3 Chapter

Research Design and Methodology

Any research by its core meaning is an organized set of activities aimed at studying and developing a model/procedure/technique to find the solutions to a realistic problem, supported by literature and data, such that its objectives are optimized and help the researcher in making valid recommendations/inferences for implementation. Thus a good piece of research work should start with setting clear-cut objectives. Objectives set for this research include;

Research Objectives

1. To study the production pattern of fruits in general and mango in particular of the entire world and also the countries of interest, i.e., India and Brazil over the past years.
2. To study the Agrarian structure, population distribution structure, key economic indicators including FAO indices, imports and exports of major group related to FPI (Fruit Processing Industry) of both countries, i.e., India and Brazil over the past years.
3. To study the exports and imports pattern (configuration) of fresh fruits and major processed fruit products in general and exports of mangoes and processed mango products (complete range of products) in particular of India over the past years. Also to study country wise contribution and CGR (Compound Growth Rate) of each of the processed mango products exported, in great detail.
4. To assess the availability of necessary infrastructure to the farming community (mango cultivators) and the fruit processsing industry (fruit processors) of India and also to study the problems facing these two groups.

5. To study the investment pattern, extent of adoption of advanced technology, penetration level of co-operative movement, financial viability and profitability, amongst both groups, i.e., mango cultivators and mango processors of India.
6. To study the various processes involved like procurement, storing, grading, cleaning, packing, etc., and also to study the management practices followed by both the groups i.e., mango cultivators and mango processors of India.
7. To study the functioning of concerned nodal agencies/ Government departments/other concerned institutions, of both countries, i.e., India and Brazil.
8. Lastly to suggest recommendations to all the stake holders involved, i.e., mango cultivators, mango processors, all concerned nodal agencies/Government departments/other concerned institutions, and lastly to Ministry of Agriculture, Government of India for the healthy growth of the fruit processing industry of India.

Research Plan

Broadly, the research work undertaken can be classified as descriptive and diagnostic type of research.

The research project undertaken is a descriptive study because it is a fact finding investigation with adequate interpretation. Moreover it is more specific than exploratory study, as it has focus on particular aspects or dimensions of the problem studied. It is designed to gather descriptive information and provides information for formulating more sophisticated studies.

The research project undertaken is a diagnostic study also because the research is aimed at discovering; what is happening in fruit processing industry, why is it happening, and what can be done about it, etc., i.e., identifying the causes of a problem and the possible solutions to it. Moreover it is more actively guided by hypotheses that are being formulated at the outset.

The research work undertaken involves both primary research as well as secondary research. Primary research involves collecting first hand information directly from the cultivators and processors through structured interviews guided by detailed interview schedules. Once collected, information is put to analysis using MS-Excel and SPSS software packages. Two separate chapters titled ‘primary research pertaining to cultivators’ and ‘primary research pertaining to processors’ will cover entire discussion about this particular part of the research.

Whereas secondary research consists of, gathering required secondary information through exploring various secondary sources. Various credible sources have been explored to gather the required information. Once gathered, information is put to analysis using various statistical and computational tools and techniques. A separate chapter titled 'Secondary Research' will cover entire discussion about this particular part of the research.

Description about Primary Research

Primary description about this particular part of the research includes;

Geographic Region Covered

Entire Karnataka state and adjacent districts of neighboring states, i.e., Tamil Nadu, Andhra Pradesh and Maharashtra has been chosen as the geographic region for this particular research project.

Sampling Method

Single stage cluster sampling coupled with non probabilistic convenience based selection within the cluster has been used where-in Karnataka state has been chosen as a cluster. The reason behind choosing Karnataka state as a cluster is, it is a leading producer of fruits next only to Maharashtra. Maharashtra ranks first with its dominant share of 17.08 percent, whereas Karnataka ranks second with its share of 12.37 percent. Moreover Karnataka ranks fourth in mango cultivation next only to Andhra Pradesh (17.98%), Uttar Pradesh (17.15%) and Bihar (11.00%), representing 8.83 percent of total mango cultivation of India. Thus Karnataka is a major mango growing state and has a strong mango processing industry that best represents the entire nation, as a good cluster. Within the cluster, the non probabilistic convenience based sampling scheme is used to facilitate the researcher to draw required samples from various strata within a cluster. Stratum in this case is nothing but the different scales of operations of both cultivators as well as processors, i.e., tiny scale, small scale, medium scale, and large scale.

Sample Size

Considering the feasibility of the study and the limitations of resources including time, sample size of fifty mango cultivators (Those who have grown minimum of fifty plants and more) and twenty-five mango processors spread across the entire state of Karnataka and also the adjacent districts of neighboring states (Andhra Pradesh, Tamil Nadu and Maharashtra) has been decided.

Method of Data Collection

In depth interviewing mechanism guided through structured interview schedules, prepared separately for cultivators as well as processors, is being used to gather the first hand information about the farming community (mango cultivators) as well as fruit processing industry (mango processors). Wherever we had difficulty in reaching the respondents, especially the processors, responses were being collected through mail with ongoing clarifications if necessary.

Tools used for Collecting Data

Well structured interview schedules, for both groups, i.e., mango cultivators and mango processors, designed carefully, were being used to gather primary information. Interview schedules once prepared were being tested for appropriability for the research.

Tools used for Data Analysis

Various statistical, mathematical and computational tools and techniques including; Pearson correlation, Pearson chi-square test, tabulation analysis, etc., are being used, using MS-Excel and SPSS software packages for primary data analysis. The detailed discussion about the tools and techniques used is covered under chapter titled 'Primary research pertaining to cultivators'.

Hypotheses

After careful considerations and intense discussions with the experts, following hypotheses (four in number) were being framed;

Hypothesis 01

(Ho-01): Null hypothesis 01: Indian fruit processing industry especially mango processing industry is not at all affected by non availability of high yield and high pulp containing varieties of mangoes that also have high resistance towards pest attack, which are ideal for processing.

(Ha-01): Alternate hypothesis 01: Indian fruit processing industry especially mango processing industry is affected by non availability of high yield and high pulp containing varieties of mangoes that also have high resistance towards pest attack, which are ideal for processing.

Alternate hypothesis Ha-01 further mean that; the problem is due to non-availability of quality seedling/sapling of desired variety and the lack of adequate extension support to farmers from the concerned nodal agencies. So farming community should be provided with the required extension support with respect to; providing right variety quality seedling, careful monitoring of the growth, effective and efficient farm management, mode and time of harvesting, post harvest management, seeking the benefits of economies of scale, etc., from the concerned Government departments/nodal agencies/concerned Institutions to change the attitude and mindset of farming community.

Hypothesis 02

(Ho-02): Null hypothesis 02: Indian fruit processing industry, especially mango processing industry is not at all plagued with lack of necessary infrastructure that is required for harvesting, transporting, raw material storing, grading, processing, packaging, marketing of the output, etc. This is not a serious bottleneck for this industry.

(Ha-02): Alternate hypothesis 02: Indian fruit processing industry, especially mango processing industry is plagued with lack of necessary infrastructure that is required for harvesting, transporting, raw material storing, grading, processing, packaging, marketing of the output, etc. This is a serious bottleneck for this industry.

Alternate hypothesis Ha-02 further mean that there lies a tremendous scope to revamp this industry by; adopting well proven strategies, channelizing the funds properly to create the necessary infrastructure that is required, extending necessary support to the farming community as well as fruit processing industries by the concerned departments and institutions, etc. Traditional practices need to be replaced with ultra modern practices that encompass technological advancements together with sound management skills which will bring down the post harvest loss to more reasonable levels.

Hypothesis 03

(Ho-03): Null hypothesis 03: Lack of cooperative effort amongst farming as well as processing community is not at all a serious hindrance that prohibits this industry from reaping the benefits of larger economies of scale and higher value addition.

(Ha-03): Alternate hypothesis 03: Lack of cooperative effort amongst farming as well as processing community is a serious hindrance that prohibits this industry from reaping the benefits of larger economies of scale and higher value addition.

Alternate hypothesis Ha-03 further mean that smallness of individual cultivator and processor is the sole cause for their exploitation and is also a prime cause for non-exploitation of the huge potential of this industry. Hence, a cooperative movement amongst farming as well as processing community will strengthen their position with regard to the following;

1. Creating necessary infrastructure like; well developed nurse-ries, laboratories, storage facilities including cold storage, pre cooling centers, and freeze drying facilities, cargo airports in the vicinity of cultivation centers, state of the art packaging and processing facilities, sound marketing, sales, and extension networks, GIS facility, etc., will become possible.
2. Reaping the benefits of larger economies of scale and higher value addition will become possible.
3. Adopting an integrated approach right from the farm gate till final consumer encompassing all the activities like; planting the right variety quality seedling, harvesting at right time, proper grading, proper storing, in time processing, innovative packaging, effective and efficient marketing and selling, etc., will become possible.
4. Enjoying higher power to bargain in the market will lead to fetching better prices for their output, which in turn will improve the financial condition of the farmers and the processors.

Enchanting success of 'green revolution' and 'white revolution' in India has already set the trend. A similar approach needs to be followed to turn around this industry and making 'horticulture revolution' a successful one.

Hypothesis 04

(Ho-04): Null hypothesis 04: Lack of integration of all the activities starting from farm gate till final consumers, because of ill functioning of the Government departments/nodal bodies/concerned Institutions with no clear direction and goals doesn't prohibit the farming community and processing industry of India from attaining the desired growth.

(Ha-04): Alternate hypothesis 04: Lack of integration of all the activities starting from farm gate till final consumers, because of ill functioning of the Government departments/nodal bodies/concerned Institutions with no clear direction and goals prohibit the farming community and processing industry of India from attaining the desired growth.

Alternate hypothesis Ha-04 further mean that there lies a most promising scope to import the 'Brazilian Model' where in a single nodal agency 'EMBRAPA'(Brazilian Agency for Agriculture Research and Animal Husbandry), takes complete care of both farming community (cultivators) and processing industry (processors) by having a fool proof mechanism/system in place to address all their concerns/problems and working in an integrated fashion, with more clearer objectives, strategies and policies, to sort out the contemporary upcoming issues. This is the secret of the success of Brazilian fruit processing industry.

Following facts and figures about 'EMBRAPA' prove this.

1. There is one and only one APEX Govt. nodal body for entire agriculture and animal husbandry industry of Brazil, unlike in India where we have many nodal bodies catering to specific industries like horticulture, cotton, sugar, food processing, fisheries, poultry, dairy, etc.
2. It takes complete care of interests of farmers, keep them aware about latest developments, provide them the necessary inputs in terms of knowledge, expertise, infrastructure, facilities, technology, etc.
3. It employs 120,000 Farmer Agro Technology Extension Agents who work shoulder to shoulder with the farmers in the field using a 'bottom up' approach, innovating all the time, as opposed to our 'top down' approach where the office loving agricultural scientists dish out recommendations and vanish. Indian agriculture extension network is the most inefficient in the world (*Times of India*; November 20, 2006 edition).
4. EMBRAPA doesn't distribute grants and subsidies to farmers like India. Rather it builds necessary state-of-the-art infrastructure like;
   (i) Cargo airports in remote areas to facilitate zero time transfer of perishables to processing centers (Total number of airports in Brazil: 4,276, compared with 341 in India),
   (ii) Gene banks to store seed samples,

(iii) Cold chain facility throughout the country to minimize post harvest loss,

(iv) New state-of-the-art technologies to bring down the cost,

(v) Ongoing continuous research in the field of sustainable and organic agriculture to lead the world in agriculture and animal husbandry,

(vi) Developing better varieties to enhance the yield, etc.

Gathering and Analyzing Primary Information

Accordingly data was collected through intense personal interviews with the farmers and processors spread across the geographical region set for the purpose of research.

Data collected was then being checked thoroughly to trace out the missing part and later collected the same through ongoing follow up with the respondents via telephonic conversation/mail/email.

Once assured that all the responses are complete, the entire information was coded as per the requirement of SPSS and fed in to the computer system. Entire information was then put to analysis using various statistical, mathematical, and computational techniques. Findings were then discussed in the light of recent developments based on which hypotheses were tested and conclusions were drawn.

Description about Secondary Research

Primary description about this particular part of the research includes;

Method and Sources of Secondary Data Collection

FAO commodity year books, International trade statistics from www.trademap.com, FAO Production year books, FAO statistical year books, the little green and red data book series of WB (World Bank), etc., for the past years have been explored to avail the required data. Export import data bank from the official website of the Directorate General of Foreign Trade (DGFT) under ministry of commerce and industry has been explored to a great depth to get the required information about the exports and imports configuration of India. Relevant research papers and articles published in various journals of both nations, news papers, magazines, etc., have all been explored to get the required information. Nevertheless, official websites of UNCTAD, DGFT, ITC, WB, FAO, etc., have been explored deeply to get hands on the required information.

Tools used for Collecting Secondary Data

Tabulation techniques are used for collecting secondary information.

Tools used for Secondary Data Analysis

Various statistical, mathematical and computational tools and techniques including Average percent increase or decrease analysis, Average percent contribution analysis, CGR (Compound Growth Rate) analysis, independent t-test, etc., using MS-EXCEL are being used to analyze the secondary information. The detailed discussion about the sources explored, information gathered, tools used, and the presentation of the findings is covered under chapter titled 'Secondary Research'.