers in

converting to organic agriculture was the lack of assured markets and market premiums along with high cost of certification. She suggested that branding and packaging in an eco-friendly way would improve the margins for organic producers.

Saxena and Singh (2000) reported that unavailability of good quality culture at the time of sowing was a major problem expressed by 75 percent farmers, followed by lack of knowledge and skill about the improved methods of compost making (63%). About 41 per cent farmers expressed lack of awareness about the time, concentration and method of application of biofertilizers as a major problem. Unavailability of vermicompost in adequate quantity was also a problem expressed by 44 per cent farmers.

Jain and Bhattacharyya (2000) reported five types of constraints which included social, financial, situational, technological and operational constraints. A majority of the respondents (68%) reported unawareness about biofertilizer practices. Other constraints were lack of practical oriented training (64%), lack of relevant literature (60%), lack of confidence in biofertilizers (50%), a few (44%) reported lack of biofertilizers supply centre in village and lack of storage facility.

Chothe and Borkar (2001) reported that lack of knowledge about biofertiizers was a major constraint encountered by 61.33 per cent of respondents, low income was the constraint expressed by one fourth respondents. Approximately, 42 per cent of respondents stated lack of demonstrations to use biofertilizers and 20 per cent respondents stated unavailability of extension literature like agricultural magazines were the constraints for non adoption of biofertilizers.

Mahale (2002) indicated that lack of government support, many government department lack information about organic farming,

insufficient training and extension for farmers, lack of market information and market access constraints, difficulties with export licenses and organic certification requirements, supply difficulties, lack of consistent quality and regular supply, lack of processing facilities, and lack of organic input such as seeds, biofertilizers, biopesticides as some of the limitations in marketing of organic products.

Klonsky and Smith (2002) found that the major hindrances to organic farming in general, included high initial cost (15-20%), high cost of certification especially for relatively small farmers.

Singh (2003) opined that high price expectations, delayed delivery, quality restrictions, lack of certification and marketing networks were some of the constraints in marketing organic products internationally. The major problems encountered by organic farmers were found to be initial lower yields, no price incentives, and no separate markets for organic produce, besides lack of and high costs of certification

The major problems encountered by organic farmers were found to be initial lower yields, no price incentives and no separate markets for organic produce, besides lack of and high costs of certification (Singh, 2003).

Das (2004) discussed the challenges for conventional farmers who want to adopt organic practices. She opined that organic markets were still a niche segment which called for different skills than regular marketing. She pointed out the negligence of organic farming in the agricultural policy of the Government of India. It was indicated that the marketing channel for organic products in India had been confined to exports and that the creation of a proper balance between domestic and export market was needed. Market development for organic inputs was also suggested.

Thakur and Sharma (2005) identified some pertinent problems faced by the organic farmers in Himachal Pradesh viz., non availability of latest scientific knowledge on management practices lack of technical know-how of scientific soil management, lack of scientific nutrient management, problems in pests and disease control, seeds of good varieties and hybrid of crops not available, scarcity of FYM and other organic manures, lack of knowledge and availability of biofertilizers and biopesticides and marketing problems like market intelligence, developing the right kind of marketing network, importance of going organic, ensure supply of organic food and to introduce the organic way of life to farmers, traders, consumer stores and consumers.

Ramesh *et al*. (2007) observed that lack of marketing facilities (43.7%) and non-availability of premium prices (39.5%) were the top most constraints expressed by the farmers in central Madhya Pradesh for the adoption of organic farming. Among the production constraints, management of pest and diseases (35.4%) and limited availability of organic manure (31.3%) were prominent. High demand for labour for operations like preparation of compost (12.5%), reduced yields (10.5%) and lack of scientific knowledge (10.2%) were the other constraints.

Methodology

CHAPTER III

METHODOLOGY

An appropriate research design is mandatory for effective and efficient research inquiry. In this chapter, the database and the analytical tools used in the study are presented under the following heads.

3.1 Description of the study area
3.2 Data base
3.3 Analytical Tools

3. 1 Description of the study area

Karnataka was selected for the study as the state produces a large variety of commodities in considerable area under organic production. Further, market outlets are established in places of district importance where farmers have already initiated organic production. The state is situated between 11^0 05' and 18^0 50' North latitude and 70^0 and 78^0 30' East longitude. It is surrounded by Arabian Sea in the West, state of Maharashtra in the North, Andhra Pradesh and Tamilnadu in the East and Kerala and Tamilnadu in the South. Since organic commodities also require similar agro climatic conditions as those of conventional production, the particular commodity group had to be selected from specific regions (districts) of the state. Considering the importance of various commodities, rice was selected to represent cereals, red gram among pulses, tomato as vegetable and banana to represent fruit crop. Accordingly, the sample respondents were selected from five districts namely Gulbarga, Bangalore, Mysore, Belgaum and Shimoga to cover the above four commodities (Fig 1). Gulbarga was selected for redgram, Bangalore and Belgaum for tomato, Bangalore and Mysore for banana and finally Shimoga and Belgaum for paddy owing to the availability of

CHAPTER III

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~~namely Gulbarga, Bangalore, Mysore, Belgaum and Shimoga to cover the~~

crop production data. The list of organic farmers was obtained from the Organic cell of KSDA/ NGO / Organic outlets/ Organic farmers' themselves. A random sample of 30 respondents each for paddy and tomato, 18 for banana and 12 for red gram was selected to represent the four commodity groups. Thus, a total of 90 organic farmers were selected for the study. Similarly for studying the supply chain mechanism, Four organic firms, namely Sreshta (24 lettered mantra), Jaivik Krishik Society, Janodaya situated in Bangalore and Nesara located in Mysore were considered for detailed survey with respect to their marketing practices, commodity coverage, contractual production arrangements, pricing and advertising methods to understand the concept of supply chain management of organic products as followed by the firms.

3.2 Data base

Primary data pertaining to socio-economic characteristics of households, production practices, profitability, cost of cultivation of crops, constraints in organic farming, marketing methods was obtained from the sample respondents with the help of a pretested schedule. The data for the agriculture year 2005-06 was collected during the months of May and June 2007. The data on socio economic characteristics of consumers, their preference for organic products, and other related information was obtained from 50 consumers in Bangalore and Mysore cities.

3.3 Analytical Tools

Tabular analyses was used to find the profitability of organic cultivation, supply chain of organic products, consumer preference for organic products and also to document the constraints faced by the organic farmers in production and marketing of organic products.

Factor analysis was employed to assess the factors influencing consumption of organic products.

3.3.1 Profitability of Organic Cultivation

Total cost

The expenditure on cultivation included total variable cost (cost of inputs used) and total fixed cost (rental value of land, land revenue and irrigation cost) per acre of land.

Inputs

Seed Material: Expenditure incurred on purchase of seed or imputed cost seed were considered.

FYM, Vermicompost: The per unit purchase price (imputed) was multiplied with the quantities of FYM and vermicompost to obtain cost.

Green manure: The cost of procuring green manure in terms of actual price said by the farmer was considered for accounting.

Plant protection chemicals: The cost of plant protection chemicals like biopesticides and cow urine formulations for spraying and seed treatment was calculated based on the said price of the farmer.

Labour: Labour cost included expenditure on human labour and bullock labour for operations like ploughing, sowing, weeding, seed treatment, FYM application, biopesticide application and harvesting. The family labour was valued at imputed wages paid for hired labour. The wage rate for human labour and bullock labour differed across regions.

Interest on working capital: This was calculated at the rate of 10 per cent per annum on the value of FYM, vermicompost, biopesticides,

seeds and labour (including man, woman and bullock) for the duration of crop.

Certification cost: Certification cost is borne by the marketing agency or the farmer. It is paid every year.

Fixed Cost

Rental value of land: Ten per cent of gross return was taken as rental value of land.

Land revenue: This cost is different for rainfed and irrigated crops. It also varies with the region where the crop is grown.

Irrigation costs: It includes maintenance cost on irrigation structure and the same has been apportioned based on the area under the concerned crop.

Gross returns

The gross return was calculated by multiplying the total output with price received by farmers.

Net returns

It is the returns obtained by subtracting total cost from gross returns.

Net return per rupee of investment

It was calculated by dividing the net return by the total cost involved in the cultivation of the concerned organic crop.

3.3.2 Supply Chain Management of Organic Products

Supply chain management of organic products was studied by looking at the supply chain mechanism employed by the four firms

considered for the study. The respondents were the firms which exclusively sold organic products three of which are located in Bangalore and one in Mysore.

The value chain in terms of procurement of commodities, pricing mechanism, services offered to the farmers and the product range of all the four firms were studied The efficient of supply chain was studied by considering the market margin and farmer's share in consumer's rupee. for the selected commodities viz., rice, banana, tomato and red gramwere calculated. In addition, customer satisfaction of the firm and services offered to the farmers were also considered to judge the efficient supply chain. Market margin includes the marketing costs and added margins of the firm. The farmer's share in consumer' rupee was calculated as a percentage of consumer price. The firm with least market margin and highest farmer's share in consumer' rupee was adjudged as the efficient supply chain for that particular commodity. The major problems in organic supply chains were highlighted.

3.3.3 Consumer Preference for Organic Products

Factor Analysis

Factor analysis is a multivariate technique in which, the two most commonly employed factor analytic procedures in marketing applications are principal and common factor analysis. The objective is to study the consumer preference for organic products.

Principle component analysis can accommodate a large number of variables (Table 3.1) and reduce the information to a convenient size. The inter-relationship among a set of many inter-related variables are examined and represented in terms of a few underlying factors or dimensions that explain the correlations among a set of variables. This

assumes that the observed variables are linear combinations of some underlying source variables, which are known as factors.

The factor analysis programme will provide the correlation matrix as one of the outputs. Using these correlations one can see what information and hypotheses can be obtained. Factor loadings provide the correlation between the variable and the underlying dimension. The product of the corresponding factor loadings can obtain the correlation between any two variables.

Since the objective of the factor analysis is to represent each of the variables as linear combination of a smaller set of factors, we can express this as

$X_1 = l_{11} F_1 + l_{12} F_2 + \ldots\ldots\ldots\ldots + l_{1n} F_n + e_1$

$X_2 = l_{21} F_1 + l_{22} F_2 + \ldots\ldots\ldots\ldots + l_{2n} F_n + e_2$

$X_3 = l_{31} F_1 + l_{32} F_2 + \ldots\ldots\ldots\ldots + l_{3n} F_n + e_3$

: : : : : : : :

$X_m = l_{m1} F_1 + l_{m2} F_2 + \ldots\ldots\ldots\ldots + l_{mn} F_n + e_m$

Where,

X_1-X_n = Standardized scores

F_1-F_n = Standardized factor scores

l_{11}-l_{mn} = Factor loadings

e_1-e_m = Error variance

The maximum number of factors possible is equal to the number of variables. However, a small number of factors by themselves, may be sufficient for retaining most of the information on the original variables.

Tabular Analysis

Tabular analysis was done to analyze the percent weightage given by the consumers to the different attributes when buying organic products. Consumers were asked to rate each statement on a 5 point scale ranging from strongly agree, agree, neutral, disagree and strongly disagree respectively. There were 20 statements or among which 2 statements were grouped under taste, 3 each under visual appearance, authenticity, free of pesticide residue and price, 4 under health benefits and 2 under shelf life. Thus, there were 7 attributes. Total score for each respondent under each attribute was calculated. This score was converted to index number under each attribute for each respondent (Appendix III).

Index number was calculated using the following formula,

$$\mathbf{I_i} = (X\text{-Minimum})/\ (Maximum\text{-}Minimum)$$

Where,

$\mathbf{I_i}$ = Index number under each attribute for each respondent

X = Total score of a respondent under i^{th} attribute

Minimum = Minimum score under that attribute

Maximum = Maximum score under that attribute

i = 1, 2, 3 7

The index numbers of all the respondents under each attribute were summed up to get an overall score for the concerned group. Such seven overall scores were obtained for all the seven attributes. These seven scores were totalled up to obtain a grand total. Percentages were calculated to know the attribute weightage the consumer gives during his purchase decisions of organic products.

Results

CHAPTER IV

RESULTS

Keeping in view of the objectives of the study, the results are presented under the following headings.

4.1 Socio-economic profile of organic farmers

4.2 Cultivation practices

4.3 Profitability of organic cultivation

4.4 Supply chain management of organic products

4.5 Consumer preference

4.6 Constraints in production and marketing

4.1 Socio-economic profile of organic farmers

Socio-economic profile of respondent farmers was studied in terms of age, educational qualification, experience in organic farming, family size, land holding, average area under organic management, and household annual income. The details of the above are presented in Table 4.1. The average age of the respondents was 44 years, their average annual income being Rs. 98,665 with an approximate average family size of 5 members. The average experience of respondents in organic farming was 5.40 years. Their average years of education were 12. The respondents' average land holding was 12.00 acres with an average land area of 6.54 acres under organic management.

4.2 Cultivation practices

The cultivation practices followed by sample farmers for all the selected crops were compiled and presented in Table 4.2.

Table 4.1 : Socio - economic characteristics of organic farmers

Particulars	Unit	Average
Age	Years	44
Annual income	Rupees	98665
Education	Years	12
Family size	Numbers	4.67
Organic farming experience	Years	5.40
Land holding	Acres	12.00
Organic land area	Acres	6.54

Table 4.2 : Cultivation practices

Practices	Paddy	Banana	Tomato	Redgram
Seed treatment	*Panchagavya* or Salt water	*Panchagavya*	*Panchagavya*	*Beejamrutha*
Nutrient management	FYM, vermicompost and green manure (Dhaincha, *Crotalaria sp.*, *Navdhanya*)	FYM, vermicompost and green manure (*Proraria sp.*)	FYM, vermicompost and green manure (*Navdhanya*)	FYM, vermicompost and neem cake
Pest and disease management	Spraying of 1 litre cow urine mixed in 5 litres of water or spraying of diluted *kashaya*	1 litre cow urine +neem mixed in 10 litres of water or *Jeevamrutha*	*Dashaparni* or neem and pongemia cake or *Jeevamrutha*	*Jaivika Jeerna Gataka*
Weed management	Manual weeding and crop rotation	Manual weeding and crop rotation	Manual weeding and crop rotation	Manual weeding and crop rotation

4.2.1 Seed treatment

Respondent farmers growing paddy, banana and tomato used *Panchagavya* for seed treatment. *Panchagavya* is a paste of cowdung (5kg), cow urine (4.5 litre), milk (250ml), curd (250ml) and ghee (100g) mixed and allowed to ferment for 10 days. On eleventh day the paste is diluted ten times of its volume with water for spraying. Some of the paddy growing farmers used salt water for seed treatment. Ten litres of salt water is taken and a whole egg is placed inside this water. If three-fourth egg is submerged then the consistency of the salt water is ready for seed treatment. *Beejamrutha* was used for seed treatment of red gram. It is prepared by using 5 litres of cow urine, 5 kg cow dung, 1.5 kg of $CaCO_3$ and 5 litres of water. This solution is fermented for 20 days and used for seed treatment purpose.

4.2.2 Nutrient management

All the respondent farmers used FYM and vermicompost as a predominant source of organic manure. Green manure usage varied across regions depending on species occurrence. Dhaincha, *Crotalaria sp.*, Sunhemp, horsegram and *Proraria sp.* were used as green manure. *Navdhanya* was used as green manure by some of the respondent farmers growing paddy and tomato. It is a mixture of Dhaincha (3kg), Amaranthus (0.2kg), bengal gram (5kg), black gram (1kg), green gram (1kg), coriander (500g), sesamum (200g), fenugreek (0.5kg), niger (200g) and mesta (0.1kg). This seed mixture is sown and grown which is later incorporated into the soil.

4.2.3 Pest and disease management

Spraying of 1 litre cow urine mixed in 5 litre of water was practiced by farmers against paddy stem borer. *Kashaya* was also sprayed to combat the pest and disease problem in paddy. It is prepared by adding,

ground 1 kg of *Mukkadka* and *Kathale* (shrubs) into 10 litres of boiling water which is allowed to ferment overnight. 1 litre of *Kashaya* is diluted with 5 litres of water for spraying.

Neem was added in the cow urine to spray against pest and disease management in banana. *Jeevamrutha* is used for banana and tomato pest control. It is a mixture of cowdung (10kg), cowurine (5litres), milk (2.5litres), curd (1.25litres), buttermilk (700ml), jaggery (500g), full ripened bananas (2 dozen), biofertilizer (500g), yeast (100g) and 200 litres of water which is allowed to ferment for 5-7 days. This solution is filtered and mixed with equal proportion of water for spraying. *Dashaparni* (neem-5kg, *Hulagala*-3kg, custard apple-3kg, Bel or papaya leaf-2kg, *Yekka*-2kg, *Nerium sp.*-2kg, *Chadarangi* leaf-2kg, tulsi-2kg, *Magalani* leaf-2kg, *Madhugunaki*-2kg, chilli-1kg, garlic-0.5kg, cowdung-3kg, cow urine-5 litre and water-200 litres) is a combination of leaf extracts of plants containing NPK, micronutrients, fungicides and pesticides that was used for tomato pest and disease problem by some of the respondents. Neem and pongamia cakes were used by others. *Jaivika Jeerna Gataka* was used against *Heliothis sp.* in redgram. It is prepared by mixing one part cow urine with 3 parts water to which neem, custard apple seeds, *Lakki*, papaya and *Parthenium sp.* are added. This mixture is allowed to ferment for 1 month. 1 litre of this decoction is mixed with 90 litres of water when spraying.

4.2.4 Weed management

Crop rotation and manual weeding were followed to minimize the weed problem in all the crops.

4.3 Profitability of organic cultivation

4.3.1 Paddy

Paddy is an important food crop grown extensively under rainfed conditions in regions with assured rainfall while, under surface irrigation in other parts of the state. The average area under rainfed organic paddy was two acres, while it was 1.64 acres in the case of irrigated paddy.

The profitability of organic paddy cultivation is assessed separately for rainfed and irrigated paddy as the productivity and cost of production differ widely. All the organic producers in Shimoga cultivated a local paddy varity called Hosudi. Considering the cost of cultivation of rainfed paddy grown under organic management, the expenditure on organic manure formed 52 per cent of the cost of cultivation followed by labour cost (27 per cent). Female labour accounted for around 60 per cent labour share. The average yield of paddy and straw per acre worked out to 820 kg and 1124.22 respectively and the gross return was Rs. 8103.07 at an average price of Rs. 9.2 per kg of paddy. The cost of production per acre was Rs. 6916.02 yielding a net return of Rs. 1154.10. The average net return per rupee of investment was 0.17 indicating the sustainable nature of organic cultivation (Table 4.3).

In the case of irrigated organic paddy, the cost of organic manure formed 23 per cent of the cost of cultivation. The expenditure on human and bullock labour formed 37 per cent of the cost of cultivation. The cost of production worked out to be Rs. 8768.99. The average yield of paddy and straw obtained under irrigated conditions were 1264.27 kg and 1748.29 kg which were higher than rainfed paddy. Irrigated paddy fetched an average price of Rs. 15.43 yielding gross returns of Rs. 20416.80. The net return per acre of irrigated organic paddy cultivation was Rs. 11647.81 and the average net return per rupee investment at

Table 4.3 : Cost of cultivation of organic Rain fed Paddy per acre

Sl. No.	Particulars	Quantity (Kg)	Price (Rs/kg)	Value (Rs.)
1	Seed cost	36	9.25	333 (4.814)
2	Seed treatment	1.87	6.33	12(0.17)
3	FYM	22.47	20.00	449.33(6.50)
4	Vermicompost	423.33	3.50	1481.67(21.42)
5	Green manure	22.67	75.33	1707.56(24.69)
6	Biopesticides	21.67	2.55	55.33(0.80)
7	Labour cost	13.0* 23.0** 4.0***		1890.33 (27.33)
8	Interest on working capital @ 10 p.a			197.44(2.85)
A	TOTAL VARIABLE COST			6126.66
B	FIXED COST			
9	Rental value			777.36 (11.24)
10	Land revenue			12.00(0.17)
C	TOTAL COST OF PRODUCTION (A+B)			6916.02 (100)
11	Main product(paddy)	820.00	9.2	7552.20
12	By product	1124.22	0.49	550.87
D	RETURNS			8103.07
E	Net returns			1154.10
F	Net returns over one rupee of investment			0.17

Note: * - mandays, ** - womandays, *** - bullock days

Rs. 1.33, indicated the profitable nature of organic paddy cultivation under irrigated conditions (Table 4.4).

Marketing arrangements

Paddy farmers in Shimoga district marketed their organic paddy to Bangalore (15 quintal), Tumkur (60 quintal), Tiptur (20 quintal), Chennai (12 quintal) and Ahmedabad markets through their organic farmers' group or Sangha called Akshaya Jeevana Kilara Society. The produce was not marketed individually by the farmers but by the society and the returns are distributed in accordance to the farmer's share in the pooled produce.

Irrigated paddy growers in Belgaum district marketed their organic produce in the local market, as well as in upcountry markets like Bombay, Pune, Tiptur, Mysore and Bangalore. Organic rice was sold at Rs. 47 a kilo to the Bombay market as compared to Rs. 38 per kg in Karnataka. The produce is sold to retail organic outlets called Jaivik Krishik Society and Era Organic in Bangalore.

4.3.2 Banana

Yelakki variety of banana is cultivated in Bangalore and Mysore districts. Owing to many positive quality attributes, this variety is sought after by consumers. The average area under organic banana was 1.03 acres. Banana is a heavy feeder and performs well when adequate plant nutrients are incorporated in the soil.

The expenditure on organic manure was 24.3 per cent of the cost of cultivation and expenditure on labour formed 23.63 per cent. The resulting cost of cultivation was Rs. 38801.30 yielding a gross return of Rs. 125670.08. The average yield of banana per acre was 8205.26 kg with an average price of Rs. 15.32 per kg. The net return per acre from

Table 4.4 : Cost of cultivation of organic Irrigated Paddy per acre

Sl. No.	Particulars	Quantity (Kg)	Price (Rs/kg)	Value (Rs.)
1	Seed cost	28.43	18.93	538.11(6.14)
2	Seed treatment	4.5.56		41.25(0.47)
3	FYM	510.71	1.09	554.49(6.32)
4	Vermicompost	582.14	2.18	1268.24(14.46)
5	Green manure	6.17	27.95	172.50(1.97)
6	Biopesticides	281.86	1.82	514.92(5.87)
7	Labour cost	18.0* 33.0** 4.0***		3206.12 (36.56)
8	Interest on working capital			209.64(2.39)
A	TOTAL VARIABLE COST			6505.27
9	Rental value			1932.09(22.03)
10	Land revenue			24.57(0.28)
11	Irrigation cost			307.05(3.50)
B	FIXED COST			2063.72
C	TOTAL COST OF PRODUCTION(A+B)			8768.99(100)
12	Main product(paddy)	1264.27	15.43	19507.69
13	By product	1748.29	0.52	909.11
D	RETURNS			20416.80
E	Net returns			11647.81
F	Net returns over one rupee of investment			1.33

Note: * - mandays, ** - womandays, *** - bullock days

organic banana cultivation was Rs. 86868.79 and the average net return per rupee of investment was Rs. 2.24 which is indicative of high profitability (Table 4.5).

Marketing arrangements

Farmers growing banana in Bangalore rural district marketed their produce in Bangalore city. The produce was sold to organic outlets like Jaivik Krishik Society, Janodaya, Adinature and Sreshta located in Bangalore. The transportation costs were borne by the firms.

Banana grown in Mysore district was exclusively sold to Nesara Organic Service Organisation, a voluntary body involved in marketing of organic products located in Mysore. These farmers are registered members of the organization. Farmers sell their produce directly to the consumers on Fridays.

4.3.3 Tomato

Tomato is popularly used as a vegetable in curries and other food preparations and eaten raw in the form of salads. Tomatoes have become indispensable in Indian kitchen. The details on variable and fixed costs are presented in Table 4.6.

Tomato is a labour intensive crop as it requires regular care in tending plants. The share of labour expenditure formed 29.05 per cent of the production cost of organic tomato followed by the expenditure on organic manure (21.56 per cent). The cost of production worked out to be Rs. 19451.44 per acre with a gross return of Rs. 52360. The average yield of tomato was 6600 kg which is far lower than the conventional tomato (40 tons). Organic tomato fetched an average price of Rs. 7.93 per kg. The net return per acre was Rs 32908.56 and the net return per rupee of investment was Rs. 1.69 (Table 4.6).

Table 4.5 : Cost of cultivation of organic Banana per acre

Sl. No.	Particulars	Quantity(Kg)	Price (Rs/kg)	Value (Rs.)
1	Seedlings	984.2105	4.13	4066.34(10.48)
2	Seed treatment	111.00		290.47(0.75)
3	FYM	6405.56	0.98	6263.21(16.14)
4	Vermicompost	1127.78	2.50	2819.44(7.27)
5	Green manure	13.40		343.33(0.88)
6	Biopesticides	9.00		765.26(1.97)
7	Labour cost	74.0* 42.0** 3.0***		9170.36(23.63)
8	Interest on working capital			1976.54(5.09)
A	TOTAL VARIABLE COST			25694.96
9	Rental value			12567.01(32.39)
10	Land revenue			31.00(0.08)
11	Irrigation cost			508.33(1.31)
B	TOTAL FIXED COST			13106.34
C	TOTAL COST OF PRODUCTION(A+B)			38801.30(100)
12	Main product	8205.263	15.32	125670.08
D	RETURNS			125670.08
E	Net returns			86868.79
F	Net returns per rupee of investment			2.24

Note: * - mandays, ** - womandays, *** - bullock days

Table 4.6 : Cost of cultivation of organic Tomato per acre

Sl. No.	Particulars	Quantity (Kg)	Price (Rs/kg)	Value (Rs.)
1	Seed cost	0.04	48833.33	2189.36(11.26)
2	Seed treatment	56.3		6.9(0.04)
3	FYM	2423	0.89	2164.84(11.13)
4	Vermicompost	740	2.50	1850.00(9.51)
5	Green manure	7.31		179.69(0.92)
6	Biopesticides			1328.57(6.83)
7	Labour cost	48* 23** 3***		5651.22(29.05)
8	Interest on working capital			334.26(1.72)
A	TOTAL VARIABLE COST			13704.82
9	Rental value			5236(26.92)
10	Land revenue			22.21(0.11)
11	Irrigation cost			488.42(2.51)
B	TOTAL FIXED COST			5746.63
C	TOTAL COST OF PRODUCTION (A+B)			19451.44(100)
12	Main product	6600	7.93	52360.00
D	RETURNS			52360.00
E	Net returns			32908.56
F	Net returns per rupee investment			1.69

Note: * - mandays, ** - womandays, *** - bullock days

Marketing arrangements

Organic tomato grown in Bangalore rural district is marketed in Bangalore city. The produce was sold to organic outlets like Jaivik Krishik Society, Janodaya, Adinature and Sreshta located in Bangalore. The transportation costs are borne by the firms.

Tomato growing farmers in Belgaum district sell their produce in Belgaum through their organic group called Organic Food Club. The produce was sold to the consumers who were registered members of the club. The sale is in the form of assorted vegetables of 3 kg priced at Rs. 50 or 4.5 kg at Rs. 75 or 8 kg at Rs. 125, which include tomato and other vegetables. The produce was sold weekly and delivered at their door steps.

4.3.4 Red gram

Red gram is mostly converted to dal for consumption purpose. Organic red gram perhaps has the highest consumer acceptance that there is heavy demand and advance booking way ahead of harvesting season.

The expenditure on organic manure was 47.55 per cent of the cost of production while cost on human and bullock labour formed 19.28 per cent. The cost of cultivation of organic red gram per acre was found to be Rs. 10483 resulting in a gross return of Rs. 28906.25. The average yield obtained per acre was 770.83 kg realizing an average price of Rs. 37.50 per kg. The net return per acre from organic red gram cultivation was Rs. 18423.25. The net return per rupee of investment was Rs. 1.76 (Table 4.7).

Table 4.7 : Cost of cultivation of organic Redgram per acre

Sl. No.	Particulars	Quantity (Kg)	Price (Rs/kg)	Value (Rs.)
1	Seed cost	3.58	32.75	117.35(1.12)
2	Seed treatment			35.83(0.34)
3	FYM	3916.83	1.03	4047.39(38.61)
4	Vermi compost	375.00	2.50	937.50(8.94)
6	Biopesticides			118.58(1.13)
7	Labour cost	9.0* 10.0** 3.0***		2021.46(19.28)
8	Interest on working capital			303.26(2.89)
A	TOTAL VARIABLE COST			7581.38
9	Rental value			2890.62(27.57)
10	Land revenue			11.00(0.10)
B	TOTAL FIXED COST			2901.63
C	TOTAL COST OF PRODUCTION(A+B)			10483.00(100)
11	Main product	770.83	37.50	28906.25
D	RETURNS			28906.25
E	Net returns			18423.25
F	Net returns per rupee investment			1.76

Note: * - mandays, ** - womandays, *** - bullock days

Marketing arrangements

Red gram grown in Gulbarga district was marketed in the local market called Alanda. The consumers made a direct contact with the farmers for organic redgram. It was sold in the form of both dal and gram

4.4 Supply chain management of organic products

The organization, management and functioning of organic produce supply chain was studied through an indepth analysis of the mechanism employed by the four firms considered viz. Sreshta (24 lettered mantra), Jaivik Krishik Society, Janodaya and Nesara. The chain was analyzed from the procurement of organic products till the product reached consumers.

4.4.1 Sreshta (24 Lettered Mantra), Bellandur, Bangalore.

Sreshta is a new private venture for organic production, processing and marketing set up in late 2004 which includes central warehouse, packing unit, baking unit and a bakery shop, and cleaning and grading unit headquartered at Hyderabad. There are six production centers in six states (Andhra Pradesh, Karnataka, Tamil Nadu, Delhi, Maharashtra and Kerala), each headed by a production head. The organic outlet is named as *24 Lettered Mantra*. There are 2 organic outlets in Hyderabad, 2 in Bangalore, 1 in Coimbatore, 2 in Chennai, 2 in Delhi, 2 in Pune and 1 in Trivandrum. In Bangalore, it started in 2005 with outlets at Whitefield and Bellandur (Table 4.8). A total of 800 commodities are sold in the outlet with a monthly turnover of Rs. 2.7 lakhs. In value terms the highest revenue is from fruits and wheat flour.

Procurement of products - Its suppliers for the Bangalore outlet include contract farmers and independent growers. There are 60 contract farmers in Karnataka at Kolar, Hosakote, Chitradurga, Hassan and Gadag. Supplies from all over India are routed through the head office at

Table 4.8 : General information of the firms

Firms	Sreshta	Jaivik Krishik Society	Nesara	Janodaya
Type of organization	Private	Govt. owned	Voluntary	NGO
Established	2005	2004	1998	2003
Number of outlets	2	1	1	4
Location	Whitefield and Belandur, Bangalore	Lalbagh, Bangalore	Chamaraja puram, Mysore	Jayamahal Extension, Bangalore

Hyderabad by vega logistics. Independent growers include Gopalan Organics based at Bangalore. It has direct procurement linkage with contract farmers in Kolar for onion, Tumkur for vegetables, Kanakpura for leafy vegetables, Hosakote for exotic greens, Mulbagal for gourds and root crops, Hassan for potato, onion and coconut, Chitradurga for chikoo, mango and guava, sapota from Gadag and ragi from Kollegal. Other products like pulses, minor millets, ice creams, pineapple etc are sourced from other parts of the country (Table 4.9). The transportation cost is borne by the firm.

Pricing mechanism - From Table 4.9 it could be observed that each firm had its own pricing policy. The product prices of the company are based on procurement price and cost with added margins. The farmers are offered market rate for conventional produce (Namdhari or Food World prices) plus 20 per cent premium. When anything goes wrong only the conventional price is paid. The payments to the suppliers are paid through demand draft on a fortnightly basis.

Services offered - The contract farmers enter into a written contract for a minimum period of 1 year. No inputs or credit are provided by the firm. Technical assistance regarding crop planning and recommended dose of fertilizer to be used is given by the field staff. Contract is cancelled if the farmer violates the contract terms for more than three times (Table 4.10).

Certification – It is managed by the firm itself. The certification cost for the contract farmers is borne by Sreshta. The certification agencies approached are SKAL and IMO (Table 4.10).

Packaging, processing and labeling of the sourced products from all over India are done at Hyderabad. A warehouse, grading centre and distribution centre are located at Bangalore for the locally sourced products. It has a brand of its own called “24 Lettered Mantra”.

Table 4.9 : Procurement and pricing mechanism

Particulars	Sreshta	Jaivik Krishik Society	Nesara	Janodaya
Contract farmers	Procurement from 60 contract farmers in Karnataka	No contractual arrangements	No contractual arrangements	No contractual arrangements
Independent growers	Procurement from Gopalan Organics, Art of Living	Present	Present	Absent
Farmers Groups	No procurement from farmers groups	Present	Absent	Present
Maximum distance of procurement	610 km	480 km	320 km	320 km
Growing centres	Kolar Hosakote Chitradurga Hassan Gadag	Tumkur Shimoga South Canara North Canara Belgaum	Mysore Shimoga	Byrapura Arkere Devanahalli Mulbagal Shimoga
Pricing Mechanism				
Premium paid to the farmer	20% over Namdhari or Food World price	20% over HOPCOMS price	Farmer quotes the price	5% over HOPCOMS price
Payment	Demand draft	Demand draft and Cash	Cheque	Cash
Duration of payment	Fortnightly basis	Monthly and on the spot basis	Monthly	Weekly

Table 4.10 Services offered to seller farmers

Firms	Sreshta	Jaivik Krishik Society	Nesara	Janodaya
Seeds, FYM and Vermicompost	Not provided	Not provided	Not provided	Not provided
Soil Testing	Not done by the firm	Not done by the firm	Not done by the firm	Soil testing is done by the firm
Crop planning	Information on crop planning is given by field staff	Guidance on crop planning is not given	Guidance on crop planning is not given	Guidance on crop planning is not given
Field visits	Field visits are conducted by the field staff of the firm	No field visits	Fields are visited by the members of the firm and consumers	Field visits are undertaken thrice a month by the staff
Organic promotions	Tie-up with ICCOA for organic promotions	Organic promotions done by the founder organization Sahaja Samruddha	Organic promotions are done by conducting workshops	Conducting training programmes and follow-ups
Certification	Done by SKAL or IMO at the cost of Sreshta	Certification by internal control system	Certification by internal control system	The firm links the farmer to AOCA

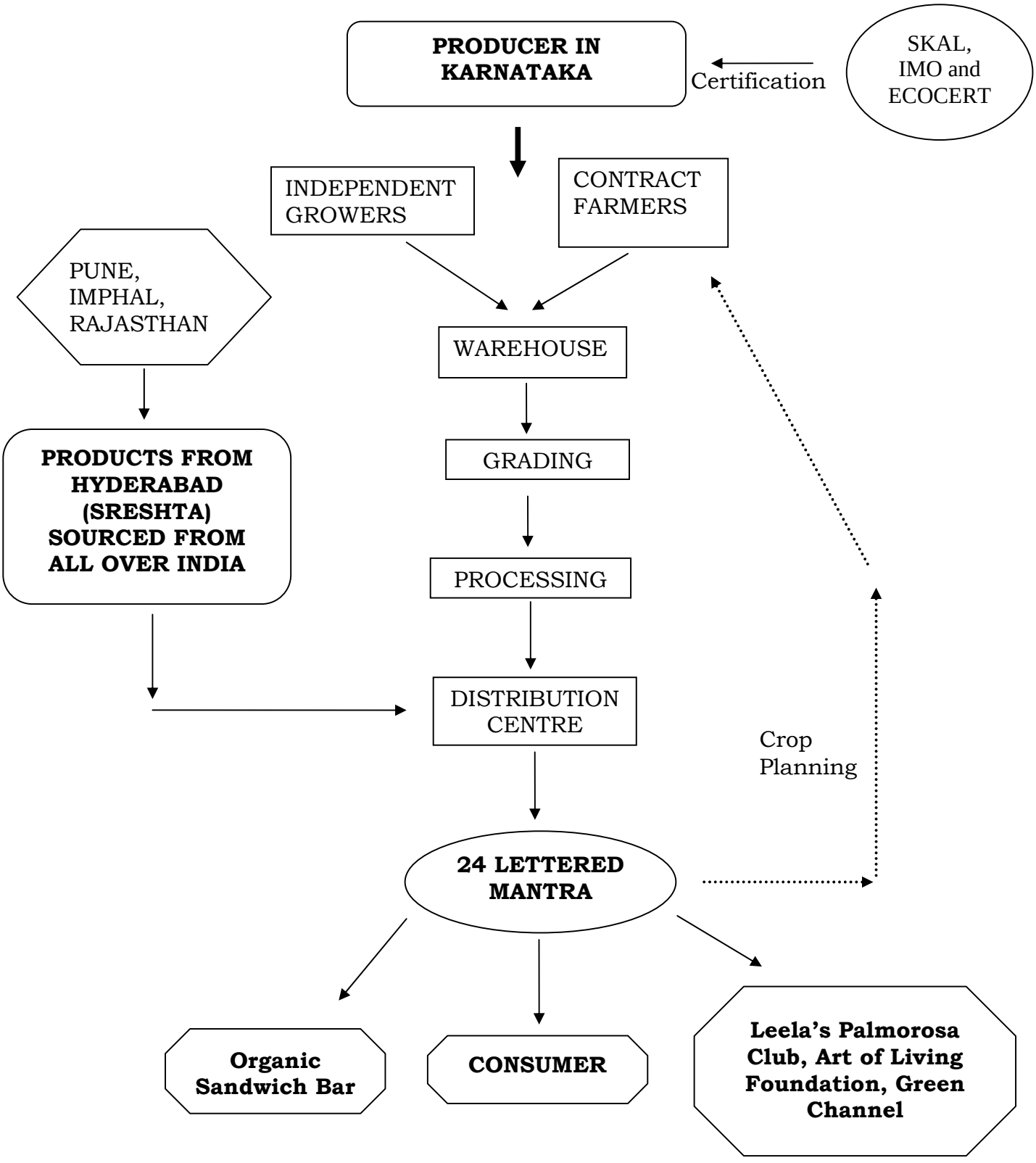

Fig 2. SUPPLY CHAIN MODEL OF 24 LETTERED MANTRA

Marketing – The firm undertakes direct marketing of organic foods through its organic outlets at Bellandur and Whitefield. Its main buyers are individual consumers. The total monthly sales accounts for Rs. 2.7 lakhs with Rs. 1 lakh for administration charges (Table 4.11). Sales to institutions like Leela's Palmorosa Club, Art of Living Foundation and Green Channel form 20% of the total sales. It has entered into a tie-up with Max hypermarket and Spencers. Organic sandwich bars are set up in Infosys, Wipro, Tesco and HP head/ regional offices. It has a tie-up with ICCOA for organic promotions. Organic supply chain network of Sreshta is given in Fig. 2.

Sresta has a range of 800 organic products which include all types of cereals and pulses and their processed products, bakery items like breads, cookies, tarts, muffins etc., spices, dry fruits, jams, fruit juices, health drinks, honey, variants in organic coffee and tea powder, edible oils etc. About 70% of the products are certified.

4.4.2 Jaivik Krishik Society, Lalbagh, Bangalore.

It is a federation of organic farmers and farmers' groups supported by the State Government of Karnataka. It is a nodal agency between the government and the organic producers' groups in quality control and provides marketing and value addition support. It has its single outlet in Lalbagh and started its business in the year 2004.

Procurement – Most of its suppliers are farmers' groups and the produce is largely from local villages. Before procurement, the sample is tested for the presence of pesticide residue at Govt. laboratory, Hulimavu. Rice, wheat, pulses and spices are procured from Belgaum which is the maximum distance of procurement for the society. Spices, rice and pulses come from Shimoga and South Canara, pulses and cereals from North Canara and vegetables from Tumkur and villages

Table 4.11 Sales and administration expenses (monthly)

Firms	Sreshta	Jaivik Krishik Society	Nesara	Janodaya
Sales	Rs.2.7 lakhs	Rs.1.5 lakhs	Rs.50,000	Rs.20,000
Administration charges	Rs.1 lakh	Rs.22,000	Rs.6000	NA

around Bangalore. The society also procures organic produce from independent growers (Table 4.9). It also procures from Kerala, Tamilnadu and Andhra Pradesh. The transportation is looked after by the society. There is no membership for the farmers as well as the consumers.

Pricing – The suppliers are offered 20-30% premium above the conventional market price. Vegetables and fruits are procured at 20% above HOPCOMS buying price. If the products do not comply with standards the entire lot is rejected. The suppliers are generally paid cash on the spot or at the end of the month. They are paid through demand draft if the value of purchase is more than Rs.5000 (Table 4.9).

Services offered - There is no written contract with the farmers' groups. Services offered to the farmers include conducting of training, workshops, seminars and symposia to spread the concept of organic farming. Inputs are not supplied to the farmers. No assistance on crop planning and soil testing is provided. Field visits are not conducted by the society (Table 4.10).

Certification – Certification is not undertaken by the firm. There is internal control system where the farmers themselves inspect fellow farmers' fields. Its founder organization Sahaja Samrudha assists the farmers in getting IMO certification (Table 4.10).

It has a godown where products are delivered, a processing centre and a packing centre at Bangalore.

Marketing – It has one shop at Lalbagh with monthly sales of Rs. 1.5 lakhs and incurs Rs. 22000 towards administration. Consumers are the main buyers (Table 4.11).

All its products are labeled as Jaivik Krishik Society. The product range of 100 items including all cereals and pulses, their processed

products, baby foods, honey, spices, vegetables and fruits, juices etc. 50% of the products are certified.

The organic supply chain network of Jaivik Krishik Society is given in Fig 3.

4.4.3 Nesara Organic Service Organisation, Mysore.

Nesara Organic Service Organisation is a voluntary organization set up in August 1998 with a view to promote organic farming (Table 4.8). It is an organization of 25 registered farmers and 150 registered consumers. A life membership fee for Nesara is Rs. 1000. It is in Chamarajapuram, Mysore.

Objectives:

1. To identify organic farmers.
2. To generate consumer awareness for organic farming.
3. To establish a direct link between producers and consumers.
4. To conduct organic farming camps and organic field trips.
5. To promote organic farming through Nesara newspaper.

Procurement – The suppliers are registered farmers present in and around Mysore. There are twenty five farmers supplying organic products to this outlet. It procures 90% of the produce from its registered farmers. Rice is sourced from Shimoga and groundnut and redgram from Andhra Pradesh (Table 4.9).

Pricing – Farmer quotes the price. Payments to the suppliers are made through monthly cheques. Immediate payment is done for outstation produce (Table 4.9).

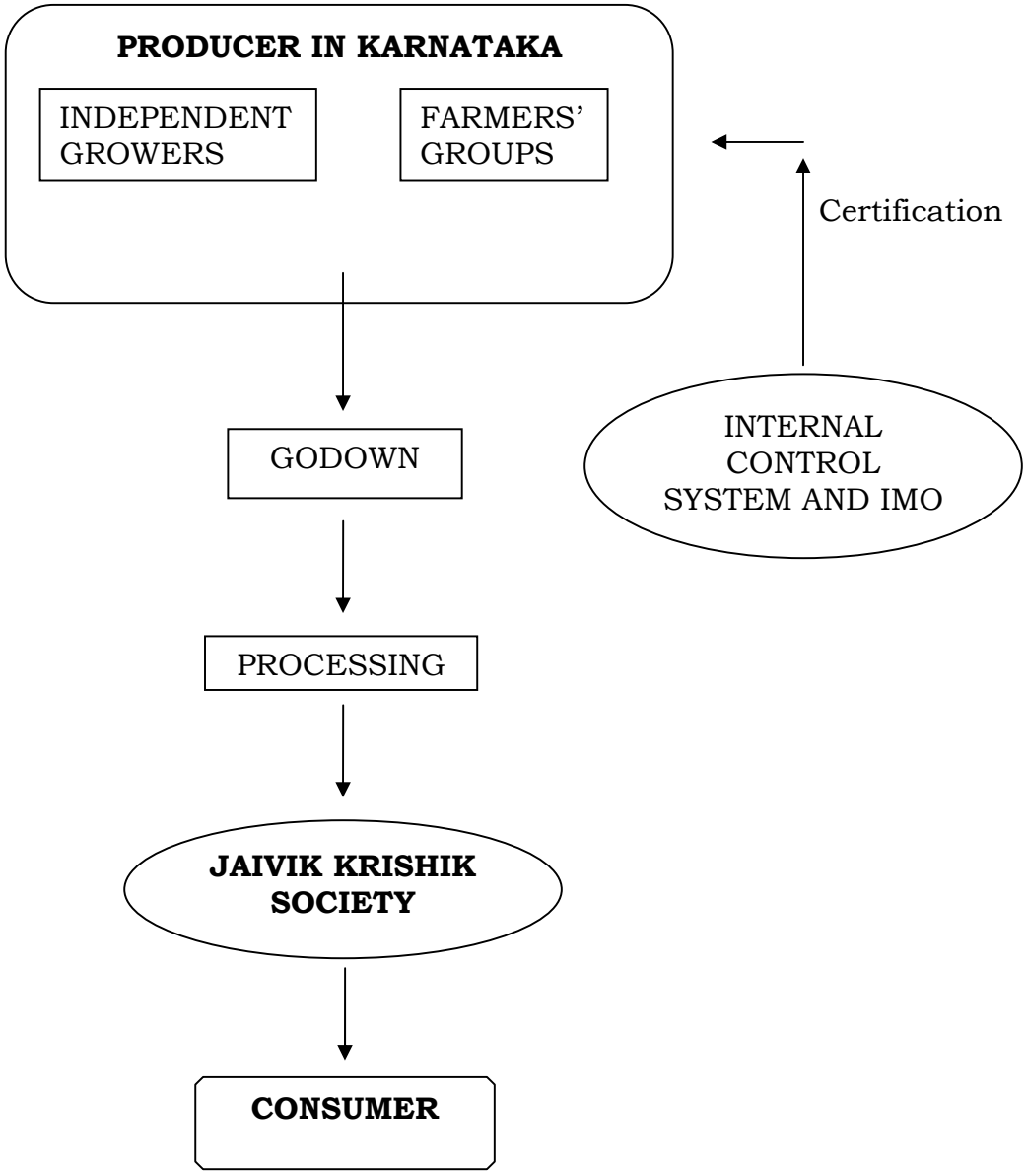

Fig 3. SUPPLY CHAIN MODEL OF JAIVIK KRISHIK SOCIETY

Services offered – It conducts workshops and promotes organic movement. The members of the organization along with the consumers go round the fields. Preparation of organic recipes is demonstrated to the farmers as well as consumers which is a kind of value addition (Table 4.10).

Certification – There is no certification done by the organization but the prevailing internal control system ensures that the product is organically produced (Table 4.10). The outlet has no godown, processing and grading facilities.

Marketing – It is a direct marketing arrangement where there is a one-to-one contact with the farmer. The product directly goes from producer to the consumer which facilitates development of producer-consumer relationship. This shows the traceability of the product. It is open on all days except for Thursday. Nesara gets fresh greens on Fridays. It has a monthly sale of Rs. 50000 with the administration charges being Rs. 6000 per month (Table 4.11).

All its products are labeled a code that signifies the farmer who has grown it or the farm where the produce has come from. There are a range of 20 products. These include fruits and vegetables, rice, ragi, ghee, juice, jam, pickles, *kashaya pudi*, natural colours, flavours, sambhar powder, dried fruits and medicines. Organic milk and buttermilk are also sold. Packing is done by the individual farmers.

The organic supply chain network of Nesara is given in Fig 4.

4.4.4 Janodaya, Jayamahal Extension, Bangalore

Janodaya is an organization that facilitates and promotes socio-legal-economic empowerment of the poor in Karnataka, through community participatory intervention processes. It is funded by Indian

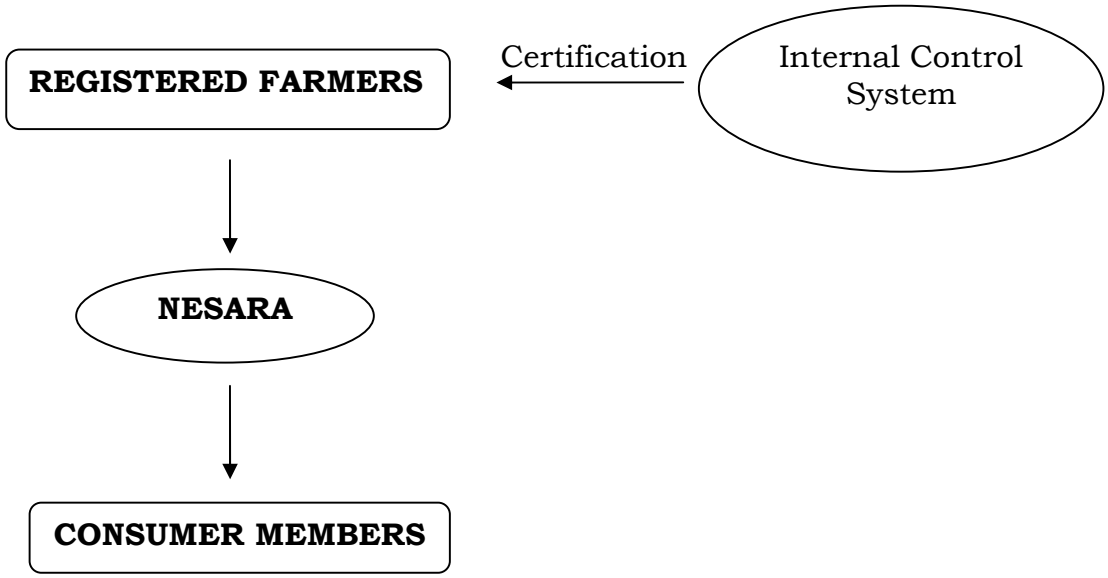

Fig 4. Supply Chain Model of NESARA

Institute of Rural Development (IIRD), Aurangabad. IIRD is an organization that pioneered organic food production for livelihood of the poor, through natural farming by small farmers. It is Maharashtra based and has a vast international and national network promotion partners. It perceives organic agriculture and management as "Farmers Right" and local standards as the process for certification and marketing. It has 4 partners - Janodaya in Karnataka; PAF in Tamilnadu; SEVA in Kolkata and Thanal in Kerala.

Initiatives:

1. Four outlets for organic sales
2. Consumer awareness and networking activities
3. Mobile vehicle for organic sales

Janodaya was set up in August 2003 to establish an alternate market for organic produce in India (Table 4.8).

Procurement – Its suppliers are farmers' groups in Byrapura, Arkere, Devanahalli villages of Bangalore rural district, Mulbagal in Kolar district and from Shimoga district. The transportation cost is borne by Janodaya (Table 4.9).

Pricing – Suppliers are paid a premium of 5% over HOPCOMS price. Weekly payments through cash are made to the suppliers (Table 4.9).

Services offered – It has no written contracts with any of the suppliers and does not deal in organic inputs. It conducts demonstrations on preparation of *Panchagavya*, biopesticides, vermicompost pits preparations, and neem extract preparations. The staff conducts field visits thrice a month. It conducts trainings and workshops to provide

information to the farmers regarding government policies on organic farming (Table 4.10).

Certification – Janodaya links the farmers to AOCA (APOF Organic Certification Agency) which is a certifying agency of APOF (Association for Promotion of Organic Farming). The costs are borne by the farmers (Table 4.10).

There are no grading, processing and storage facilities.

Marketing – It is a direct marketing concept where farmer directly sells his produce to consumers for which Janodaya provides a platform. There are four outlets of Janodaya. Each outlet sells organic produce on a fixed day once a week for a few hours. The outlet at Rajajinagar sells organic products on Wednesdays from 10.30 a.m to 2.00 p.m. Another at Koramangala sells on Thursdays from 10.00 a.m to 5.00 p.m. Two more at Hebbal and Jayamahal sell on Tuesdays and Mondays. The sales of the firm are largely local market focused. The monthly sales amount to Rs. 9000 with no administration expenses as it is funded by IIRD (Table 4.11).

The range of products includes fruits and vegetables, cereals and pulses, amla pickle and honey amounting to ten groups. It has a label called “Eat Healthy-Live Healthy” and these products are not certified.

The organic supply chain network of Janodaya is given in Fig 5.

4.4.5 Efficient Supply Chain

The price spread or market margins for the selected commodities in all the firms are shown in the Table 4.12.

In the case of rice, the highest market margin was that of Sreshta at Rs. 15 followed by Jaivik Krishik Society, Janodaya and Nesara at

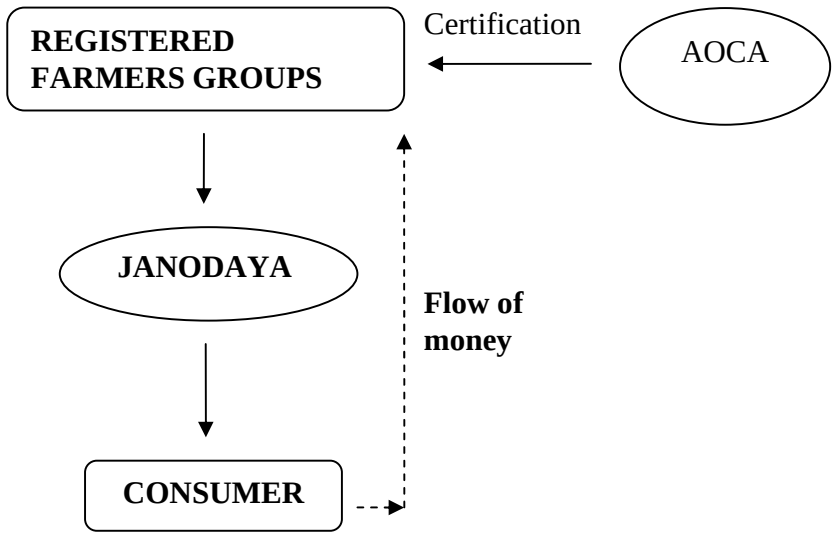

Fig 5. Supply Chain Model of Janodaya

Table 4.12 : Market margins and Farmer's share in consumer's rupee for selected commodities of all the firms

Commodities	Sreshta				JKS				Nesara				Janodaya			
	Farm gate price (Rs/kg)	Retail price (Rs/kg)	Market Margin	% of consumer rupee	Farm gate price (Rs/kg)	Retail price (Rs/kg)	Market Margin	% of consumer rupee	Farm gate price (Rs/kg)	Retail price (Rs/kg)	Market Margin	% of consumer rupee	Farm gate price (Rs/kg)	Retail price (Rs/kg)	Market Margin	% of consumer rupee
Rice	21	36	15	58	15	26	11	58	21	25	4	84	17	24	7	71
Banana	16	35	19	45.7	12	20	8	60	16	19	3	84	17	21	4	81
Tomato	8	15	7	53	8	12	4	67	8	10	2	80	8	10	2	80
Redgram	33	58	25	57	40	50	10	80	-	-			35	40	5	87.5

Rs.11, Rs. 7 and Rs. 4 respectively. The share of farmer in consumer's rupee for rice was found to be the highest for Nesara at 84 per cent followed by Janodaya at 71 per cent, while in Jaivik Krishik Society and Sreshta it was at 58 per cent. Nesara with highest farmer's share in consumer's rupee and least market margin was found to be the best supply chain for rice among others.

The highest market margin in banana marketing was that of Sreshta at Rs. 19 followed by Jaivik Krishik Society, Janodaya and Nesara at Rs. 8, Rs. 4 and Rs. 3 per kg respectively. Producer's share in consumer's rupee was highest in Nesara at 84 per cent followed by Janodaya, Jaivik Krishik Society and Sreshta at 81 per cent, 60 per cent and 47.5 per cent respectively. Of all, Nesara had the least market margin and highest farmer's share in consumer's rupee and thus is an efficient supply chain.

In tomato, the highest market margin was that of Sreshta at Rs. 7 followed by Jaivik Krishik Society at Rs. 4. On the other hand Janodaya and Nesara had Rs. 2 margin per kilo. Farmer's share in consumer's rupee for tomato was highest in Nesara and Janodaya at 80 per cent followed by Jaivik Krishik Society at 67 per cent and Sreshta at 53 per cent. Of the four, Nesara and Janodaya had the least market margin and highest farmer's share in consumer's rupee. Thus they are efficient supply chains for tomato.

Red gram was not sold by Nesara. The highest market margin for redgram was that of Sreshta at Rs. 25 followed by Jaivik Krishik Society at Rs. 10 and Janodaya at Rs. 5. Farmer's share in consumer's rupee for tomato was highest in Janodaya at 87.5 per cent followed by Jaivik Krishik Society at 80 per cent and Sreshta at 57 per cent. Janodaya is the best supply chain for redgram as it has the least market margin and highest share of farmer in consumer's rupee.

Thus, Nesara was adjudged as the efficient supply chain for rice, banana and tomato. Janodaya was the efficient supply chain for redgram and tomato.

Marketing costs are included in the market margins of the respective commodities for all the firms.

Supply chain management is basically measured in terms of the satisfaction of the client and an effective and transparent flow of information and products across the supply chain. It essentially involves collaboration of various actors in the chain. In this context Nesara can be adjudged as the efficient supply chain. It has gained the confidence of the consumers in terms of quality of the produce and also established a direct contact of the consumers with the growers. They are satisfied with the price at which the organic products are offered. There is a transparency in the information flow as the farmer would get a direct feedback about his produce from the ultimate consumer himself. This facilitates improvement in the quality of the produce. On the farmers side, the firm conducts workshops, field and farm visits to enhance his knowledge in organic cultivation of crops. Farmers' fields are visited by the consumer members to have a feel of organic production and the plight of the organic farmer. This establishes a one to one contact with the farmer. In addition to this, Nesara offers organic products with least market margin and as both the grower and consumer are satisfied with the firm, Nesara is adjudged as the efficient organic supply chain in the present study.

4.5 Consumer preference

4.5.1 Socio-economic characteristics of consumers

In order to get a broad view about the sample respondents it would be useful to examine the distribution of the sample according to age,

income and education. The socioeconomic characteristics of the respondents in the study are furnished in the Table 4.13. It could be seen that average family size of the sample was 3.66 members.

The distribution of sample according to the age group was analyzed according to which 46 percent of the respondents belonged to the age group of 35-54 years followed by 36 percent into the age group of <34 years. 18 percent were under the age group of 55 years and above.

The distribution of sample according to the income group was known according to which 52 per cent of the respondents belonged to the income group of over Rs. 20000 followed by 32 per cent in the group of Rs. 10001-20000. 16 per cent were under the income group of upto Rs. 10000.

The literacy levels of sample respondents were examined which showed that 72 percent of people among sample respondents had education upto graduation. 24 percent of the people had done their post graduation and 4 percent of respondents were doctorates.

4.5.2 Factors influencing consumer preference for organic products

In order to study the factors influencing organic products consumption a total of 50 respondents were randomly selected from all the four outlets. The socioeconomic features of the respondents are presented in Table 4.13. It could be observed that most of the respondents were in the 35-54 years age group earning an income over Rs. 20,000 per month. All the organic consumers had high level of educational qualification. The factors influencing the purchase of organic products were examined using factor analysis as it can accommodate a large number of variables and reduce the information to a convenient size.

Table 4.13 : Socio economic characteristics of organic consumers

Particulars	**No. of respondents**	**Percentage**
Age(years)		
< 34	18	36
35 – 54	23	46
55 +	9	18
Monthly family income(Rs.)		
≤10000	8	16
10001-20000	16	32
20000+	26	52
Education		
Upto graduation	36	72
Post graduation	12	24
Doctorates	2	4
Average family size is 3.66 members		

The factors identified from the variables considered for factor analysis were health benefits, prestige issue, eco-friendly nature, production without using fertilizers and price. The factor analysis scores are indicated in Table 4.14. Only those variables that were found to have highly significant effect upon the dependent variable were included in the table.

In the present study, out of the above considered factors, only the first 3 factors are known to have considerable influence on the purchase behaviour of consumers.

The factors, which had eigen values more than 1 were of most importance as each variable will have a contribution (eigen value) equal to one. The important variables were quality, health benefits, prestige symbol and eco-friendly nature of organic products which put together explained 51.85 percent of the total variation in purchase behaviour.

The table indicates that, the first factor explained 35.38 per cent variance, followed by second factor explaining 8.73 percent and the third factor explaining 7.73 per cent of variance.

The rotated factor matrix loadings for identified factors are given in Table 4.15. This helps in identification of the variables that have large loadings on the same factor. That factor was interpreted in terms of variables that load high on it. It can be seen from the table that the three factors contained eight, five and three variables respectively. Factor 1 captured the quality of organic food free from pesticide residues and its associated health benefits. Factor 2 was highly related to organic consumption as a prestige issue. Factor 3 represented the consumers' perception of eco-friendly nature of organic products. The loadings of variables on their respective factor ranged from 0.114 to 0.969.

Table 4.14 : Total variance explained by Factor analysis

Sl.No	Factors	Eigen values	% of variance	Cumulative variance
1	Health benefits and pesticide free food	7.078	35.38	35.38
2	Prestige symbol	1.747	8.73	44.12
3	Eco-friendly nature of organic products	1.547	7.73	51.85
4	Production without fertilizers	0.902	4.51	56.36
5	Price	0.770	3.84	60.21

Table 4.15 : Rotated Factor Matrix

Variables	Factor Loading		
	Factor 1	Factor 2	Factor 3
Organic food is more tastier	0.839	0.022	0.147
It is free of pesticide residues	0.780	-0.095	0.200
It is safe food for children and sick	0.688	-0.335	0.264
It is more nutritious	0.705	-0.186	-0.248
Organic fruits and vegetables are larger than the conventional ones	-0.672	0.150	-0.247
It is less attractive than the conventional produce	0.079	0.114	-0.047
It is eco-friendly	0.007	-0.158	0.713
It stays more fresh compared to the conventional produce	0.969	0.094	-0.214
It can be stored or more number of days	0.874	0.195	0.037
There are health benefits on consumption of organic food	0.382	-0.167	-0.130
Organic consumers fall sick less often	0.551	-0.385	0.245
Organic fruits are more sweeter	0.144	0.137	0.202
It is produced without using chemical fertilizers and pesticides	-0.020	0.459	0.078
Its high price confers its better quality	0.224	0.036	-0.009
It is certified	-0.557	0.346	-0.005
Certification is a quality assurance for organic products	-0.291	-0.066	-0.123
There is no much difference in genuinity between labeled and non labelled	-0.221	-0.222	0.121
There are no blemishes on organic produce	-0.005	0.020	0.251
It is meant only for high-end consumers	-0.297	0.766	0.116
Organic consumption is a status symbol	0.100	0.607	-0.061

Note: The underlined values represent the loadings of variables on their respective factor.

4.5.3 Attributes influencing consumer preference for organic products

The percent weightage given by the consumers to the different attributes of organic products was examined using tabular analysis. From Table 4.16 it can be seen that highest weightage of 19 per cent was given to the pesticide free nature of organic products followed by taste and health benefits associated with them at 17 per cent. Consumers gave equal weightage of 14 per cent to shelf life and authenticity attributes. Least weightage was given to appearance and price of organic products. The per cent weightage given to different attributes are depicted in Fig 6.

4.5.4 Problems faced by the consumers

The problems faced by the sample respondents in buying organic products are summarized in Table 4.17. Fortynine per cent of the consumers opined that insufficient quantity of the product was the major problem faced by them. This was followed by low product range expressed by 39 per cent of the respondents. Other problems faced by them were lack of awareness about organic food and no proximity to the outlets. Five per cent of the respondents had no problems in the purchase of organic products. These are depicted in Fig 7.

4.6 Constraints in production and marketing of organic products

4.6.1 Constraints in production of organic products

The constraints listed in Table 4.18 are the problems faced by the farmer respondents during the production of organic products. These constraints were analysed by using tabular analysis. High labour requirement was the major problem faced by 42.88 per cent of the respondents. Reduced yield as a problem by 28.68 per cent of the respondents while 21.42 per cent of them did not face any problem with

Table 4.16 Weightage of attributes

Attributes	Per cent weightage
Pesticide residue	19
Taste	17
Health benefits	17
Authenticity	14
Shelf life	14
Price	10
Appearance	9

Table 4.17 Problems faced by consumers

Problems	Per cent to Total
Insufficient Quantity	49
Low Product Range	39
Lack of Awareness	5
No problems	5
Lack of Proximity	2

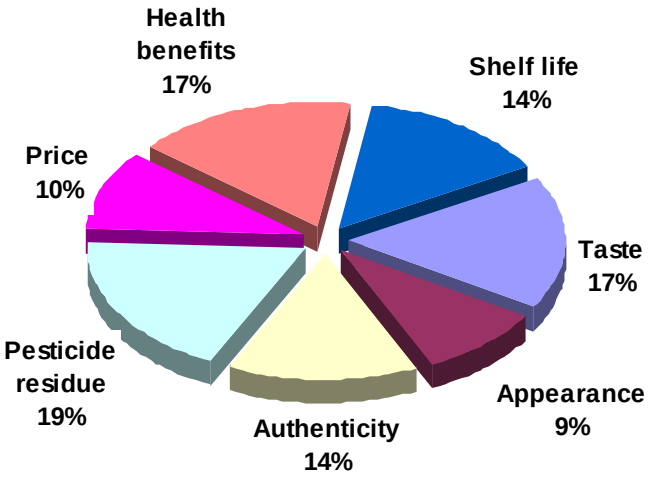

Fig. 6. Attribute weightage of organic products

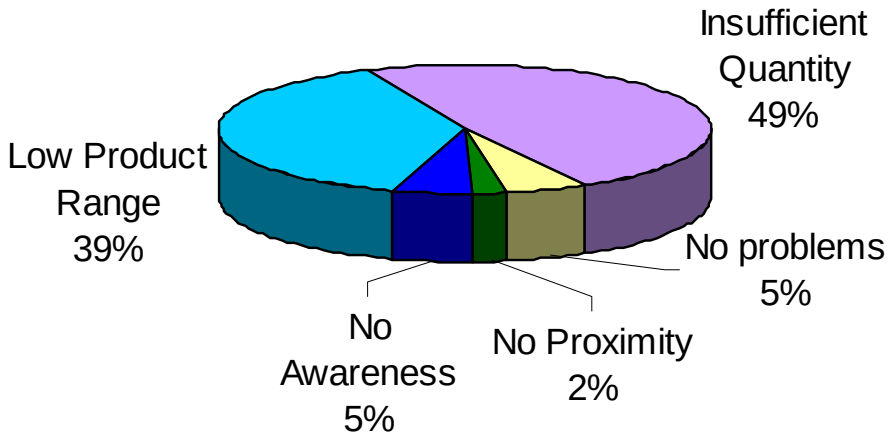

Fig. 7. Problems faced by the consumers

organic production. The remaining faced the problem of inadequate availability of organic manure.

4.6.2 Constraints in marketing of organic products

Lack of assured market was the top most constraint encountered in the marketing of organic products as reported by 37.47 per cent of the total respondents surveyed. Low price for organic produce was the next major constraint, expressed by 31.24 per cent of the respondents. There were no problems in the marketing of organic produce for around 19 per cent of the respondents. Lack of publicity to create consumer awareness was the other constraint expressed by the remaining respondents (Table 4.19).

4.7. Major Problems in Organic Supply Chain

1. Lack of consistent supply, stocks and availability is one of the major problems facing organic supply chains.
2. The market share of organic is only a few percent of the total food market, thus it represents an unattractive niche in the conventional food chain.
3. To get the small segment of organic products to meet the needs of the small segment of customers challenges the performance of the organic chain.
4. There is no balance between demand and supply.
5. Lack of proper coordination among the actors of the supply chain.
6. The quality of organic produce decreases the flexibility of the organic supply chain due to the required conversion period, of yield fluctuations, relatively high price of organic raw material, as well as restrictions and requirements set by the regulation concerning organic.
7. Lack of organic promotions to generate consumer awareness for organic products.

Table 4.18 : Constraints in production of organic products

Constraints in production	Per cent to Total
Labour problem	42.88
Reduced yields	28.56
No problem	21.42
Inadequate availability of organic manure	7.14

Table 4.19 : Constraints in marketing of organic products

Constraints	Per cent to Total
Lack of assured market	37.47
Low price	31.24
No problems	18.71
Low consumer awareness	12.47

Discussion

CHAPTER V
DISCUSSION

The results presented in chapter IV are discussed in this chapter under the following headings

5.1 Socio-economic profile of organic farmers

5.2 Cultivation practices

5.3 Profitability of organic cultivation

5.4 Supply chain management of organic products

5.5 Consumer preference

5.6 Constraints in production and marketing of organic products

5.1 Socio-economic profile of organic farmers

The details of socio-economic characteristics of the sample respondent farmers are presented in Table 4.1. The average age of the respondents is 44 years meaning that they have sufficient farming experience to grasp the benefits of organic farming. The average annual income per farm from an area of 12 acres of land is Rs. 98,665 which includes income from subsidiary occupations like tailoring, basket making, paper selling, business and holding jobs in offices. The respondents are long standing in organic production with over five years of experience in organic farming. The average years of schooling is 12 years including a few graduates and post graduates as well. The average land area under organic management is 6.54 acres which is approximately half of the total land holdings. The additional labour and manure requirements for organic cultivation and lack of exclusive markets for organic produce have become an impediment to converting entire land holdings to organic management.

5.2 Cultivation practices

The profitability of organic cultivation is assessed by considering one widely cultivated crop under each category, namely cereals, pulses, vegetables, & fruits. Accordingly the cultivation practices of paddy, red gram, tomato, and banana, are given in Table 4.2. In general the cultivation practices across farms are more or less the same except for difference in the use of herbs which is subject to local availability. In case a particular herb is not available, the respondents mostly found alternatives for substitution.

5.2.1 Seed treatment

All the respondent farmers are found to use panchagavya for the seed treatment of paddy, banana and tomato and beejamrutha for redgram. Cow dung is major ingredient in both the treatments, as a source of nutrients in organic farming while cow urine acts as insecticide to control seed borne diseases. Salt water is also used for seed treatment as salt has antiseptic and antifungal properties.

5.2.2 Nutrient management

FYM and vermicompost are used by all the respondent farmers as a predominant source of organic manure. Green manure like Dhaincha, *Crotalaria* sp., Sunhemp, Horsegram, *Proraria sp.* and Navdhanya are extensively used. These organic manures provide plant nutrition through biologically-derived nutrients via the activity of soil microbes and soil animals. This improves soil biological activity and plays a key role in suppressing weeds, pests and diseases. The use of organic manure increases soil organic matter content which inturn increases water holding capacity and reduces erosion.

5.2.3 Pest and disease management

All the pest and disease control measures invariably contain cow urine, cow dung and locally available shrubs that are believed to have pesticidal effect. Neem is used as biopesticide which has repellant, antifeedant, insect growth regulatory and pesticidal properties. This is in conformation with the findings of Meena *et al.* (2007) and Ramesh *et a.l* (2007).

5.2.5 Weed management

Crop rotation and manual weeding are practiced to reduce weed problem in all the crops. Crop rotation is followed to suppress weeds and enhance soil quality by building beneficial root colonizing bacteria. Manual weeding is done as synthetic or chemical herbicides are prohibited in organic farming.

5.3 Profitability of organic cultivation

5.3.1 Paddy

The costs and returns in cultivation of organic rainfed paddy are presented in Table 4.3. The growers have spent Rs. 6916.02 per acre, of which the cost of organic manure forms 52 per cent. This is due to the fact that farmers used FYM, vermicompost and green manure as the sole source of plant nutrition. These costs are imputed as the organic manure is mostly sourced from their own farms. Labour cost formed 27 per cent of the total cost as 60 per cent of the labour used is female which is less expensive than male labour. Labour is required for three major activities viz., at the beginning of the season for transplanting and spreading of organic manures, for weeding, and for harvesting. The average net return per rupee of investment is 0.17 meaning that rainfed paddy cultivation is profitable.

In the case of irrigated organic paddy, the cost of production worked out to Rs. 8768.99 of which 37 per cent is spent on human and bullock labour. The sample farmers spent Rs 750 per acre on human labour and Rs. 2,456 on bullock labour. The net return per acre of irrigated organic paddy cultivation is Rs. 11647.81 and the average net return per rupee of investment is substantially higher at Rs. 1.33. This is mainly because of lower expenditure on pest control due to prevalence of beneficial insects. Further, the use of low cost inputs like organic manures and high price for organic paddy (Rs. 15.43/ kg) has countervailed the lower yields (Table 4.4). Singh *et al.* (2006) observed that a yield difference of 5.88 q/ha between organic and inorganic paddy was compensated by the higher price received for organic paddy (Rs. 1380/q) when compared to non-organic paddy (Rs. 1161/q).

5.3.2 Banana

Yelakki varity of organic banana is extensively grown in Bangalore and Mysore districts which is marketed through local organic outlets so also through conventional outlets. The expenditure on organic manure and labour accounted for about 24 per cent each. Banana cultivation is labour intensive as manual labour is used for opening of ridges and furrows and for other related operations. The crop performance is directly related to the extent of use of manure and hence accounts for a major share in production expenditure. Green manure crop is allowed to grow on the field along with banana plants which supplements the nutrient requirements apart from controlling weeds. The net return per acre from organic banana cultivation is Rs. 86868.79 and the average net return per rupee of investment is Rs. 2.24 which reflects profitability of the crop. These bananas are sold at premium prices with an average price of Rs. 15.32 per kg (Table 4.5).

5.3.3 Tomato

Tomato being a short duration crop is grown extensively in Bangalore and Belgaum districts. In the total cost of cultivation of organic tomato, the expenditure on labour formed 29.05 per cent of the costs followed by the cost of organic manure (21.56 per cent). The cost of production worked out to Rs. 19451.44 per acre which yielded a gross return of Rs. 52360. The net return per acre is Rs 32908.56. Organic tomatoes have high demand in the outlets and farmers are offered an average price of Rs.7.93 per kg. However, the revenue realization may seem substantially lower compared to returns from conventional tomato. It may be noted here that organic producers have other priorities and are concerned about economic and ecological sustainability rather than making maximum profits. Most of the produce is marketed in organic outlets in Bangalore, while a small percentage is sold in the local market (Table 4.6).

5.3.4 Redgram

Redgram is traditionally grown in Gulbarga region and marketed at the farm gate itself at premium price. Infact demand outweighs supply of organic redgram. The expenditure on organic manure is 47.55 per cent of the cost of production while cost on human and bullock labour formed 19.28 per cent. The cost of cultivation of organic red gram per acre is found to be Rs. 10483 with a gross return of Rs. 28906.25. The net return per acre from organic red gram cultivation is Rs. 18423.25. The average price received by the farmer for organic red gram is Rs. 37.50 per resulting in a net return of Rs. 1.76 per rupee investment (Table 4.7).

5.4 Supply chain management of organic products

The supply chain management of organic products is studied by examining the supply chain mechanism employed by the four firms viz.

Sreshta (24 lettered mantra), Jaivik Krishik Society, Janodaya and Nesara which are exclusive outlets for organic products. The supply chain is studied right from the procurement of organic products till the end product reached the consumer.

The supply chains are evaluated for their efficiency by considering parameters like price spread for the selected commodities, customer satisfaction of the firm and the services offered by the firms. The price spread or market margins are shown in the Table 4.12.

Nesara is the organic outlet located in Mysore which provides the highest farmer's share in consumer's rupee and least market margin for rice and banana. The farmer's share for rice and banana is 84 per cent and market margin for rice is Rs. 4 per kg while for banana it is Rs. 3 per kg. It gives its farmers the highest share in consumer's rupee among all the firms as it does not incur huge marketing costs owing to its procurement from the nearby villages in and around Mysore. The distinguishing feature of this outlet is that the farmers quote price for their produce over which the firm adds a margin of 15 per cent. The administration expenses are also less as the organization is a voluntary one where all the members serve voluntarily except for one person who is paid for being in the outlet all through the week. The telephone charges are exempted while the land rent is paid. It is a kind of direct marketing where the farmers sell their produce directly to the ultimate consumer. This facilitates feedback to organic farmers regarding the requirements from consumers. The consumers get to know the source of the organic product and the conditions under which the product is grown i.e there is traceability and authenticity. The supply of this firm is demand driven which is not the case usually in organic supply chains. The farmer is satisfied with the sale price for the produce and in the same way the

consumer is as well satisfied with the value for the money spent on organic produce. Thus it is adjudged as an efficient supply chain.

Similarly Janodaya which is another outlet located at Bangalore also has a low margin of Rs.2 per kg of tomato which is on par with that of Nesara. It is also the best supply chain for red gram which is not dealt by Nesara. The farmer's share for red gram is 87.5 per cent with a market margin of Rs. 5. It has a direct marketing arrangement for organic products. It is comparatively a longer supply chain than Nesara as it procures from many places in Karnataka. Its main focus is on creation of an alternate market for organic produce. The marketing costs are added to the final price without any margin for the firm. The administration expenses are borne by Indian Institute for Rural development (IIRD) which funds Janodaya. Thus, the seller farmers receive a major share in consumer's rupee.

On the contrary, Sreshta and Jaivik Krishik Society offer organic products to its consumers at much higher prices, when compared to Nesara and Janodaya. The marketing costs of Sreshta are high as it procures its products from all over India. Its margins are also high as it is a profit oriented firm with its branches in six states. It also has its own branding, packaging and processing facilities which add to the final price. Sreshta and Jaivik Krishik Society have longer supply chains and have large scale operations. Jaivik Krishik Society has its suppliers spread across all over Karnataka and thus incurs huge marketing costs. The administration expenses are also high as these shops are well equipped and have a number of hired labourers to manage the outlet. It has its own processing and packaging facility. However the shop has a variety of traditional as well as exotic vegetables and food preparations.

A comparison of all the four firms reveals that those firms having shorter supply chains are Janodaya and Nesara. Though these are being

run on smaller scale, the producer-farmer is satisfied with the market he gets for his produce. In both the cases the producers receive great respect for their produce as direct marketing is prevalent in these outlets. Thus, Nesara is the efficient supply chain for rice, banana and tomato. Janodaya is the efficient supply chain for redgram as well as tomato.

5.5 Consumer preference

The consumer preference for organic produce is the driving force for organic movement. The preference for organic products is largely influenced by the psychographic and lifestyle attributes of consumers. Therefore, the factors influencing organic products consumption and the opinion of consumers are delineated for better comprehension.

5.5.1 Socio-economic characteristics of consumers

The socioeconomic characteristics of the sample organic consumers are given in the Table 4.13.

The distribution of sample according to the age group shows that 46 percent of the respondents belonged to the age group of 35-54 years followed by 36 percent in the age group of less than 34 years. 18 percent are in the age group of 55 years and above. This reflects the fact that consumers of all age groups are aware of organic products.

The distribution of sample according to the income group reveals that highest number of consumers belonged to the income group of over Rs. 20000 per month. This shows that the market for organic products is a niche market catering exclusively to the consumers in high income group. This is due to the fact that the prices for organic products are 25-30 per cent higher than the conventional products which is prohibitively expensive for consumers who have no special liking for organic products.

The literacy levels of sample respondents show that 72 percent of respondents have education upto graduation. Majority of the respondents are engineers, doctors and other professionals. It can be concluded from the results that only the educated people are aware of organic products and their health associated benefits.

5.5.2 Factors influencing consumer preference for organic products

The factors influencing the purchase of organic products are examined with the help of factor analysis. A total of twenty variables are considered encompassing different aspects of organic products. The results of factor analysis revealed three distinct factors viz., health benefits, prestige issue, and ecofriendly nature of organic products are found to influence in order, the purchase of organic products. Health benefits associated with the consumption of organic products is the driving factor influencing their decision to purchase as the produce is free of pesticide residue and are devoid of hazardous chemicals. It is a prestige issue for the consumers as organic products can be afforded only by the high-end consumers who have an above average income. The eco-friendly nature of these products is another factor that influences the consumers' preference for organic products. This is because of the cultural practices involved in organic production that aim at conserving the natural resources like water, soil and air.

5.5.3 Attributes influencing consumer preference for organic products

The per cent weightage given by the consumers to different attributes of organic products is depicted in Fig 5. It can be seen that highest weightage of 19 per cent is given to the pesticide free nature of organic products followed by taste and health benefits associated with them at 17 per cent. The reason could be that consumers are knowledgeable about the ill effects of conventional production system.

Organic fruits and vegetables have a distinct taste which is also a major reason among the consumers for their preference. Organic food is considered safe for children and sick people and so preferred by the consumers for their health benefits. Consumers gave equal weightage of 14 per cent to shelf life and authenticity attributes. It may be because organic products can be stored for more number of days and also they remain fresh for longer time. Consumers prefer organic food with certification labels or if they are convinced that the product is genuinely produced under organic conditions.

5.5.4 Problems faced by the consumers

The problems faced by the sample respondents in buying organic products are summarized in Table 4.17. The major problem faced by the consumers is insufficient quantity of the product as expressed by 49 per cent of the respondents. It is mainly due to the insufficient supply of certain organic products which have higher consumer demand. This is partly due to lack of co-ordination among the actors in the supply chain. The supply is not demand driven and this leads to insufficient quantity of organic products. The other problem is low product range faced by 39 per cent of the respondents. The reason could be the lack of availability of suitable varieties for organic production. Lack of information flow to the growers about the demand for the products may be another factor for the low product range. Also certain kinds of crops can be easily managed under organic conditions, while certain other types require additional care in managing pests and disease. Therefore such crops are not extensively cultivated. Some of the other problems faced by the respondents are being unaware of organic food and long distance to the outlets. Not all the people are aware of organic products because of lack of organic promotions to create consumer awareness. The location of the outlets which sell organic products is very remote and inconvenient.

They are not located in happening market places and the consumers are not aware of the other outlets where organic food is being sold.

5.6.1 Constraints in production of organic products

The constraints in production of organic products are summarized in the Table 4.18. High labour requirement is the major problem faced by 42.88 per cent of the respondents. Organic production is highly labour intensive. It requires huge amount of labour for spreading organic manure, preparation of bioformulations, manual weeding and harvesting. Labour is found to be scarce due to urban migration. Reduced yield as a constraint is opined by 28.68 per cent of the respondents. This is mainly due to the local varieties which are hardy but low yielding. It takes a minimum of three years to restore the soil fertility in order to get comparable yields. Around 21 per cent of the respondents could not find any problem with organic production as they are practicing organic farming for more than eight years during which the soil productivity has increased and yields are stable. The remaining producers faced the problem of inadequate availability of organic manure (7.14 per cent). This is in conformation with the findings of Saxena and Singh (2000) who reported that some of the respondents who were not self sufficient in producing organic manure, using on farm resources found it difficult to buy adequate quantity from other sources.

5.6.2 Constraints in marketing of organic products

Lack of exclusive market for organic products is the top most constraint encountered in the marketing of organic products by 37.47 per cent of the total respondents surveyed. Low price for organic produce is the next major constraint, expressed by 31.24 per cent of the respondents. This is in accordance with the findings of Jha (1999) who reported that the major bottleneck in converting to organic agriculture for producers were the lack of assured markets and market premiums for

organic produce. About 19 per cent of the respondents did not face any problems in marketing of organic produce. This is mainly due to the marketing network that they have established with the buyers in different locations of the country. Lack of publicity to create consumer awareness as a constraint is expressed by the remaining respondents (Table 4.19).

Thus, the foregoing discussion clearly showcases the merits of organic production by way of conserving precious non renewable resources, ecosystem health and consumer satisfaction and opinion of the respondents. Further, it also drives home the fact that establishing a direct link between producers and consumers will promote organic production and consumption.

Summary

CHAPTER VI

SUMMARY

The major findings of the study based on empirical analysis of data from organic farmers, consumers and exclusive supply outlets of organic products are presented in this chapter. The policy recommendations are made for promoting organic cultivation in the state.

The growing awareness about the ill effects of synthetic chemicals in the food chain paved the way for 'Organic Agriculture' as an alternative production management system that promotes and enhances health of agro-ecosystem, including bio diversity, biological cycles, and soil biological activity. Organic agriculture is developing rapidly and is now practiced in more than 120 countries of the world. Currently, the countries with the greatest organic areas are Australia (11.8 million hectares), Argentina (3.1 million hectares), China (2.3 million hectares) and the US (1.6 million hectares). Global sales of organic food and drink have increased by 43 per cent from 23 billion US-Dollars (17.8 billion Euros) in 2002 with sales reaching 33 billion US-Dollars (25.5 billion Euros) in 2005. Organic Monitor expects sales to have approached 40 billion US-Dollars (30.9 billion Euros) in 2006 (Yussefi and Willer, 2007).

Organic farming system in India is not new and is being followed from ancient time. The rainfed regions accounting for about 70 per cent of the total arable land, is still managed with low external input usage which offers a very big potential for "Certified Organic Agriculture". The rich biodiversity in various agro-climatic regions gives India a competitive edge for a large basket of products in the world market. India exported 31 organic products valued at Rs. 71.23 crores.

In India, only the large scale organic agriculture is export oriented. Domestic marketing is still in its infancy except for those producers cum

consumers spread across the country. There are farmers groups and NGOs who have organized marketing for the rural/tribal farmers with whom they work. Very few alternative marketing channels have been tried. The Indian Institute for Rural Development organizes weekly markets and direct producer consumer marketing. Retailing efforts are thwarted by insufficient product range, irregular quality supply of organic products and inconveniently located outlets. The growth in domestic market is very critical for creating the necessary impetus, whereas export supply chain can focus on only those products having competitive advantage.

Supply chain management involves an organizational or institutional perspective involving collaboration, business environment, power and trust; a performance perspective involving performance measurements and consumer behaviour; and a process perspective involving process management issues such as costing, supply chain organization, targets, throughput time and decision making. A supply chain refers to different actors being linked from farm to fork to achieve more effective and market oriented flow of products.

Food chain, where the actors are interlinked to produce value to customers in the form of a food product, is part of a complicated food system. Networks of various actors comprise the food chain, through which the cascade of added value flows downstream, and is delivered to the consumer, while each actor gets a share of the total value created by the supply chain. Organic food chains are often considered alternative food chains, characteristic to which is close connection between the consumers and the producers of the food. Close connection is enabled by the short chain with few or no intermediaries, and therefore often considered also the most suitable for marketing organic products. To get the small segment of organic products to meet the needs of the small

segment of consumers in distant locations is the challenging task performed by the organic supply chain. According to supply chain management theory, the interaction as well as flow of information among the actors, starting from the consumers and continuing all the way to the suppliers, holds the key to performance.

The newly emergent organic produce supply chains across the globe have been found to be excluding small producers due to reasons of high certification costs, smaller volume of produce, and tighter control by the chain leaders in the absence of any local market outlets for the organic producers.

The domestic market for organic products in India is at a concept selling stage with very small customer base, which is limiting the entry of entrepreneurs. Organized retail, which can be the major driver for the rapid growth, is yet to involve directly in the supply chain. The demand of organic products by restaurants and star-hotels in the metros, has remained partially exploited, as they have limited business mandate to develop and invest in direct supply chain.

In this context, the study was conducted to explore the supply chain management of organic products in Karnataka with the following specific objectives:

1. To study the cultivation practices and profitability of organic cultivation
2. To study the supply chain management of organic products
3. To assess the consumer preference for organic products
4. To study the constraints in production and marketing of organic products

The Primary data on socio-economic characteristics of households, production practices, profitability, cost of cultivation of selected crops, constraints in organic farming was obtained from ninety respondent organic farmers with the help of a pre-tested schedule. Five districts of the state were purposively selected based on the area under the four selected crops, namely paddy, red gram, tomato and banana. The sample respondents were selected from Gulbarga for red gram, Bangalore and Belgaum for tomato, Bangalore and Mysore for banana and finally Shimoga and Belgaum for paddy keeping in view of the availability of data.

The data on socio-economic characteristics of consumers, their preference for organic products, and other related information was obtained in a pre- tested schedule from 50 consumers in Bangalore and Mysore. Four organic firms, namely Sreshta (24 Lettered Mantra), Jaivik Krishik Society, and Janodaya situated in Bangalore and Nesara located in Mysore were considered for detailed survey with respect to their marketing practices, commodity coverage, contractual production arrangements, pricing and advertising methods to study the supply chain management of organic products followed by the firms.

Tabular analyses were used to find the profitability of organic cultivation, supply chain of organic products, consumer preference for organic products and also to document the constraints faced by the organic farmers in production and marketing of organic products. Factor analysis was used to assess the factors influencing consumer preference for organic products.

MAJOR FINDINGS OF THE STUDY

1. The average literacy level of the sample respondents was 12. 06 years of schooling with a large percentage among the literates with college education. Most of the respondent farmers were engaged in subsidiary occupations with organic agriculture being the means of livelihood.

2. All the selected sample farmers had long standing experience in organic farming. The average experience of respondents in organic farming was 5.40 years. Out of the average holding size of 12 acres, approximately half of their land holding was under organic management. Most of the farmers practicing organic farming were classified under large farm category.

3. All the respondent farmers used *Panchagavya* for the seed treatment of paddy, banana and tomato and *Beejamrutha* for redgram. FYM and vermicompost were used by all the respondent farmers as predominant source of organic manure. Green manure like Dhaincha, *Crotalaria sp.*, Sunhemp, horsegram, *Proraria sp.* and *Navdhanya* were also used as green manure. Pest and disease management included cow urine, cow dung, neem and locally available shrubs which are believed to have pesticidal effect. Crop rotation and manual weeding were followed to reduce the weed problem in all the crops.

4. Considering the cost and returns for organic rainfed paddy, the growers had to spend Rs. 7139.15 per acre of which the cost of organic manure formed 52 per cent and the average net return per rupee of investment was 0.17. In the case of irrigated paddy, the cost of production worked out to be Rs. 8768.99 and the average net return per rupee of investment was Rs. 1.33s.

5. The organic banana growers incurred a cost of Rs. 38801.30 per acre with a net return of Rs. 86868.79 per acre and the average net return per rupee of investment was Rs. 2.24 which is highly profitable. The cost of cultivation of organic tomato was found to be Rs. 19451.44 per acre with a net return per acre of Rs 32908.56 and Rs. 1.69 being the net return per rupee of investment. The cost of cultivation of organic redgram per acre was found to be Rs. 10483 with gross returns of Rs. 28906.25. The average price received by the farmer for organic red gram was Rs. 37.50 per kg.

6. Nesara in Mysore was found to be the efficient supply chain for rice, banana and tomato. Janodaya was the efficient supply chain for redgram as well as tomato. The farmer received a major share in consumer's rupee with least market margin in these two supply chains for the respective commodities.

7. Majority of the sample organic consumers (52 per cent) belonged to the income group of over Rs. 20000 per month and all the sample respondents were educated upto graduation.

8. Health benefits associated with the consumption of organic products was the major driving factor to influence the consumer preference for organic products. The other factors being status symbol and ecofriendly nature of organic products. Consumers attributed highest weightage of 19 per cent to the pesticide free nature of organic products followed by taste and health benefits associated with them at 17 per cent.

9. Insufficient quantity of the organic products was the main problem faced by 49 per cent of the sample consumers. This was followed by low product range with other problems being lack of awareness about organic food and no proximity to the organic outlets.

10. High labour requirement as a major constraint in the production of organic products was expressed by 42.88 per cent of the respondents. Reduced yield and inadequate availability of organic manure were some of the other constraints encountered in the production of organic products.

11. Lack of assured market was the top most constraint in the marketing of organic products as expressed by 37.47 per cent of the respondents. Low price for organic produce and lack of publicity to create consumer awareness for organic food were the other problems in marketing of organic products.

POLICY IMPLICATIONS

1. Government support during the transition years is an essential prerequisite for organic agriculture to gain organic momentum in the state. Hence, well-thought-out subsidy and other support schemes need to be designed so as to make conversion to organic agriculture easier and cheaper.

2. Government-supported research initiatives and extension services have to be developed with the collaboration of state agricultural universities to facilitate capacity building through research, training and extension in organic agriculture.

3. Organic extension services and training facilities for farmers (such as organic farmers' field schools) should be established.

4. The Government should arrange for local marketing arrangement of the organic produce by facilitating weekly farmer’ markets, buyers-sellers meet, organic fairs etc. in each hobli. This can be conducted in accordance with the NPOP being implemented in every hobli of the state.

5. Organic promotions need to be taken up by the Government to enhance consumer awareness about the health-safety and environmental implications of organic produce.

6. Support structures should be introduced for small farmers' group certification to overcome the exorbitant costs involved in certification by external agencies.

7. Cooperatives and Non-governmental organizations should be involved in the development of an organizational system to assist the less educated farmers regarding the certification and marketing of organic products.

8. Govt. initiative is necessary in the establishment of large-scale production units for products such as biofertilisers, biopesticides, bio-control agents etc.

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CHAPTER VII

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Appendices

APPENDIX I

Accredited certifying agencies in India

1. Association for promotion, of Organic Farming (APOF), Bangalore.
2. Bioinspectra, Cochin.
3. Indian Society for Certification of organic products (ISCOP), Coimbatore.
4. Indian Organic Certification Agency (INDOCERT), Cochin
5. LACON, Chunangardi.
6. SGS India Pvt Ltd, Gurgaon.
7. International Resources for Fair Trade (IRFD), Mumbai.
8. One Cert Asia, Jaipur, Rajasthan.
9. Skal lnspection and Certification Agency, Bangalore.
10. IMO Control Pvt. Ltd., Bangalore.
11. Ecocert International, Aurangabad, Maharashtra.
12. National Organic Certification Association (NOCA), Pune.

APPENDIX II

National Standards of Organic Farming

Ministry of Commerce Under the "National Programme for Organic Production" has prescribed National Standards for Organic Production. These standards are grouped under following six categories:

1. Conversion
2. Crop production
3. Animal husbandry
4. Food processing and handling
5. Labeling
6. Storage and transport

1. Conversion Requirements

The time between the start of organic management and cultivation of crops or animal husbandry is known as the conversion period. The whole farm including the livestock should be converted to the standards over a period of time. If the whole farm is not converted then the two must be separate and inspectible. Regular inspections during the conversion period should be carried out.

Simultaneous productions of conventional or in conversion and\or organic which can not be distinguished clearly are not allowed. Full conversion period is not required where organic farming practices are already in use.

1.1 Maintenance of organic management

Organic certification is based on continuance. The converted land and animals shall not get switched back and forth between organic and conventional management.

1.2 Landscape

Organic farming should contribute beneficially to the ecosystem. Areas should be managed properly and linked to facilitate biodiversity. The certification programme shall set standards for a minimum percentage of the farm area to facilitate biodiversity and nature conservation.

2. Crop Production

2.1 Choice of crops and varieties – All seeds and planting materials should be certified organic, well adapted to local climatic conditions and resistant to pests and diseases. If certified organic seed or planting material is not available then chemically untreated conventional material can be used. Uses of genetically engineered seeds, pollen, transgenic plants are not allowed.

2.2 Duration of conversion period – The minimum conversion period for plant products, produced annually is 12 months prior to the start of the production cycle. For perennial plants (excluding pastures and meadows) the conversion period is 18 months from the date of starting organic management.

2.3 Diversity in crop production – Diversity in crop production is achieved by a combination of (a) versatile crop rotation with legumes and (b) by appropriate coverage of the soil with diverse plant species during the year of production that, taken into account pressure from insects, weeds, diseases and other pests, while maintaining or increasing soil health and fertility.

2.4 Fertilization policy – Biodegradable material of plant or animal origin produced on organic farms should form the basis of the fertilization policy. Emphasis should be given to generate and use own

on-farm organic fertilizers. Brought in fertilizers of biological origin should be supplementary and not a replacement. Manures containing human excreta should not be used on vegetation for human consumption.

2.5 Pest disease and weed management including growth regulators – Weeds, pests and diseases should be controlled by a number of preventive cultural techniques, such as suitable rotations, green manures, a balanced fertilization programme, early and pre-drilling seed bed preparations, mulching, mechanical control and the disturbances of pest development cycles. Botanical pesticides prepared at farm from local plants, animals and microorganisms are allowed. Thermic weed control and physical methods for pests, disease and weed management are permitted.

2.6 Contamination control - All attempts should be made to minimize contamination from outside and with in the farm.

2.7 Soil and Water conservation – Soil and water resources should be handled in a sustainable manner to avoid erosion, salination, excessive and improper use of water and the pollution of surface and ground water. Cleaning of land by burning (e.g. slash and burn and straw burning) should be restricted. Clearing of primary forest for agriculture (jhuming or shifting cultivation) is strictly prohibited.

2.8 Collection of non-cultivated material of plant origin and honey – Wild harvested products shall only be certified organic, if derived from a stable and sustainable growth environment and the harvesting shall not exceed the sustainable yield of the ecosystem and should not threaten the existence of plant or animal species.

3. Animal Husbandry

3.1 Maintenance\rearing of animals

The certification programme shall ensure that the management of animal environment takes into account the behavioral needs of the animal and provides for sufficient free movement, sufficient fresh air and day light, protection against excessive sunlight, temperature, rain, wind etc., enough lying and resting area, ample access to fresh water and feed and proper environment for their biological and ethological needs.

3.2 Length of conversion period – The whole farm including livestock should be converted to organic according to the standards. Animal products may be certified organic only after the farm has been under conversion for at least 12 months and the required standards have been achieved. Length of the conversion period can be extended at the discretion of the certification agency. In case of dairy and egg production the conversion period shall be 30 days at minimum.

3.3 Brought-in animals

All organic animals should be born and raised on the organic holding. When organic livestock is not available the certification programme shall allow brought-in conventional animals according to the specified age limits e.g. 2 days old chicken for meat production, 18 weeks old hen for egg production, 2 weeks old for any other poultry, piglets up to 6 weeks old after weaning and calves up to 4 weeks old which have received colostrums and are fed a diet consisting mainly of full milk.

3.4 Breeds and breeding

Breed should be chosen which are adapted to the local conditions.Artificial insemination is allowed. Embryo transfer techniques are not allowed. Hormonal heat treatment and induced births are not

allowed unless applied for medical reasons. Use of genetically engineered species or breeds is not allowed.

3.5 Mutilations

Mutilations of animals in any form are not allowed. Certification programme may allow following exceptions – Castration, tail docking of lambs, dehorning, ringing and mule sing etc.

3.6 Animal nutrition

The livestock should be fed 100% organically grown feed of good quality. All feed should come from the farm itself or be procured from the region. The certification programme shall draw up standards for feed and feed ingredients.

Synthetic growth promoters or stimulants, synthetic appetizers, preservatives, artificial colouring agents, urea, farm animal by products to ruminants, droppings, dung or other manure, feed subjected to solvent extraction (soy and rapeseed meal), pure amino acids and genetically engineered organisms or their products are strictly prohibited in the feeds. Vitamins, trace elements and supplements shall be used from natural origin.

3.7 Veterinary medicines

Natural medicines and methods including homeopathy, ayurvedic, unani medicines and acupuncture shall be emphasized. Conventional veterinary medicines are allowed when no other justifiable alternative is available, but in all such cases the withholding period should be double the legal period. Use of synthetic growth promoters, substances of synthetic origin for production, stimulation or suppression of natural growth and hormones for heat induction is prohibited.

3.8 Transport and slaughter

Transport medium should be appropriate for each animal and the animals are fed and watered during transport. Each animal shall be stunned before being bled to death. The equipment used for stunning should be in good working order. No chemical synthesized tranquilizers or stimulants shall be given prior to or during transport.

3.9 Bee keeping

Bee hives shall be situated in organically managed fields and/ or wild natural areas. Hives shall not be placed close to field or other areas where chemical pesticides and herbicides are used. Each bee hive shall primarily consist of natural materials. For pest and disease control and for hive disinfection, Caustic soda, lactic, oxalic, acetic and formic acids, sulphur, enteric oils and *Bacillus thuringensis* are allowed.

4. Food processing and handling

4.1 General principles - Organic products shall be protected from co-mingling with non-organic products, and shall be adequately identified through the whole process.

4.2 Pests and disease control – Preventive methods such as disruption, and elimination of habitat and access to facilities, mechanical, physical and biological methods and permitted pesticidal substances as per the standards are used for disease and pest control.

4.3 Ingredients, Additives and processing aids

100% of the ingredients of agricultural origin shall be certified organic. For the production of enzymes and other microbiological products, the medium shall be composed of organic ingredients. Preparations of microorganisms and enzymes commonly used in food

processing can be used. But no genetically engineered microorganisms and their products shall be used.

4.4 Processing methods - Processing methods should be based on mechanized, physical and biological processes, so that the quality of organic ingredients is maintained through the process. Some of the approved processes are: Mechanical and physical, biological, smoking, extraction, precipitation and filtration.

Extraction shall only takes place with water, ethanol, plant and animal oils, vinegar, carbon-di-oxide, nitrogen or carboxylic acids and all these shall be of food grade quality.

4.5 Packaging

Material used for packaging shall be ecofriendly. Recycling and reusable systems should be used. Packaging material should be biodegradable.

5. Labeling

When the full standard requirements are met, the product can be sold as “Organic”. On proper certification by certification agency “India Organic” logo can also be used on the product.

6. Storage and transport

Products integrity should be maintained during storage and transportation of organic products. Organic products must be protected from co-mingling with non-organic products and must be protected all times from contact with the materials and substances not permitted for use in organic farming.

APPENDIX III

Variables considered for consumer preference of organic products

Statements/Variables	Attributes
1. Organic food is more tastier 2. Organic fruits are more sweeter	Taste (1)
3. It is safe food for children and sick 4. It is more nutritious 5. There are health benefits on consumption of organic food 6. Organic consumers fall sick less often	Health benefits (2)
7. Organic fruits and vegetables are larger than the conventional ones 8. It is less attractive than the conventional produce 9. There are no blemishes on organic produce	Appearance (3)
10. It is eco-friendly 11. It is free of pesticide residues 12. It is produced without using chemical fertilizers and pesticides	Free of pesticide residue (4)
13. It stays more fresh compared to the conventional produce 14. It can be stored or more number of days	Shelf life (5)
15. It is meant only for high-end consumers 16. Organic consumption is a status symbol 17. Its high price confers its better quality	Status symbol (6)
18. It is certified 19. Certification is a quality assurance for organic products 20. There is no much difference in genuinity between labeled and non-labelled	Authenticity (7)