CHAPTER - I

INTRODUCTION AND DESIGN OF THE STUDY

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1.1 INTRODUCTION

India has been largely an agriculture oriented country with most of its
teaming millions of people depending on it for employment, economy and even
for survival for ages. They have been cultivating varieties of crops both as
irrigated and rain fed ones. Maize is one of the crops grown in all states except
Kerala. This was distinctly known also as Indian corn. This maize is a
nutritious food to the mankind as a very delicious fodder to the cattle. Besides
these, maize has been used as value added products and as raw materials for
many industrial products.

Maize is a ‘grass’ domesticated by indigenous people in Mesoamerica in
pre-historic times. The Aztecs and Mayan cultivated it in numerous varieties
throughout central and southern Mexico to cook or grind in a process called
“nixtamalization”. During the 1st millennium AD, maize cultivation spread
from Mexico into the U.S. South-west and a millennium later into U.S. North-
east and south-eastern Canada. For western civilization, the story of maize
popularly known as corn began in 1492 when Columbus's men discovered this
new grain in Cuba. Later the crop spread through much of the Americas.
Between 1250 A.D. and 1700 A.D. nearly the whole continent gained access to
the crop. After European contact with the Americas in the late 15\textsuperscript{th} and early
16\textsuperscript{th} centuries, explorers and traders carried maize to Europe.

It was believed that maize was introduced in India by Portuguese during
the 17\textsuperscript{th} Century, but more recent evidences supported the possibilities of its
Pre-Colombian introduction through the Atlantic-Arabian trade routes. The
later evidence is also supported by the more recent variability that has been observed in the maize collection made from the north-eastern Himalayan region.

Maize (Zea mays) is a plant, which usually grows to a height of one meter to three meters or more in some cases. It belongs to family ‘Gramineae and Genus Zea’. The word "corn" has many different meanings depending on what country you are in. Corn in the United States is also called maize or Indian corn. Corn in England means wheat; in Scotland and Ireland, it refers to oats.

The term “corn” was derived from Indo-European word which means “small nuggets”. New English and German settlers who arrived in the new world referred maize as corn. They distinguished it from other grains by calling it Indian corn. The origin of the word maize is believed to be from 'Taino people in northern Antilles Island. The word ‘Taino’ means ‘mahis’ which was considered as source of life. Over the time the word mahis got transmitted into maize. In scientific and formal usage, “maize” is normally used in a global context. Equally, in bulk-trading contexts, “corn” is used most frequently.

Among the agricultural commodities “Food Crop” is the most essential one for the survival of mankind and animal life. Maize is one of the most important cereal crops in the world agricultural economy and is grown in many countries in each of the continents of the world. It is utilized in more diversified ways than any other cereal. The grain is quite nutritious, with a high
percentage of easily digested carbohydrates, fats and proteins and hardly and deleterious substances.

Maize is a coarse grain and it is now being accepted as staple diet and its demand is increasing year by year. In Indian agriculture, maize occupies a prominent position and each part of the maize plant is put to one or the other use and nothing goes as waste. In India, current consumption pattern of maize is poultry, pig, fish feed 52 per cent, human consumption 24 per cent, cattle feed 11 per cent, starch 11 per cent, seed and brewery industry 1 per cent each.\(^5\)

The products from maize are value added products which include maize starch, liquid glucose, dextrose monohydrate, anhydrous dextrose, sorbitol, corn gluten to name a few. Maize starch is employed in the manufacture of asbestos, ceramics, dyes and chemicals, plastics, oil cloth, paper and paper boards and in cosmetics, pharmaceutical industries. Maize cobs and maize kernels are used as a biomass fuel source such as ethanol and the like to reduce fuel costs.

Maize production essentially provides the food needed for a growing population, the raw materials for industrial production and the wide market for the domestically manufactured products. Maize is used as whole grain and as an important component of many products that have become an essential part of our daily use in some form or the other. There is growing requirement from poultry sector, which uses corn as feed.\(^6\)

Today, broiler farming has grown tremendously with country owing to its importance as a source of economy, employment and nutritional values in
terms of animal protein. The major component of the feed for the broiler birds is maize and with the spectacular growth of the broiler industry, maize also has to be made available in large quantities. Cultivation of maize thus will be highly a profitable venture for the farmers. Maize is finding newer dimensions in its use to improve the quality of human life. Consequently its demand and price are galloping in international market.

Maize is an important cereal crop in world after wheat and rice. The importance of maize lies in its wide industrial applications besides serving as human food and animal feed. It is the most versatile crop with wider adaptability in varied agro-ecologies and has highest genetic yield potential among the food grain crops. Maize is doing wonderful things in our everyday life. Maize is present in one form or other in the food we eat, the milk we drink, the paper we read, the chocolates and biscuits we take, the clothes we wear and the medicines we take.

Global Maize Growth

Corn is an important feed component for cattle, poultry and swine in most regions of the World. Grains ground into flour are employed to prepare corn flakes and meals, while corn germ oil is a good cooking medium. Corn starch is a raw material in many brews and jams. The area and production at the global level in 2002-03 were 137.17 million hectares and 601.14 million metric tonnes. These factors registered a gradual and a consistent growth reaching the highest ever level of 169.63 million hectares and 883.28 million
metric tonnes respectively constituting 23 per cent and 47 per cent in terms of area and production of maize at the world level during 2011-12. United States of America, China, Brazil, Mexico, Argentina and India together account for 75 per cent of the world maize production. USA is the leading producer of maize with 40 per cent of the global production and India contributes 3 per cent of global production\textsuperscript{9}.

**Maize Growth in India**

Presently India ranks 4\textsuperscript{th} in area and 6\textsuperscript{th} in production of maize at world level. The present growth rate in maize production 8.94 per cent is much more than its consumption of around 5 per cent\textsuperscript{10}. There has been a continuous increase in area under maize cultivation in India. Maize was cultivated in 8.33 and 8.60 million hectares during 2009-10 and 2010-11 respectively. During 2011-12, the area under maize cultivation increased by 2.32 per cent over previous year and reached to 8.80 million hectares. The production of maize has increased to 21.76 million metric tonnes in 2011-12 from 9.53 million metric tonnes in 1995-96. The yield has increased to 2470 kg/ha in 2011-12 from 1595 kg/ha in 1995-96. Karnataka, Andhra Pradesh, Maharashtra, Tamil Nadu, Rajasthan and Uttar Pradesh together contribute 60 per cent of area and 70 per cent of maize production in India. Karnataka produces 4.1 million tonnes of maize from 1.3 million hectares in the year 2011-12.
Maize in Tamil Nadu

Tamil Nadu attained fourth position in Indian Maize production as against seventh a year before, because of the highest productivity of 6042 kg/ha and larger cultivation in 2011-12. During 2011-12, around 16.95 lakh tonne of maize was produced from 2.81 lakh hectares in Tamil Nadu. Introduction of hybrids increased the yield of maize in Tamil Nadu and the productivity reached 6.04 tonnes per hectare. Maize is mainly grown in Perambalur, Dindigul, Coimbatore, Salem, Erode, Virudhunagar, Villupuram, Theni, Tiruchirapalli and Tirunelveli Districts. These districts together contribute 90 per cent of the total area and production of maize in Tamil Nadu.

Maize Foreign Trade

The importance of maize has been realized all over the world and therefore there have been hectic export and import of maize both as whole grain and value added products. During 2011-12 global maize export was 94917 metric tonnes out of which United States exported 48262 metric tonnes and India exported only 4569 metric tonnes. The United States is the largest exporter of maize in the world followed by Argentina, Thailand, France and South Africa.

Countries like Vietnam, Sri Lanka, Malaysia, Indonesia and Taiwan are the major importers of maize from India. World major importing nations of maize are Japan, Korea, Taiwan, Mexico, China, U.K., Egypt, Malaysia and Sri Lanka. Efforts can be made to identify potential market for India maize in the
major maize importing countries other than Sri Lanka and Malaysia to which India is already exporting maize. During 2011-12, India exported around 4 million tonnes of maize. High global maize price and weakened value of Indian currency have helped India’s maize exports in 2011-12\(^2\). Thus maize has an immense potential for exports besides catering to the food and industrial needs of the country.

However, cultivation of maize has some of the inherent problems like erratic pattern of rain, pests and diseases, over use of pesticides and insecticides and the like. The produce show high levels of pesticide residues which cause health and environmental hazards. Shortage and non-availability of labour also is a problem now a days. The cost of all the required inputs is on the constant increase where as the cultivators face serious fluctuations in the market price of maize often. Absence of regulated markets, market information, lack of minimum support price, indebtedness and forced sale of the produce are some other problems which the farmers encounter. Since maize has an abundant and constant demand for various needs, the cultivation of this crop can be encouraged in terms of extension of area, technological innovations to increase production and strengthening of the market networks.

1.2 STATEMENT OF THE PROBLEM

Large numbers of people in the district are dependent on agriculture for employment and income generation. They cultivate many kinds of crops and maize is one of the cereal crops enthusiastically cultivated in this district.
Maize is the major crop cultivated in the district both as an irrigated and rainfed one. Higher demand for maize as poultry and cattle feed and as a food crop, less labour intensive, comparatively higher returns and the like are some of the reasons attributed to the preference of maize cultivation in the district.

In addition, maize is in demand as an industrial raw material and as an ingredient for various industrial products and is value addition. Therefore, a large number of farmers cultivate maize which consequently provides employment to a large number of skilled and unskilled labourers both in farming and industrial sectors.

However, maize cultivation is no exception to problems which are faced by any other agriculturalists in their operations. The problems encountered by the maize cultivators are ‘increased cost of inputs’, ‘inadequate power supply’, ‘traditional cultivation practice’, ‘frequent monsoon failures’, ‘pest and diseases menace ’ and ‘lack of efficient irrigation management’.

The price of maize both in national and international markets has been widely fluctuating during the last decades. In the recent past, the prices of maize fluctuated to an unimaginable level. Despite these price fluctuations, there seems to be no government intervention in the maintenance of price. In Dindigul district maize prices are often manipulated in the wholesale market and at retail point against the interest of maize cultivators.

Equally, marketing of maize is one of the important factors which have a direct bearing upon the cultivators. The prevailing system of maize marketing is considered as “non-cultivator friendly” owing to factors like unethical
market practices, unhealthy practice of the middlemen, weak channels of distribution and forced sale for clearing debts.

In such contexts of prospects and limitations in the cultivation and marketing of maize, it becomes imperative to study the viability and profitability of maize cultivation in Dindigul district. Though there were number of studies in production and marketing of maize in general and that too at state level, an in-depth study is felt necessary to bring out cost and return in maize cultivation at the micro level. This will not only help to identify the profitability pattern of maize cultivation in a developing area like Dindigul district but also to frame suitable policy measures to popularize and enhance the cultivation of this food crop.

Similarly a study relating to problems associated with marketing of this crop from cultivators’ point of view will encourage the potential maize growers to select a suitable channel of distribution and to attract more people in the cultivation of maize. This will ultimately have a positive impact on overall economic development of the district and the state. Hence the present study.

1.3 CONCEPTS AND REVIEW OF PREVIOUS STUDIES

To develop clarity and comprehension for conducting the present study it is essential to review the various concepts used by the researchers in the related previous studies. In this section, a brief review of the related concepts and past studies was made and the conceptualization for the present study was
also attempted simultaneously under two headings namely; Production Concepts and Marketing Concepts.

1.3.1 Production Concepts and Studies

In this heading, production, production function, productivity, cost of production, and their related studies are reviewed and they have been also conceptualised for the present study.

Maize Cultivators

Maize cultivators are those who cultivate maize in their own land or in leasehold land by performing all the basic agriculture functions such as ploughing, sowing, irrigating, weeding, manuring and harvesting.

Marginal Farmer

Marginal farmer means farmer who cultivates maize as owner or tenant, in less than 2.47 acres of agricultural land.

Small Farmer

Small farmer means a farmer who cultivates maize as owner or tenant, in 2.48 acres and more but in less than 4.94 acres of agricultural land during the study period irrespective of acreage they possess.

Medium Farmer

Medium farmer means a farmer who cultivates maize as owner or tenant, in 4.95 acres and more but less than 9.88 acres of agricultural land during the study period irrespective of acreage they possess.
Rental Value of Land

Rental value for owned land at the existing rate of rent prevailing for similar land in the village. In the case of leased land, the actual rent paid was taken.

Human Labour

The wage earned by labourers namely, male and female labourer was considered as a criterion for standardization into man day units. Based on their wage rate, two women were equated to one man. The adult male labour working for a period of eight hours was considered as one man day unit. All human labour of family as well as hire, employed in different operations was valued at the prevailing wage rates.

Bullock Labour

The bullock labour (owned and hired) was valued at the prevailing hire charges in that locality.

i) Production

Dewett (1982) defined ‘production’ as essentially transformation of one set of goods into another. He also defined it as creation of value or want satisfying goods and services. According to Seth (1985), ‘production’ is the result of blending of various factors of production namely, land, labour, capital and organization.

According to Pande and Mithani (1990), ‘production’ is the creation of output or goods and services.
In the present study, ‘Production’ represents the yield of maize resulting from the application of different input materials.

**ii) Production Function**

**Klein (1973)** defined ‘production function’ as a mathematical expression of technical relationship between input and output, which would remain constant as long as technology remained invariant$^{16}$.

**Samuelson (1978)** defined ‘production function’ as one which indicated the maximum amount of output that could be produced by each of the specified inputs or factors of production and it was defined for a given state of technological knowledge$^{17}$.

**Sadhu and Mahajan (1981)** used the Cobb-Douglas type of production function to test the production efficiency of individual inputs in aggregate enterprise of mark and balata farms. In order to evaluate the economic efficiency of different inputs, the marginal value products of inputs were compared with their respective acquisition costs$^{18}$.

Many production studies conducted in India evidenced the ability of Cobb-Douglas production function to provide consistent estimates. Hence in the present study Cobb-Douglas production function was employed.

**iii) Productivity**

**Sathilal and Hiremath (1995)** observed the ratio of marginal value product to marginal factor cost for land and plant protection chemicals was more than unity in small as well as large orchards. It suggested that there was scope for increasing returns from beer orchards by increasing the use of these
resources. The ratios were less than unity for labour and fertilizers in small orchards and for labour, farm yard manure and fertilizers in large orchards indicated that the resources were over-used in production.\(^{19}\)

According to *Saha et al. (2009)* residue management with maize stalk cover, organic manure like poultry manure and mulching with locally available weed ambrosia, special, not only conserves soil moisture so as to achieve a second cross but also improves productivity and water use efficiency of mustard during winter (rabi) season.\(^{20}\)

According to *Dilip Singh (2010)*, maximum net returns can be obtained from single cross hybrid high quality protein maize. Nitrogen should be applied in 5 split application in ratio of 10:30:30:20:10 at basal, 4 leaf emergence, 8 leaf emergence, tassel emergence and early grain-filling stages.\(^{21}\)

**iv) Cost of Production**

According to *Rajiv Mehta (2000)*, the price of any agricultural commodities is determined by the cost of cultivation. In agriculture, the cost of cultivations refers to the various input costs incurred by a farmer to produce the final output. The analysis of cost and return is of vital necessary in agriculture.\(^{22}\)

*Naik and Thimmappa (2001)* concluded that cost of production of different agricultural commodities reacts differently in the event of disequilibrium of supply and demand. The study of cost variability covers their distinct patterns in long term and short term perspectives. Besides, the
magnitude or volatility or cost variation of different agricultural commodities depends on the respective elasticity of demand\textsuperscript{23}.

According to Sujit and Mishra (2002), cost of inputs has increased manifold but cost of final produces from agriculture has not increased to that extent. The costs of final producers are not only determined by cost of inputs but also market forces, uncertainty and erratic monsoon\textsuperscript{24}.

**Fixed Cost**

Mittal and Saxena (1974) defined fixed cost in agriculture as that which was independent of the level of production whereas the variable cost varied with the level of output\textsuperscript{25}.

Paul A. Samuelson (1980) divided the total cost into fixed and variable costs. Fixed cost represented the total expenses incurred even when no output was produced but production had been committed in. It was often called overhead cost and usually included contractual commitments for rental, maintenance, depreciation, overhead, salaries and wages. It is a sunk cost because it is quite unaffected by any variation in the level of output, during the period of time in which it is sunk\textsuperscript{26}.

Fixed cost is those which remain constant in total amount with increase or decrease in the volume of output or productive activity in a given period of time. In the present study, fixed cost consists of land revenue, rental value, depreciation on capital assets, interest on fixed capital and repairs and maintenance cost.
Variable Cost

According to samuelson (1973), Variable costs represented all items of total cost except fixed costs\(^27\).

According to Tandon and Dhondyal (1978), the variable costs as prime costs and related to the variable resources\(^28\).

In the present study, variable cost is those which vary in total in direct proportion to the volume of output. It included the value of bullock labour, machine labour, human labour, seeds, farm yard, manure, composts, fertilizers and plant protection chemicals and irrigation. The total cost equal to variable cost plus fixed cost.

1.3.2 Marketing Concepts and Studies

In this section, the concept of market and marketing, marketing cost, returns, Marketing margin, marketing efficiency, price-spread and their related studies are reviewed.

Village Traders

Village traders are those who purchase maize directly from cultivators, assemble and sell it to the Commission Agents. They take title to the goods and also bear the risk associated with it.

Commission Agents

A commission agent is one through whom the farmer sells his produces to buyers and he is usually granted broad powers by those who sell goods through him. He normally takes over the physical handling of product, arrange
for sale, collect the value, deduct his fee and remit the balance to the principal he represents. He never owns the title of the goods and as such does not bear the risk associated with it. Commission agents in the study area are those traders who purchase maize from cultivators and village traders and sell it to wholesaler.

**Wholesalers**

A wholesaler is one who purchases maize in bulk quantities from the large farmers, commission agents and makes sale to industrial consumer.

**Industrial Consumer**

Industrial consumer are the owners of power-driven mills who purchases maize from cultivators, village traders, commission agents and wholesalers and convert it in to maize powder and sells the same to the retailers.

**Net Income**

Net income is gross income minus total expenses of production i.e., cost of seeds, manure, irrigation charges, wages of hired labour and imputed value of unpaid family labour, depreciation, rent, interest on own and working capital and marketing cost

**Family Labour Income**

Family labour income is the gross income minus total expenses of production excluding wages of unpaid family labour.

**Farm Business Income**

Farm business income is the gross income minus total expenses of production excluding wage of family labour and interest on working capital,
which is equal to the amount of net profit plus the value of the unpaid family labour.

v) Marketing

According to Stanton (1975), Marketing is a total system of interacting business activities designed to plan, price, promote and distribute satisfying product and services to the present and potential customers\(^{29}\).

According to Subramaniyam et al (1985), Marketing was the processes of defining, anticipating and creating customer needs and wants and of organizing all the resources of the company to satisfy them\(^{30}\).

Yadav (1985) reviewed marketing as “A system of interrelated activities designed to develop price, promote and distribute goods and services to groups of customers”\(^{31}\).

In the present study, marketing is considered as the performance of all business activities involved in the flow of goods and services from the point of initial production up to consumption.

vi. Agricultural Marketing

According to Thambi (1973), agricultural marketing was not mere selling or distribution but it embraced all the activities that began with ascertaining the needs of the consumer and the market opportunity, setting up production to meet the anticipated demand, pricing, distribution and advertising in the sale of product, hopefully at a small profit\(^{32}\).

According to Irwin (1973), agricultural marketing included all the services, intangible and physical, rendered between the farmers and the
ultimate consumers. The intangible functions included pricing plus financing and risking, guiding products to consume in a place and form and physical functions included transporting, processing, sorting and grading of products.

Chandran (1975) defines ‘Agricultural Marketing’ as the performance of all business activities such as determining the needs of the consumer, organising the production process to meet the expected demand, pricing, distributing, selling and all other related activities involves in setting farm products in motion from the producer to consumer through times, space and form.

Lallan Singh (1984) referred marketing of agricultural produce was highly complex mechanism. It comprised of series of operations, processes and agencies involved in the movement of food and raw materials from the farm to the final consumers and the effect of such operations on producers and middlemen. These included buying, assembling, processing, packaging, transporting, storing, financing, risk bearing and selling.

In the present study, agricultural marketing is considered as all the activities involved in the movement of agricultural produces and services from the farmers to the ultimate consumers.

vii) Marketing Structure

Lele (1973) described the market structure as the various market channels, intermediaries and traders involved in moving the produce from producers to consumers.
**Bilgrani (1974)** defines “marketing channel” as distributors who are engaged in direct or indirect transfer of title to the product as it moves from producer to consumer or industrial users\(^{37}\).

According to **Mamoria and Joshi (1975)**, middleman is one who specializes in performing operations or rendering services that are directly involved in the purchase and sale of goods in the process of their flow from producer to final buyer\(^{38}\).

In the present study, market structure included village traders, commission agents, wholesaler and industrial user who are engaged in the trade channel.

**viii) Marketing Cost**

According to **Jain (1971)**, marketing costs are the actual expenses incurred in bringing the goods and services from the producer to the consumer. The expenses are incurred by all those who are engaged in the process of marketing from producers to retailers\(^{39}\).

According to **Moore et al (1973)**, marketing cost were the actual expenses incurred in the marketing process. They included not only cost of performing the various marketing functions but taxes and other assessments as well\(^{40}\).

**Dhull and Gangwar (1975)** defined ‘marketing cost’ as the actual cost incurred by each agency involved in the marketing channel for performing their functions. This included transportation, loading and unloading, weighing,
cleaning, octori, market fee, commission, sales tax, processing cost and wastage\textsuperscript{41}.

In the present study, marketing cost refers to the cost incurred by each agency involved in the marketing channel for performing its functions like packing, loading, unloading, transportation, grading cost, storage cost, establishment charges and administrative charges paid in marketing of maize collected in the study area.

\textbf{ix) Marketable Surplus and Marketed Surplus}

According to \textbf{Singh and Naraina Rao (1974)}, ‘marketable surplus’ generally stands for the quantity available with the producer for disposal, after meeting his genius requirements for family consumption, seeds, livestock, feed, payment of wages and disbursement to village artisans, other customary payment for service rendered and the like\textsuperscript{42}.

According to \textbf{Singh and Naraina Rao (1974)}, ‘marketed surplus’ represents that portion of the total production which is actually disposed off by either for cash or by barter\textsuperscript{43}.

According to \textbf{Bhatti et al. (1972)}, ‘marketed surplus’ depends on the total farm production, the retention for consumption and farm operations such as payment of wages in kind, feed and seed\textsuperscript{44}.

\textbf{x) Returns}

\textbf{Singh et al (1977)} stated that the net income, above all costs, was the return that pertains to all factors of production over and above all charges for such factors less all costs included in the production process\textsuperscript{45}. 
Sisodia (1978) defined the ‘net income’ in a simple way as the gross income less cost C\(^46\).

Kandasamy et al. (1980) have used the term ‘gross return’ to mean the value of the total produce. Net return is the remainder after subtracting total expenditure from gross income\(^47\).

According to Kalaivanan (2002), “gross income” is the actual amount realized on the sale of the produce and he arrived at the net income by deducting cost of production from the gross income\(^48\).

In the present study, the gross income was defined as the total value of crops valued at harvest price in the reference period. The net income was defined as the gross income less the total cost which included all the cash and kind expenses incurred.

xi) Marketing Margin

Kohls and Downy (1972) were of the opinion that margin was the difference between the amount consumer’s paid for final product and the amount producer’s received\(^49\).

Moore et al (1975) considered marketing margin as the actual amount received by the marketing agencies in the marketing processes\(^50\).

According to Singh et al (1979), the marketing margin included all cost of assembling, processing, storage, transportation, wholesaling and retailing\(^51\).

Ramamoorthy (1981) defined ‘marketing margin’ as the income to the marketing agencies who might themselves have paid out most of the cost to cover their own expenses, the price they paid for labour, equipment and the like
in carrying out the marketing functions, bearing a portion as a reward for management of enterprise and risk\textsuperscript{52}.

In the present study, marketing margin is the surplus received by the different intermediaries in carrying out the marketing functions.

xii) Price Spread

George (1972), defined ‘price spread’ as the costs incurred and profits gained by the agencies involved. It often included payments for services like assembling raw materials from the farm, processing, storage, transportation, wholesaling and retailing\textsuperscript{53}.

Sidhu and Rangi (1979) referred price spread as the difference between the price paid by the consumer and the price received by the producer for an equivalent quantity of the farm product\textsuperscript{54}.

Suryaprakash et al. (1979) analysed different marketing channels and worked out the price spread. They found that in groundnut the price spread was relatively smaller than in coconut, copra and cotton\textsuperscript{55}.

In the present study, the price spread refers to the difference between the price paid by the consumer and the price received by the grower of maize.

xiii) Spatial Variation

According to Dahl and Hammond (1977), prices of agricultural products vary geographically in relation to transportation differentials required to move commodities from one place to another\textsuperscript{56}.
In the present study, spatial variations in prices would be the fluctuation in the prices of a product at a particular point of time in different places for the produce of the same quantity.

xiv) Temporal Variation

Temporal Variation referred to the changes in the price of the produce at a particular market over a time period. A study on past temporal price movements of a commodity would assist in forecasting the future behavior of prices. The variation in price over time comprises of four components namely trend, cyclical, seasonal and irregular variations.

According to Bober (1971), trend movement indicated the general tendency of the behaviour of the data over long period of time.\(^{57}\)

In the present study, the secular trend variation represents the general tendency of the price variation over a period of 20 years.

Bober (1971) defined the cyclical variation as the recurrent fluctuations that occurs at about the same time in many economic time series and has a periodicity that varies from a minimum of one year to a maximum of twelve years.\(^{58}\)

In the present study, cyclical variation refers to recurrent up and down movement around secular trend levels, which are different from seasonal fluctuations and have duration anywhere from 2 to 12 years. The cyclical variation in annual price of maize was studied through moving average method.

Bober (1971) stated that on examine a series of fluctuations that had duration of less than one year and if these fluctuations recurred from year to
year in a periodic fashion, it would be inferred that the data were undergoing seasonal variation\(^5\).

In the present study, seasonal variations in the monthly average prices of maize are studied for ten years from 2003-04 to 2012-13 by applying 12 months moving average method.

According to Gupta and Gupta (1983), the irregular variations refer to such variations which would not repeat in a definite pattern and they include all types of variations other than those accounting for the trend, seasonal and cyclical movement\(^6\).

In the present study, the variations in the prices which are irregular and unpredictable are called irregular variations.

xv) Storage

Chauhan et al. (2007) concluded that nearly one-half of the marketed surplus was mostly disposed off in second quarter (December – February) due to inadequate storage facilities at farmers’ level and occurrence of the post harvest losses by insect pests attack during storage\(^6\).

Warde et al (1998) observed that the rotting losses of stored onion after 120 and 240 days had shown a significant difference. The total loss of onion bulbs after 90 and 150 days was found to be significant while after 30, 60 and 120 days, it was non-significant\(^6\).

xvi) Marketing Efficiency

Dahl and Hammond (1977) marketing efficiency to the achievement of minimum cost in accomplishment of the basic marketing functions of
assembling, processing, transportation, storage, distribution and related physical and facilitative activities.\textsuperscript{63}

\textbf{Desai (1979)} assessed efficiency of marketing of agricultural produce by the size of producer’s share in the price paid by the ultimate consumer.\textsuperscript{64}

\textbf{Ramamoorthy (1982)} measured marketing efficiency by the marketing margin received by each of the intermediaries and their proportions to the consumer’s price.\textsuperscript{65}

\textbf{Hugar and Hiremath (1984)} evaluated the marketing efficiency by marketing margin, price received by the producer, cost of marketing and profit share of traders.\textsuperscript{66}

\textbf{xvii) Problems of Productions and Marketing}

\textbf{Sundaresan and Thanasekaran (1984)} in their study on production and marketing of grapes identified severity of diseases and pest attack, lack of adequate capital facilities to meet the initial establishment costs and high cost of inputs as major production problems, while unorganized market structure, high marketing costs and unnecessary deductions and lack of finance facilities ranks as the important marketing problems.\textsuperscript{67}

\textbf{1.4 OBJECTIVES OF THE STUDY}

The overall objective of the study is to understand the production and marketing of maize in Dindigul district and the specific objectives are given below.
1. To study the profile of the study area, socio-economic characteristics of the sample cultivators and production practice of maize.

2. To analyse the trend, growth and magnitude of variability of the area, production and productivity of maize at the world, national, state and district levels.

3. To analyze the factors motivating the maize cultivation, the costs and returns, resource-use efficiency, returns to scale and the problems encountered in the cultivation of maize by the cultivators in the study area.

4. To study the market structure, marketing cost, marketing margin, price-spread, price analysis, marketing efficiency of different channels, problems of marketing of maize and measures to overcome the problems in the study area.

5. To offer suitable suggestions based on findings for improvement.

1.5 SCOPE OF THE STUDY

The present study is undertaken to examine the production and marketing of maize in Dindigul district of Tamil Nadu. This study intends to analyze the opinion of maize cultivators about the maize cultivation pattern, the existing marketing system, the socio-economic factors and intermediaries’ opinion about their business. This study would also encompass the trends in the growth of area, production and productivity of maize at the world, national,
state and district levels. Cost of production, cost and return, resource-use efficiency, market structure, choice of middlemen, price-spread, price analysis and marketing efficiency are also covered in this study.

1.6 METHODOLOGY

The present study is mainly based on survey method. Both primary and secondary data were used. The required primary data were collected from the sample respondents through two types of well constructed interview schedules originally, in conformity with the objectives of the study. These draft interview schedule were prepared by the researcher and the same was pretested by circulating them among a few major maize cultivators in the study area and intermediaries. Necessary modification, correction and inclusions were made in these schedule based on the suggestions given. The officials of the department of agriculture were also consulted before finalizing the interview schedule to their present form.

Secondary data relating to area, production and yield of maize at world level were collected from web site www.enwikipeadia.org., www.fas.usda.state.org, www.indexmundi.com. and www.tnagmark.tn.nic.in. Data relating to area, production and yield of maize in India for different states and districts were collected from the reports of Directorate of Economics and Statistics, Ministry of Agriculture, New Delhi, Seasonal and Crop Report of Tamil Nadu and ‘G’ return of Dindigul district and maize journals and annual reports published by Directorate of Maize Research, New Delhi. Data relating
to the profile of the study area was collected from Census Report 2011, Department of Economics and Statistics, Chennai and Agricultural Census and District Statistical Hand Book of Dindigul district.

1.7 SAMPLING TECHNIQUE

In Tamil Nadu, Dindigul district ranks first in production of maize and second in area of maize cultivation. It consists of fourteen development blocks, of which five blocks namely Oddanchatram, Palani, Reddiyarchatram, Thoppampatty and Vedasandur were selected based on area coverage under maize. From each block, three panchayats were selected by simple random sampling. Accordingly Chatrapatty, Veeralapatti and Ambilikkai were selected in Oddanchatram block, Ayakudi, Neikkarapatti and Kanakkampatty in Palani block, Neelamalaikottai, Puduchatram and Palakkanooruthu in Reddiyarchatram block, Kallimandayam, Keeranur and Vagarai in Thoppampatty block, and Marampadi, Eriodu and Vedasandoor were selected in Vedasandoor block. From each panchayat selected, two villages were selected at random. A sample of 420 maize cultivators were selected at the rate of 14 from each selected villages.

The 420 sample maize cultivators were post-stratified in to marginal, small and medium farmers and 140 sample farmers from each group was selected for the present study. It was found that 23 interview schedule from marginal farmers, 2 from small farmers and 35 from medium farmers were incomplete and hence rejected. Thus the total sample size was 360. Of these
samples, 117 were marginal farmers, 138 were small farmers and 105 were medium farmers.

A multi-staged random sampling method was adopted with the selection of the blocks, followed by simple random selection of the panchayats, villages and respondents. The convenient sampling technique was applied in collecting data from the market functionaries. The data collected from different market functionaries include 50 village traders, 50 commission agents and 25 wholesalers in Dindigul district of Tamil Nadu.

1.8 PERIOD OF THE STUDY

Primary data were collected from maize cultivating farmers and merchant middlemen. The field survey was undertaken during the months of September to December 2011. The primary data for the study were collected from the maize cultivating farmers and merchant middlemen relate to the year 2011-2012. Secondary data relating to area under maize cultivation, production and productivity of maize were collected for a period of 10 years from 2002-03 to 2011 - 2012. The data relating to price of maize were collected for a period of 20 years from 1993-94 to 2012-13.

1.9 TOOLS OF ANALYSIS

To study the trends in area cultivated, production and productivity of maize, simple regression equation has been used.
In order to find out the growth rate in area, production and productivity of maize, compound growth rate has been calculated using semi-log.

To study the magnitude of variability in area, production and productivity of maize, co-efficient of variation has been computed.

To analyse the socio-economic characteristics of the sample respondents, simple percentage analysis is used.

Cobb-Douglas type of production function in log form was used to analyse the determinants of gross returns.

To find the resource-use efficiency of factor inputs, marginal value productivity of each of the significant input variables for marginal, small and medium farmers was analyzed.

To measure the marketing efficiency of the various channels in the marketing of maize, Shepherd’s method was used.

Price-spread was measured by using concurrent margin method where the margin was the difference between the price paid by the ultimate consumer and the price received by the producer.

Time series analysis was carried out to study the temporal variations in the prices of maize using multiplicative model.

To find out the factors motivating maize cultivation, factor analysis has been used.

Garrett’s Ranking Technique has been used to identify problems in production of maize.
F-test has been used to analyse the problems of marketing of maize and measures to overcome the problems of marketing of maize.

1. 10 LIMITATIONS OF THE STUDY

The data and information on production and marketing of maize were collected from a sample of maize cultivators by personal interviews with the help of pre-tested schedules. Hence, the data collected and inferences drawn from them are subject to recall bias, as maize cultivators did not maintain any records. Since the study deals with marketing intermediaries also, the data furnished by them may have some bias. But necessary care was taken to counter check the data. Further, this study is confined to a particular agro climatic region and the conclusions drawn are applicable only to the regions similarly situated. Hence the results of the study have to be interpreted with the above limitations in view.

1.11 CHAPTER SCHEME

The present study is divided into six chapters.

The first chapter entitled “Introduction and Design of the Study” introduces the topic and traces the development of maize cultivation and marketing. Besides Introduction, this chapter includes Statement of the problem, Objectives of the study, Scope of the study, Concepts and review of previous studies, Methodology, Sampling Technique, Period of the study, Tools of analysis, Limitations of the study and Chapter scheme.
The second chapter entitled “Profile of the Study Area, the Respondents and Package of Practices in Maize Cultivation” summarizes the profile of the study area, characteristics of sample respondents and maize cultivation practices in Dindigul district.

The third chapter entitled “Maize Production – An Overview” analyses the area, production and productivity of maize at the world, national, state and district level. This chapter also analysis the growth performance, magnitude of variability and trend values in area, production and productivity of maize.

The fourth chapter entitled “Cost and Return Analysis of Maize Cultivation” analyses the factors motivating the cultivators to involve themselves in maize cultivation, the cost of production, profitability, production function, resource-use efficiency and returns to scale and the problems encountered in maize cultivation by the cultivators in the study area.

The fifth chapter “Marketing of Maize” describes about the channels of distribution, price-spread, price analysis, marketing efficiency, problems of marketing of maize and measures to overcome the problems of marketing of maize in the study area.

The sixth chapter entitled “Summary of Findings and Suggestions” epitomizes the major findings of the study. A few suggestions have been made for improvement.
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