CHAPTER II
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2.1 Introduction
Agriculture and investment have ever been the kingpin for the healthy survival of a country like India. It contributes to the significant share of the GDP in India. Therefore, investment in such agricultural and allied activities has to be thoroughly studied to observe the trend in line with the investment alternatives available world over. A well-planned investment in agriculture shall be offering a fruitful return over the period of cultivation. However, here comes the question of how that plans become "perfectly planned". Strict planning must be crafted out considering all related constraints to derive the best out of the agricultural activities.

The researcher has gone through plenty of previous studies, published articles, reports, etc. related to the agricultural growth and investment portfolio of agrarians to critically look at the existing knowledge horizon. As per literature planning, the study gave focus on to respond to the changing scenario in agricultural portfolio. The relevant literature is widely covering from concepts, methodology, quantitative, qualitative and policy papers. This chapter has been classified into different sections based on the nature of literature. They are primarily broken down to Indian agriculture growth and agriculture trade and Implications of liberalisation on agricultural investments, agriculture diversification, crop diversification and modernisation, and finally the agriculture investment, developments, cropping pattern and diversification in Kerala.

2.2 Review on Indian Agriculture Growth and Developments
Karthick & Chandrasekar (2016) explored the relationship between agricultural area, production, and yield with the use of secondary data from government sources for 15 years preceding the year of study. The study had analysed three years of export data separately as well. For the methodological convenience, total agricultural output was divided into food grains and non-food grains and applied different descriptive and trend statistics. Moreover, the study significantly pointed out the importance of Integrated Farming System (IFS) which would enhance efficient utilisation of farming resources. In the end, the study concluded that overall cultivation is rapidly reducing
because of the scarcity of water and irrigation facilities. Notably, the research had only emphasised on integrated farming but not on the agricultural portfolio in particular.

Saleena (2017) observed the recent trends in agricultural developments in India with a focus on Kerala State. The researcher gave more attention to Kerala's performance in comparison with rest of India by considering the area, production, and productivity (yield) as parameters. Trend and percentage analysis were used to describe the past and present state of the performance. As a concluding mark, research results documented a diminishing trend of agriculture in the State and would require a paradigm shift to transform the traditional system of agriculture to a modernised sector by adopting technology-driven practice.

Tyagi (2012) in a research article, conceptually explored an overall view of the agriculture growth history happened during the pre and post-independence time frame until 2005. The researcher drilled down on the growth pattern of the agriculture in India by majorly classifying the post-colonial period into 15-20- years' time slot. Together with, the study had slightly linked agriculture growth trend up to the different macro policies which would push the growth upwards considerably. This research article focused more on the policy review dimensions. However, some secondary government data were also processed and depicted to back the study. Finally, the study analysed the issues & prospects, and corresponding policy changes took place during the period under review. Also, it articulated that the agriculture is the backbone which contributes a large share in GS; it needs to be well-maintained too. Otherwise, it would cause inflations and imbalances at the macro level, the study concluded.

Ghosh (2008) analysed the sustainability of Indian agriculture and the development by examining the trend in the area under High Yielding Varieties (HYV) crops and the trend of the annual compound growth rate of output and yield of produce in India. In his analysis, though the new technology-inclusive farming strategies gave a short-term income growth during the 1990s, the study had strongly warned about the infertile soil and consequent agriculture regressive growth as well. Thus, HYV had several environmental and sustainable development implications as well. The author
noted that the National Agriculture Research System (NARS) could play an imperative role in the development of location specific and environmental-friendly technologies.

Saran (2009) through a book chapter, had analysed the scenario in Indian agriculture, it highlighted the areas like foreign trade, horticulture, food processing, and sustainable agricultural practices. Theoretically put, it discussed the opportunities in Indian agriculture ahead, the author stress on the needs to be able to produce what is saleable, and the same time is open to importing what we cannot produce enough at present. The author emphasised on the importance of adhering to global agricultural practices and standards. Along with foreign markets, it also urges Indian agribusiness professionals to tap the opportunities in the domestic markets. Besides, it was an attempt to discuss the issues that are redefining at present in the Indian agribusiness by challenging and questioning various theories and statements that have dominated Indian agriculture for decades. It also stresses upon a clear and consistent government policy that need to have conductive to a competitive agri-business sector in the country.

Ficci-b2b.com (2009) contributed to book chapter in the form of a report which furnished a brief overview of Indian agriculture which appeared on their business to business portal FICCI B2B. The purpose of the report was to bring out the country’s agriculture prospects by highlighting India being the second largest producer of fruits and vegetables in the world, the exporter of spices and the biggest producer of milk then. The report identified variables of such climatic factors of abundant seasonal rains and around the year sunshine, which have been a favourable atmosphere for good agricultural production and the country achieved significant advances in productivity of primary food and cash crops. The report pointed that India has strong potential in horticulture and allied agribusiness sectors like dairy, livestock, and fishery. This study also briefly tracks the growth in agricultural finance, insurance and agri-produce marketing.

Behera & Mishra (2007) through their article, made a suggestive policy framework perspective for agriculture. The study started with the analysis of Indian Agriculture, and different types of policies undertaken to solve the real-life problems existed then.
The study highlighted the role of governments in building a prospective agrarian society. In their study, it was discerned that the absence of input markets & institutional control has not only increased prices of inputs, but it also created uncertainty on their availability in the right allocation of quantity, the price at the right time to small as well as marginal farmers. The researcher observed a steady plunge in subsidies on seeds, pesticides, fertilisers, etc. offered by governments, ever-fragmenting farmland which would increase the cost of agricultural produce. On the other hand, lack of marketing proximity to the output market, weakness in agriculture industry linkage, asymmetric information, and the absence of agri-business relations have limited farmers from getting right prices for their commodities. It concluded that all these external crises caused the farmers to drop the cultivation and find an alternative job available.

**Reddy & Mishra (2008)** in their study investigated the trend among small and marginal farmers and found that the incidence of suicide had been higher, subsistence agriculture moving to the high-value crops with a strong motivation to improve their social and the economic status. They are needed to take the risk in small agricultural entrepreneurs whose success lead to the basic premise for the transformation of rural India towards the better and equitable income and livelihood. So, the farmers' distress is not due to the enterprising qualities of farmers who look through growth and even achieve it in good measure. However, drought-prone environment and the non-caring policy regime move those who bring growth into the victims. In a nutshell, the study linked rural development with agriculture while highlighting the negative impact of natural calamities in the agro-based states like Andra Pradesh & Punjab.

**Thakur & Ravinath (2007)** demonstrated the awareness of export procedures and policies among farmers. The objective of the study was to bring forward the problem and to critically assess attractiveness of standards, policies and regulations, consumer preferences and proper business practices in every product category and area for achieving the cutting edge in international market competition. The investigation suggested many measures to increase the awareness of ever-changing export procedures and policies.
Deepika (2007) sought to establish through an examination of empirical evidence by studying the relationship between agricultural trade and export and GDP growth. The paper developed and tested a causal model with distinctive reference to the impact found post-1990s. Paired T-Tests and Trend analysis were used to conclude the result. The results documented that there is signifying role of external trade of agricultural produce; however, the impact of agriculture on balance of payment was found to be quite minimal.

Veellingiri & Thiyagarajan (2007) examined the cashew nut crop profile of India. The research empirically analysed the total cashew nut production in India and its proportionate share in the global market. It highlights that the crop grows with minimal fertility and a few inputs. In India, cashew is produced mainly in the coastal regions of the states of Kerala, Karnataka, Goa, Maharashtra, Andhra Pradesh, Orissa and Tamil Nadu. Kerala stands first in the production of cashew in India, with a contribution of approximately 50 per cent of the total production. Cashew is considered as the most important cash crop in south India. It was discovered that India commands about 40 per cent share of the international market in cashew production. The study discussed the yields and revenue generated out cashew for a five-year period (2000-01 to 2005-06) and concluded with the importance of cashew nut production promotion as it has a global market. In every state, the respective manufacturers and other related associations/organisations are committed to provide need-based assistance to farmers, buyers and sellers for developing the cashew industry in India shortly.

Peter (2007) discussed the current trends in the Indian rubber plantation industry. The article discussed the trend in production, consumption and import and export for five years. The variable considered for the study were the area, production, productivity, and their relative growth trend. It also analysed the consumption trend of Natural Rubber (NR) during the period under study. Finally, it looked through the price trends in the local and international market by taking Kottayam (Kerala) and Bangkok (Thailand) respectively. It concluded with a need for biotechnology and intensive research on rubber technology leading to product diversification. It hinted the e-marketing inclusive growing with a particular focus on North East as well.
2.3 Agriculture Diversification and modernisation

Birthal et al. (2013) in their study revealed that agriculture diversification towards high-value crops could potentially strengthen farm incomes in a country like India where demand for high-value food products has been mounting speedily than that for staple crops. Horticulture dairy farming, floriculture livestock management, etc. are mostly earning a higher income to the agriculture sector. The diversification towards high-value-added crops can minimise the poverty through the participation of small farm holders. The study also reflected that compared to larger farms, small farm holders showed more participation in high-value fruit and vegetable production. The high capital intensity and more gestation lags in fruits seem to be the limiting force for small farmers having a small capital and a low appetite for the riskier fruit market.

It is also given that; in India, agriculture is providing higher labour endowments with a predominance of smallholders, the allocated share of resources to high-value agriculture continues to be relatively small, although it is increasing over time.

Singh (2004) asserted that the farmers face obstacles in getting effective participation in contract farming. He viewed that there is not so much need of Multinational Corporation but also the requirement of a variety of enterprises, it ensures the participation of farmers in agro-industrial sector development as equal and active partners. Further, since the current system of cooperatives in the state does not work efficiently to procure the business needs of such farmers, the new generation cooperatives (NGCs) should also be started. It also proposed in mobilising some of the capital surpluses available with these farmers for cooperative structure. State agencies, farmers' organisation and NGOs should intervene in contract farming as intermediaries to protect the farmers' interests. The contracting need not be encouraged for all crops, and the state should play more of a regulatory role rather than a promotional one. It has acknowledged that the agricultural diversification would work exclusively if the current system of procurement based on MSP is in favour of new crops.

Deshpande et al. (2009) In their study explored the hidden opportunities that exist in the segment of agribusiness. The purpose of the paper was to look through tropical features such as biodiversity, and abundant medicinal plants hid in India. It
emphasised and directed towards medicinal crops, world trade in the medicinal crops, and their marketing channels. Moreover, most medicinal crops provide more returns than traditional crops. The paper stated the scope for raising intercrops & traditional crops side-by-side. The study used primary as well as secondary data at the macro and micro levels. The study selected two important crops such as medicinal and aromatic crops which are primarily cultivated in two districts of Karnataka.

Joshi et al. (2004) In their paper entitled "Agriculture Diversification in South Asia: pattern, Determinants and Policy Implications" attempted to analyse the extent, nature and speed of agricultural diversification in South Asia and India exclusively. It noticed the determinants of agricultural diversification and determined its implication on food security, employment and constant use of natural resources. The research applied the generalised least square method (GLS Method) to determine the significance of different variables which affect the diversification. The study has found that the agriculture sector in South Asia is gradually diversifying in favour of high-value commodities, like fruits, vegetables, livestock and also fish products. Markets and roads were the critical determinants for diversification in case of India. In rainfed areas, diversification was more asserted, which were by-passed during the green revolution. The rainfed areas are becoming a hub of non-cereals due to their low water requirement and abundant labour supply. Further, the High-value crops have substantial potential for generating employment opportunities.

Anwer (2010) in his doctoral thesis observed that there is a remarkable scope for agricultural diversification in eastern states of India. It is possible only by using scientific and systematic practices and inputs suitable to their local conditions. He argued that crop diversification could be used as a tool to upturn the total productivity and far income in these states. Agriculture can be broadened among the crop, fisheries, livestock, horticulture, floriculture, and sericulture etc., for which north-eastern states have plenty of potentials. Finally, the study concludes that floriculture is attractive and has ample future opportunity of getting revenue by implementing practices like the production of perfumes, rose-water, and oils etc. Herbal farming is another good choice as the herbal crops need only small holding for their production which is suitable to the eastern states. These crops are used to make ayurvedic
medicines and extract oil for medicinal use. Therefore, diversification of agriculture must be complemented with, small-scale cottage industries.

**Birthal & Joshi (2006)** In their research paper "Diversification towards High-Value Agriculture-Role of Urbanization and Infrastructure" have analysed the diversification process in Indian agriculture towards High-Value Commodities (HVCs), i.e. fruits, vegetables and livestock products. It was found that compared to other food commodities the share of high-value commodities in chilled agricultural products is high and also the compound annual growth rate of HVCs is also higher thus varying the increased diversification of Indian agriculture towards HVCs. The study also found that this diversification is being further advanced by increased markets accessibility and the factors of their transportation facilities from production sites to consumption sites. The markets entry is approximated by urbanisation and road density. The sample districts with a high level of urbanisation exhibited greater diversification. Also, with the quick growth in income, the food basket of rural and urban consumers is changing drastically in favour of high-value food commodities.

### 2.4 Review on Crop diversification

**Shiyani & Pandya (1998)** in their study examined the levels of crop diversification in different agro-climatic zones over a period. The study observed that the farmers shifted their cropping pattern from subsistence crops to the commercial crops. Relatively on an average, the higher growth rate of acreage under castor, turmeric, mustard, rapeseed, sugarcane, maize and wheat were found in different agro-climatic zones in Gujarat, the negative compound growth rates of acreage under pearl millet, cotton and jowar were noticed in most of the zones. The study also suggested for the establishment of various agro-processing industries and infrastructural facilities, arrangement for crop protection, maintenance, construction and management of better irrigation works, research prioritization and also distribution of quality seeds and seed materials of the specific crops in the specified area on the basis of cropping pattern and needs of the people of that region.

**Bhat et al. (1989)** in their study, analysed the crop concentration and cropping pattern in Jammu and Kashmir State by using the data available from official reports. Cropping pattern had an important role in determining the level of agricultural
production and reflecting the agricultural developments. The objective of the study was to analyse the changes in cropping pattern and causes of changes and crop concentration of mainly three food crops. Shift and deviation of two types of cropping pattern are observed by the study. Shifting cropping pattern meant two or more cropping patterns for same crops, and deviation pattern meant changes within cropping pattern due to the allocation of different land between the same set of crops. The study revealed that no shift in cropping pattern happened between years and all over the past 14 years. The research detected signified changes that there had been a diversion from cereal economy to market economy, which was a good and healthy sign for the development of the agricultural sector of the state.

Praduman & Mittal (2003) looked into the crop diversification followed by farm size groups in the State. The study examined changes in cropping pattern of various Indian states that took place in three decades during the 1970s, 1980s and 1990s. It also measured the aggregate changes in cropping pattern regarding the effect of substitution and expansion. It also examined the degree of crop diversification in different farm size groups. The result obtained from the analysis was that, in the overall changes during 1967-96, about 57.5 per cent increase in crop area were due to the substitution effect, and due to the expansion effect, it was 42.5 per cent. In the southern states of India, there had been a significant change in the area under non-food grains, and that increase in the area of non-food grain area had been at the expense of a substantial decline in the area of coarse grains.

Singh & Sidhu (2004) analysis was carried out related to the factors in declining crop diversification in the State of Punjab. The study analysed the growth of agricultural output in Punjab and the role of the crop diversification and crop shift in the growth of Agriculture sector. Agriculture production in Punjab has been experiencing a sharp decline in diversity in the cropping pattern and the occurrence of wheat-rice specialisation over the past few decades. Overuse of natural resources, growing income risk and ecological problems were the serious concerns of that declining diversity. Due to enhanced yields and increased area, wheat and rice reported the highest growth in output. To know the crop diversity, Diversification index, growth in the combined value of output was disintegrated into the area and average yield. During the green revolution period, the impact of the area and the
aggregate yield on growth were almost the same and the in post-green revolution period, the result of crop yield was almost double that of the area. Future growth in the agriculture with the present crop patterns and technology would derive mostly from the area of growth which is limited due to water constraints otherwise; the crop pattern shall have to be changed to high-value crops such as vegetables and fruits. It was found that, as the diversity in the production pattern declines the changeability in the gross value of production increases.

Deshpande et al. (2007) In their paper entitled "Crop Diversification and Agriculture Labour in India" examined the process of crop diversification in agriculture and its impact on agriculture labour. For measuring the level of diversification in this study, the Herfindahl Diversification Index was used. The study found out that there is a direct connection between diversification and the welfare of agriculture labour. The study proved that some states have led to the welfare losses in these regions due to the diversification in favour of rice and wheat, and also leads to thinly spreading of resources and miss-directing the engine of growth. The share of agriculture sector in the national income has been shrinking at a faster rate than the density of agricultural worker was also observed by the study. All these observations point out unanimously to the fact that this type of diversification may have a depressing effect on the agriculture labourer's welfare.

2.5 Agriculture Trade & Implications of liberalisation on agricultural Investments  
Nasarudheen et al. (2007) attempted to assess the performance of agricultural trade in the post-reform period by estimating growth rates, indicators of trade openness and various other indices. The analysis period was divided into two major section as pre and post-liberalisation. Published growth rates are used to measure the past performance of major economic indicators and export of commodities. Using the exponential growth function to analyse the growth in quantity exported, export value and unit value (Rupee/Dollar) realised from exports. An important and interesting observation made in this study is that with the rice and marine products, the post-liberalisation period growth in the value of export was showing a decline in unit value in rupees. The study concludes that to claim an increased world market share, India is
harnessing the export product essential for those agricultural products which are demand driven, with quality consciousness for realising higher benefits is critical.

**Bhaskaran (2007)** discussed the India's agricultural export decline in the post-independence era from 50 percent of the GDP to 20 percent, attributing the decline factors like growth in population, the consequent rise in domestic consumption and also lack of technology application. The same article discussed the agricultural commodities like rice, wheat, spices, cotton, cashew, tea and their production level and growth with the technological application by using trend analysis. The study also touched upon the policy initiative including the future role and functions of banking, food security in agricultural trade, and also examining the role of technology needs in the agriculture. In the end, it highlights some of the national commission's recommendations on agriculture to boost the agricultural output to become more competitive internationally.

**Sreenivasa & Vishalakshi (2007)** analysed the trade policy initiatives in different sectors of agriculture. This review article looked through agriculture and related policies implemented post-reform. Various trade policy initiatives launched in the agricultural sector post-1991, examined both at the general and specific commodity levels. Contract farming is found to be acting as the considerable potential for agriculture. A sick status was observed on the trade policies concerned with products such as tea, seeds, spices and also the marine sector which are major constituents of the Indian agricultural trade. The study up brings that the trade policy initiatives are changing in the outlook towards foreign trade in agriculture. The article again states the strong connection between trade facilitation in agriculture and increase in productivity.

**Chand (2004)** observed the trends in international trade in agriculture under WTO regime. The analysis revealed that in the post-WTO period, the ratio of imports to GDP has increased, and also the ratio of export to GDP for agriculture sector followed small decline. The author showed from the trends in exports that India has not been able to maintain the steady flow of export of commodities like non-basmati rice, wheat, cotton and sugar cane. It had also witnessed that the export of spices, tea and coffee have been affected adversely. However, these studies have not focused on the
changes in the area and changes in the productivity. Liberalisation of trade influences area allocation and production of these crops through the prices. An attempt was made to analyse the changes in the area under tea and coffee, production and productivity of these crops during pre and post-reform periods.

**Gupta (2007)** researched into the progress made so far and the current status of the agriculture. WTO negotiations statistics provided in this study shows that the developing countries have achieved only marginal benefit through emerging trading rules since the recognition of article of association in the Uruguay Round of talks and a high degree of protectionism is prevalent in the developed countries. It highlights that developing countries are still subsidizing the agricultural products. The anticipated value of global welfare that they would accrue, based on several studies has also been illustrated. The proposal put forward by different economic cooperations enrooted to a liberalised, multilateral agricultural trade structure had also been discussed. The priorities sought by the developing and the least developed countries to help protect their farmers have been included in the concluding section.

**Sakeer (2011)** in his doctoral thesis deciphered the WTO policies and its implications for Indian agriculture. The researcher used doctrinal research method to understand the impact of WTO on agriculture. For that matter, FDI inflows, population growth, food grain productions & agricultural growths are chosen as the parameters. Simply put, it analysed the policy level changes due to WTO doctrine introduction, and its impact on the agriculture. Further, the study found that WTO had impacted the domestic productivity of agricultural produce and it had a multiplier effect on other sectors of the economy as well. The investigation suggested that the government should promote farmers to go global by exploring the R&D opportunities.

**Dev (2002)** analysed the factors affecting the growth of the agriculture sector. The study also analysed the inactive progress in the agriculture sector and its downside impact on the rural employment. It also observed need to have a viable agriculture and strive with the other countries under the WTO scenario, and also the growth rate of agricultural credit for small and the marginal farmers come down in the 1990s as compared with the year 1980s. During this period, there was no such decline in credit growth for large farmers. Rainfed in this public investment is a cause of concern as
well. The important source of an increase in employment is agricultural development. The study signified that a shift in cropping pattern in favour of non-food and cash crops is needed. Additionally, Growth in Rural Non-Farm Employment (RNFE) can improve rural wages and employment opportunities.

**Exim Bank (2007)** reported on the export potential of the plantation crops like tea, coffee, rubber, cashew nut, areca nut, coconut, cardamom and pepper. The plantation crops are highly income generating if managed properly. India is favourably positioned in the area of the plantation as well as in the cost of labour. In 2003, the total area harvested in plantations was 4.3 million ha, and the produce were 12 million tonnes. India is the largest producer as and also one of the largest consumers of Tea in the world. It also imports tea mainly from Indonesia, Vietnam, Kenya and Sri Lanka. The coffee plantation is concentrated in the southern part of India. The Robusta variety coffee is mainly produced. In natural rubber, India is one of the adopted countries, with a per hectare yield of 1600 kg. Export towards improvement in quality and making Indian brands popular abroad will be the key for the plantation sector in the international market. It notes that encouragement should be given to form strategic alliances/ joint ventures in this sector with an objective of bringing technology and value addition to this sector.

**Chand, Jha, & Mittal (2007)** in their study, evaluated the challenges of the sector of oilseeds in the wake of liberalisation under the WTO regime. Diminishing of edible oil import tariffs under WTO may leave India with less scope to protect its domestic oilseeds industry in the future. In this combination with the already high level of imports will make it particularly vulnerable to global price volatility. For undertaking a reduction in tariffs, four formulas have been proposed. Sliding scale, linear harmonisation low ceiling formula includes these. The country also urgently needs to boost its domestic competitiveness in this sector.

**Deepika (2007b)** in her article states that India has established itself as a leading developing nation opposing the undemocratic functioning of WTO and has gone far in liberalising its agriculture sector. The recent EXIM policies adopted have helped bolster agricultural trade. As per obligation under WTO, relaxation in licensing of commodities for import has been progressively made from 1995-96 through 2002. In
tariff reduction too, progress has been substantial, though India had not committed itself to tariff cation program. The article also compares Indian Trade Policies Vis-a-Vis its trading partners, in the light of Agreement on Agriculture. India has been able to provide collective leadership in impressing the three bands of reduction on the developed countries, the result of which was evident in USA and EU's commitment to tariff reduction in Zurich mini-ministerial.

2.6 Review on Agriculture investment and developments in Kerala

Mahesh (2000) in his research elaborates the implementation of land reforms and states that the agriculture sector in Kerala has undergone extensive changes in farm size, cropping pattern, cultivation practices and productivity. There has been a phenomenal development in the number of agricultural holdings leading to the materialisation of the immense number of small holdings. The study examined whether the increase in productivity of land can be described by the decrease in the size of holdings. It was verified through a sample survey conducted in a rural locality of Kerala. However, more detailed analysis using regression methods shows that no sound relationship exists between farm size & productivity. In-depth analysis, to identify the causal factors of productivity was made and the proposition that those cultivators having non-farm sources of income have more access to the resource for farm expenditure than cultivators whose sole source is cultivation was not found true in the observed data. The proposition that farms employing family labour achieve productivity higher than of farms employing only hired labour also did not provide any conclusive evidence. However, the survey data indicated an association between crop mix and productivity.

Thomas (1999) revealed that the changes in the cropping pattern and low growth rate in crop productivity were the two factors in the pattern of agricultural development in Kerala since early 1980s. A detailed examination of the major factors responsible for cropping pattern change was analysed in the study using secondary data during the 80s and 90s. The study found that a low growth rate in the price of rice, shortage of farm labourers and a rapid increase in their daily wages, low price of land under food crops, paddy, and tapioca, migration of people to urban areas, the rational course of profit maximisation were the main reasons for the conversion of land from cultivating
food crops to other uses. The growing pressure of population and development of the secondary and tertiary sectors forced the conversion of agricultural land into others which reduces the total area under cultivation. The investigation concluded with an observation that two salient features of the pattern of agricultural development were the better growth performance of cash crops and changes in cropping pattern. Declining profitability, shortage of farm labourers, the high price of agricultural land and its conversion to non-agricultural uses were the major problems of the state, cited by the study.

Mani (2006) examined the performance of agriculture sector in Kerala with unique emphasis on the post-economic reform period. The rate of increase of agricultural production in Kerala was remarkably higher during 1980s. Interestingly, it was the increasing trend in the output of non-food grains, mainly during the second half of the decade. In the nineties, however, the growth rate of agricultural production was coming down considerably. Food grains output failed to keep pace with the growth of population and consequently, the per capita availability of food grains has declined. These trends in the growth rates of agricultural production are directly or indirectly connected to a series of related issues like input supply, markets, price policy, trade policy etc. It looks at the growth patterns in the area under different crops and reveals that the share of gross cropped area under rice has consistently come down because of the growing dominance of cash crops like coconut and rubber. The result says Kerala is 50 percent short in rice production compared to consumption requirements. The key takeaway of the study was that the globalisation and the WTO regime forced to make substantial reforms in the sector of agriculture.

Jayakumar & Velayudhan (2002) In their study tried to analyse the cause and consequence of agriculture stagnation in Kerala. The study was limited only to major food crops and cash crops. Secondary data were used in the study for analysis. Growth indices of various crops were calculated from the year 1960-61 to 1999-2000. The study revealed a significant decrease in the growth of area under paddy and tapioca while the nominal increase was noted for coconut and pepper, but the rubber has shown a four-fold increase. An increasing trend was shown in the production all crops. Rubber depicted the highest growth in productivity and coconut showed the least. The study pointed out that the role of old technology prevailing in the state has
affected in the total production and price changes adversely. To sum up, relative profitability would depend on the farmer's decision also. The high wage cost hypotheses is not meaningful unless the other related needed factors are taken into consideration.

Pillai (1994) deeply analysed every aspect of agriculture in Kerala during 1958-59 to 1989-90. In this study, secondary data were used for its analysis. The relative share of agriculture and allied sector in the State Domestic Product, cropping pattern, land utilisation pattern and annual growth rates of area, production and productivity of major crops were taken into consideration for the study. Also, the study explained the major two crisis which were - the grave situation of coconut and paddy started in the mid-seventies and the shifting of the areas under food crops in favour of cash or plantation crops.

Santhakumar & Narayan (1999) carried out an investigation to study agricultural trend and prospects of Kerala to comment on prospects of agriculture growth shortly, with the factors affecting the performance of agriculture as the primary objective. The study concluded that the agricultural status of Kerala shaped with factors like price factors, changes in the landholding pattern, factors of agro-climatic change, which influenced the cropping pattern and the level of output. Unstable fluctuations in the market conditions for coconut might continue, and there might be a decline with no drastic increase in its yield rate. It observed that rubber might continue to be a principal item of income earned off the state, even though the price gap between international and national level would come down. As per general tendencies, traditional verities would be continuing by the smallholders, while the production to the market would be oriented by those who had an economic size of holdings, water resources might be produced and distributed by the emergence of the new institutional mechanism. To a great extent, investment in agriculture enhanced the non-agricultural opportunities also available to the members of the farm family. The location specific and resource-based planning of agriculture is also being aided by the assessment of resources and the area of information by the local government.

Kannan & Pushpangadan (1988) attempted to explain the agricultural stagnation in the state since the mid-seventies using secondary data for analysis, and the period of
the study was from 1962-63 to 1985-86. The study shows that the major two factors responsible for stagnation were the absence of the provision of inputs like water and land development and the environmental degradation causing the soil quality and water availability. To know the overall performance of the agricultural sector the two methods available, which were the decomposition method and the statistical estimation using different functional forms. The main conclusion derived was the decline that took place in Kerala's agriculture since mid-seventies had been like that it had wiped off the growth rate during the sixties and the early seventies. The number of rainy days reduced by deforestation along with the environmental degradation that took place in Kerala mid-seventies. The average allocation decision also depended on the weighted average of past prices.

Viswanathan (2002) gave an attempt to study irrigation facility and agricultural development in Kerala. The objective of the secondary data-based study was to examine Kerala's developmental experience in respect of the intervention in the state irrigation development in post-independence period and its impact on the agricultural performance of the region. The observed shift in cropping pattern was contrary to the conventional notion of irrigation convinced agricultural developments. The changes showed in the share of area under individual crops in the total cropped area. The study also showed that for explaining the performance of the irrigation sector, the shift in cropping pattern went a long way. It was found from the analysis that the share of paddy in the gross irrigated area had declined from 73 per cent in the year 1980-81 to 48 per cent in 1997-98. The profitability ratio of the alternate cropping system made a non-viable paddy cultivation. The major conclusions derived from the study were declining paddy cultivation that caused the paradigm shift in the cropping pattern from paddy to the perennial cash crops; resulted to the significant decline in the area under the paddy cultivation. Since the irrigation projects designed for the growth of paddy and a quick shift in cropping pattern made as an obstacle for the irrigation.

Krishnan, Vasisht, & Sharma (1991) analysed the growth trend of area, production and productivity of the major crops of Kerala, using 17 years (1970-71 to 1986-87) time series data for analysis, the significance of instability of those variables and to evaluate percentage contribution of area and productivity moving increased production of major crops in Kerala. An exponential function was used to measure the
compound growth rate and the yield change, which was acquired as the result of the productivity contribution and interaction effect. The paddy cultivation had converted economically unviable; a shift in cropping pattern in favour of the plantation and commercial crops was making the state rice deficit and the shift in cropping pattern which can be characterised to the exorbitant wage level and the socio-economic factors like gulf boom contributed a greater change.

**Eapen (1999)** considered the pattern of agricultural Development with the 11 commercial crops to be a major determinant of rural diversification in Kerala. The growth of commercial crops resulted in relatively high levels of rural non-agricultural employment like agro-processing, trade and commerce, transport and other services. The study asserts that it was a process of commercialisation, which instigated a relatively high level of rural non-agricultural employment rather than rapid industrialisation or urbanisation.

### 2.7 Review on Cropping pattern and diversification

**Geetha (2006)** made an influential study on the shift in cropping pattern almost 12 years ago. The study comprehensively analysed the growth trend in the area, production, and yield of twelve important crops. In order to statistically test the hypotheses, F-Test, t-test, and regression were used by sub-dividing the total period under study into three sections. Interestingly, yield effects were showing a significant difference from one district to another and regression result depicted that there is a meaningful relationship between the variables. A time series analysis was also carried out to see the trend in the growth, area, and production of agriculture. A paired t-test was carried out to know the difference of each component included in the study. In a nutshell, it was found that food crops were showing a diminishing trend, but the researcher observed that farmers are using rational decision making to jump from paddy according to the market demand.

**Rao & A. Gulati (1994)** put forward that an agriculture growth is not only about self-sufficiency but more about supplying the excess to the places where it's needed. It also emphasises to benefit from trade by shifting to new activities with favourable
domestic and export demand – which signifies the importance of diversification in agriculture.

**Goswami & Challa (2004)** attempted to analyse the Indian land use scenario. The study found that there has been a shift in the area from food crops to the non-food crops which indicated more diversification in recent times. Authors also expected income, price, demand, preferences, rural-urban interferences, government policy, infrastructure development and global market are some of the socio-economic factors that affecting land use planning. Five measures such as the Herfindahl index, Entropy Index, Ogive Index, Modified Entropy are used to analyse the crop diversity. The study found some main issues related to the land use pattern of India, which included the conversion of land for non-agricultural purposes due to urbanisation, industrialisation, high demand for land for housing, etc. The impact of WTO also for more diversified agriculture, problems of soil salinity etc. had also affected changes in cropping pattern. The research suggested that a future increase in production must be enlarging permanently through the increase in per hectare yield. The exploitation of land and water in a sustainable manner would be the centre of the growth process.

**Maria Saleth (1997)** suggested that income and employment prospects of poor rural groups can be considerably ameliorated by changing the size and composition of livestock enterprises to favour income wise more vital dairy animals crop diversification. A professional diversification helps multiply employment and income of the small farmers. The research was administered in the State of Tamil Nadu, the neighbouring state of Kerala.

**Lathar, Pandey, & Goyal (1996)** conducted a study on the diversification and income pattern in Haryana. The study brought out that in order to attain crop diversification, there is an urgent need to further streamline the vital infrastructures relating to input supply system, marketing system to handle extended supply of products and the existing research and extension programmes to augment the adoption of advanced production technologies going forward. This study provided only an agricultural economist perspective without touching upon any financing aspects at all.
Acharya (2003) sought to study the crop diversification in Indian agriculture. The major objective of the study was to analyse the nature and intensity of crop diversification in Indian agriculture at the State and national levels. To recognise the main crop diversification at the national levels, the author used secondary data for measuring the compound growth rate of the area. For the valuation of the Indian agriculture extent of crop diversification at the state level, the diversification index was worked out at two points of time. It revealed that Punjab, Haryana, Kerala and Bihar reflect a high-level crop diversification, also reported a considerable decrease in the output during the analysis period. The significant suggestions proposed by the study were the availability of adequate marketing infrastructure and the extension of permit environment for marketing infrastructure needed for supporting crop diversification and also the legal, regulatory framework to be simplified to empower the private sector to invest.

Cheriyan (2004) examined the changes in the method of labour due to shifting in the land use pattern, and the analysis of land use-pattern changes noted some vital pattern. The area placed to non-agricultural purposes had increased mostly due to population pressures; area under forest has fallen due to the expansion of plantation and river valley projects an increase in the cost of cultivation of traditional crops. More of the land was left fallow or used for less labour-absorbing crops. The study was mainly centred on the secondary data. According to the official records during the past 20 years, the extent of cultivable land enlarged from 60.79 per cent to 70.33 per cent. Land used to non-agricultural uses increased from 6.67 per cent to 8.06 per cent. A portion of shift of wetlands had been for non-agricultural activities, and the remaining portion was available for the re-conversion to paddy fields. The main conclusion reached was that the overall effect of the decrease of wetlands was the reduction of the area under paddy. That led to the unemployment of agriculture labourers and some of them converted rubber tapers, and others continued as the casual agricultural labourers. The workdays reduced by high wage rates and fall in rubber prices as well. Therefore, labourers and the tappers cultivated seasonal crops on a lease basis.

Joseph (1996) carried out an analysis on Kerala agriculture paid attention to the changes in cropping pattern. It proposed to infer upon the surfacing structure of the State agriculture. The long-term socio-economic implications were discussed by
employing appropriate statistical projection tools for future cropping patterns. By assuming the past trend in change in crop acreages of main crops would remain, quinquennial time series data from 1970-71 to 1990-91 used to cropping pattern were subject to a first order Markov-chain analysis to get the conversion of profitability matrix for cropping pattern changes. The major crops considered were rice, coconut, tapioca, rubber, other plantains and also cash crops and other crops. From the analysis, the rubber seemed to be the crop with the highest stability followed by paddy then coconut. Highly unstable crops such as tapioca, other plantains and cash crops and other crops were found. A quick shift in cropping pattern away from food crops was an initiate to have its adverse implications on the State's food security. To reduce the low profitability of food crops and to make their cultivation attractive, the study recommended deliberating fiscal and economic measures.

Eves (2011) earnestly studied to understand the efficient portfolio mix by using farmland investment as one of the investment avenues. The study revealed that investment in farms faces potential risk due to the fluctuating climates and seasonal variation which results in price volatility for agricultural investment. However, the study observed that a significant portion of the rural investments are still made in the farmland but is yet to see the diversification possible within – agriculture diversification or crop diversification.

Utpal (2003) studied changing cropping pattern in theory and practice with particular reference to Agrarians in West Bengal. The objective of the study was to analyse the basic reasons for crop diversification in the framework of the agricultural. For analysing the impact, a stochastic form of the equation was considered. The study made some assumptions based on the earlier studies that the cropping pattern was introduced to raise the expected farm income and the technology changes might influence cropping pattern. And also, improvement of infrastructure, expansion of irrigation, expected normal price, market forces and rainfall played important roles in the determination of area allocation among the food crops. Irrigation facility, relative price, soil condition, price policies of the government, yield of crops, infrastructure, technology etc. were led to the crop diversification in different areas. Analysis of the study revealed that the farmers were much influenced by last year's price of the crop, which was to be selected for cultivation. The farmers relatively expected profitability
and maximum possible net revenue from different combinations of crops decided based on the area allocation of crops.

**Emerick, Janvry, Sadoulet, & Dar (2014)** asked if risk factors limit the advancement in developing countries in their research papers. More specifically, the research found that investment decision in agriculture is influenced by the risk factor extensively in developing countries like India. Interestingly, the study concluded that the access to the new technology increases the cultivating area, fertiliser used, and the likelihood of modern planting methods as well. A weather-induced production variability bids a hopeful method of advancing agriculture in areas that are likely to extreme weather.

**Bastine & Palaniswami (1994)** with an assumption that the cropping pattern is unique; in the sense that homestead system of cultivation is prevalent in almost all part of the state, an analysis of growing trend of crops in Kerala was studied. The contributions of the area and productivity towards increasing the production of major crops in Kerala and the trend in growth rates for 25 years were analysed by the study. Data were collected from an official source to compute compound growth rates and fitted to the exponential function. The coefficient of variation was used to measure the instability of each crop. To measure the contribution of area and productivity towards increasing the production of major crops of the state, the decomposition method was used. From compound growth rate analysis, the considered area under rice, tapioca, and tea showed significant negative trend while pepper and coconut showed non-significant positive trend and areca nut showed non-significant growth rate. A more significant role for the crops like areca nut, ginger, tea and cashew were noticed and change in production because of change in acreage was evident in rice, tapioca, coconut, pepper, rubber and coffee. Sustaining the area under food crops and stepping up production through productivity enhancement and augmenting production of smallholder cash crops such as cashew, ginger, pepper & coconut were among major strategies that could make significant changes.

**Rao & Gopaloppa (2004)** explored the process of agricultural growth in Karnataka and its impact on the livelihood of its farmers. The study detected that agrarians in the state are left without an effective cover against adverse climatic effects. While the
proximate cause is adverse weather, it is the weakness of policy interventions which is the real cause of farmer distress. The study suggests that a closer ground level monitoring of weather effects and access to crop insurance could forestall farmer distress or at least keep it within endurable limits. The research and extension and credit and marketing are essential for farmers in a developing country confronted with the powerful forces of transformation and globalisation. The quality and dependability of the services provided by the institutions and infrastructure of Karnataka remain poor thereby causing distress and suicides in Karnataka & other states.

Ramaswami, Ravi, & Chopra (2008) discussed risk management techniques in agriculture. The researchers broadly classified the risks into farmer's level & community level. The production, climatic variation, technological change, market risks, and government interventions are treated to be the main risks to be mitigated, noted. Research also discussed the risk management tools at household & community level. It was concluded that the quality and dependability of the services given by the organizations and infrastructure of Karnataka remains meagre.

Kumar & Chand (2004) have estimated a simultaneous equation model to inspect the determinants of private and public investments and analyse the impact of capital formation on GDP agriculture. The result displays that the rate of return on private investment, which in turn depends on the terms of trade and technology, is noticed to be the most important determinant of the private capital formation. The addition of new farm holdings is the subsequent most important determinant of private investments. The institutional loan supplied to agriculture was found to be an additional determinant of the private capital formation. The impact of subsidy on private investment is also positive. The upsurge in farm subsidies and reduction in revenue accumulations from agriculture are causing an adverse impact on public sector capital formation. The GDP agriculture is affected by both capital formation as well as subventions, besides the terms of trade.

Sekhar (2004) has examined the issue of volatility of agricultural prices in India. The research also deliberated to learn the effect of the spread of international price volatility to national markets. A thorough investigation had been made to measure the degree of price instability of important agricultural commodities in major domestic
and global market and further associates the patterns of variability in the two prices. It has also found out its insinuations for Indian producers and consumers. It has been found out that the inter-year variability is normally lesser in the domestic markets than in worldwide markets. However, intra-year variability, which is short-run and a more apt measure of variability, is as high in domestic markets as in international markets. He suggested that since short-term variability in agricultural prices in international markets is not found to be higher than domestic markets, international trade may be used as a short-range price steadying strategy in case of supply shocks.

Lakshmi & Pal (1988) analysed available secondary data as an attempt to dig the growth of output of crops in Kerala during 1952-53 to 1984-85. Cropping pattern, gross cropped area, unit area yield, a change in gross output occurred due to change in gross cropped area and change in cropping pattern or any of the above combinations determine the production of agricultural commodities in a region. Decomposition of aggregate crop output into the compound elements (7-factor model) was the method used in the study. The compound growth rate for individual crops was worked out for the production, area and yield by fitting exponential function. The gradual shifting of the area to the plantation crops from food crops was one of the major changes happened in Kerala. Increase in the gross cropped area was not possible even if Kerala was well known for multiple cropping and mixed cropping systems in agriculture. Improvement in crop yield through the scientific management to introduce an element of dynamism in state agriculture and basis changes in cropping pattern through the appropriate crop planning with high yielding cultivation, which was one among the main alternatives, also led to maximising the crop output.

Rădulescu, Rădulescu, & Zbăganu (2014) in their study, developed a crop planning model with inclusive portfolio theories. Secondary data used in the study include historical land productivity data for numerous crops, soil types and produce a response to pesticide application. The study divided the entire region into several agricultural sub-regions and analysed optimum risk-return trade-offs available at the cropping pattern chosen. The focus of the study was entirely devoted to the marketing, financial and environmental risks. The same study was concluded that the least environmental risk problem is corresponding to a mixed integer problem with a linear objective function.
Nayyar & Sen (1994) articulated the trade policy reform in India, which seeks to dilute restrictions on trade other than tariffs, and to bring local prices closer to world prices, signifies a fundamental change from the past. The effect would not be limited to trade flows. The changes in the distribution of agricultural output and incomes between areas may stress inequities which would have potential consequences. The increase in domestic prices of wage goods produced in the agricultural sector is bound to corrode food security which would, in turn, have social consequences. There might not be much comfort in the balance of payments either. So far, as the volume of India's agricultural imports or exports would affect world prices, terms of trade are likely to deteriorate. The potentials would be constrained further in as much as structural rigidities in the agricultural sector inhibit supply response.

Aleknevičienė (2010) with an article dealt with efficiency measurement in farming and select economic activities. A comparative analysis was run through the excess return approach. The study adopted the reward-to-variability ration to evaluate the efficiency of financial investment in agriculture. The investigation found that the highest average return was influenced by business risk, which is both experienced by companies and the family farms.

Chand, Raju, & Pandey (2007) considered to study agriculture growth crisis; have discussed the trend in agricultural growth and factors underlying into the slowdown. They also discovered the ways and means to produce acceleration in agricultural growth in India. It was observed that the initial years of reforms were rather favourable for agricultural growth but the post-WTO period seen a plunge in the growth rate of almost all sub-sectors and commodity groups in the farming sector.

Bari (2015) had attempted to study the agriculture diversification from less remunerative crops to high value-added crops and livestock. The researcher looked at the socio-economic impact of such diversification in Aligarh District, UP – India. In the study, maximum positive deviation, Simpson Index of diversity, Karl Pearson's (r) co-efficient of correlation, Z-Score technique were the tools used to delineate the crop combination region and test its relationship with the socio-economic determinants. Thus, the research concluded that accessibility and size of the market plays a significant role to help achieve a balanced crop diversification strategy. Moreover, the
education level of the farmers seemed to be significant with regard to adopting innovative practices in the agricultural market.

**Coleman (2007)** had done a landmark study on the application of modern portfolio techniques to Agriculture. The study had analysed a national outlook of Australia in detail. The country was partitioned into different regions which produce diverse farm output considering the demographic characteristics, topography, and socio-economic condition of the farmers. It developed a matrix for a diversified agri-investment portfolio. A panel modelling technique was used to test different sectors in the agriculture, and a cluster analysis was carried out to understand the diversified portfolio to identify the strength of linkages between returns across different agricultural sectors. It concluded that adding investment in agriculture to a traditional portfolio can mitigate its risk.

**Mani (1997)** studied shift in the cropping pattern in Kerala based on the Intra-district, inter-district and inter-temporal shifts in the area, yield and production of crops like rubber, coconut and rice. The 15 years secondary data-based study argued that due to free trade strategy of India in cropping pattern, a shift occurred in favour of vegetables, superior cereals, livestock and horticultural crops. A significant reduction in the share of area under food crops was recorded in the state under study. A sharp decline in the food crops area was a rare phenomenon occurred in the agriculture of Kerala, which was explained with the help of official estimates. A growth of area expansion was noted for non-food crops especially for rubber and coconut when the state was facing a shortage of food grains because of the area under food grains considerably lowered. As per the study, there was a steep decline in area under paddy cultivation in Alappuzha, Thrissur, Kozhikode and Palakkad. An increase in area for coconut and rubber cultivation and efforts made by the rubber board resulted in a notable increase in the yield of rubber. The area diverted for non-economic activities became large in the state, and a significant shift in cropping pattern in the Northern Kerala districts was among major conclusions emerged from the study.

**Mukherjee (2012)** explored the relationship between the crop diversification and risk in India at the macro level. To analyse the secondary data, Herfindahl Index has been used to substantiate his argument. The study made an effort to compute yield risk, and price of each state using Markowitz's mean-variance theory mapped it with crop
diversification for matching States. The research summed up that relationship is positive in the case of crop-diversification and yield risk. However, price fluctuation risk could not be measured at all.

Abro (2012) used a Generalised Lease Square method with the fixed-effect model to investigate the impact of different factors on crop diversification in Pakistan for 30 years. The research found that there is a high requirement of crop diversification from low-value to high-value crops from single-multiple crops, and from agricultural production to production with procession & value addition. The study suggested that the country must develop a technology comprehensive agricultural portfolio. It also notes that diversified and labour-intensive crops could provide adequate income and employment to the farmer for long-term.

Karunakaran (2014) brought out the crop diversification pattern in Kasaragod, which is the Northern extreme district in Malabar region of Kerala. The study particularly gave an environmental perspective by taking up the permanent crops such as paddy, coconut, areca nut, rubber, pepper, cashew nut, etc. as the crop pattern and linked up with environmental conflicts. It concluded that the region is experiencing a soil quality degradation.
## Table No: 2.1
**Variable Identification Matrix**

*(Investment Size)*

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Item label (Proxy Measure)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS1</td>
<td>Amount of investment in agricultural land is increasing (Both owned/Leasehold)</td>
<td>(Behera &amp; Mishra, 2007), (Bhat et al., 1989), (Mahesh, 2000), (Birthal et al., 2013), (Joshi et al., 2004)</td>
</tr>
<tr>
<td>IS2</td>
<td>Agricultural labourer wage keeps on increasing</td>
<td>(Deshpande et al., 2007; Deshpande &amp; Pradeep, 2007), (Exim Bank, 2007), (Mahesh, 2000), (P. M. Thomas, 1999b)</td>
</tr>
<tr>
<td>IS3</td>
<td>Amount spend on agricultural equipment surge up</td>
<td>(Praduman &amp; Mittal, 2003), (Mahesh, 2000), (Behera &amp; Mishra, 2007), (Mahesh, 2000), (Behera &amp; Mishra, 2007)</td>
</tr>
<tr>
<td>IS4</td>
<td>Cost of fertilizers and pesticides used in farming increases steadily</td>
<td>(Saleena, 2017), (Ghosh, 2007), (Emerick et al., 2014), (Saleena, 2017), (Ghosh, 2007), (Emerick et al., 2014)</td>
</tr>
</tbody>
</table>

**Source:** Literature Review
Table No: 2.2
Variable Identification Matrix
(Investment Preference)

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Item label (Proxy Measure)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP1</td>
<td>There are better investment avenues than agriculture</td>
<td>(Behera &amp; Mishra, 2007), (Bhat et al., 1989), (Mahesh, 2000),</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>IP2</td>
<td>It is better to cultivate in diverse crops at the same time</td>
<td>(Abro, 2012; Acharya, 2003; Anwer, 2010; Bari, 2015; Deshpande et al., 2007; Karunakaran, 2014; Lathar et al., 1996; Mukherjee, 2012; Praduman &amp; Mittal, 2003; Shiyan &amp; Pandya, 1998; J. Singh &amp; Sidhu, 2004; Utpal, 2003)</td>
</tr>
<tr>
<td>IP3</td>
<td>It would be better to invest more in labour-intensive technologies in farming</td>
<td>(Pratap, Birthal, JOSHI, Sonia, &amp; Harvinder singh, 2008)</td>
</tr>
<tr>
<td>IP4</td>
<td>Agrarians are reluctant to take the risk in farming</td>
<td>(Geetha, 2006; Saleena, 2017),</td>
</tr>
<tr>
<td>IP5</td>
<td>Farmers are aware of hi-tech farming, but they are technically illiterate</td>
<td>(P. S. Birthal et al., 2013; Cheriyan, 2004; Joshi, Gulati, Birthal et al., 2004; Mahesh, 2000)</td>
</tr>
<tr>
<td>IP6</td>
<td>It is essential to prefer for investment in training &amp; education in agriculture</td>
<td>(Bari, 2015; Eves, 2011; Geetha, 2006; Goswami &amp; Challa, 2004; Lathar et al., 1996; Pratap et al., 2008; Ramaswami et al., 2008; V. M. Rao &amp; Gopaloppa, 2004; Utpal, 2003)</td>
</tr>
</tbody>
</table>

**Source:** Literature Review
<table>
<thead>
<tr>
<th>Item Name</th>
<th>Item label (Proxy Measure)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID1</td>
<td>The decision depends on Income generation out of agriculture</td>
<td>(Behera &amp; Mishra, 2007), (Bhat et al., 1989), (Mahesh, 2000),</td>
</tr>
<tr>
<td>ID2</td>
<td>Growth and expansion needs is another factor</td>
<td>(Cheriyan, 2004; Geetha, 2006; Mani, 2006; Praduman &amp; Mittal, 2003; Utpal, 2003)</td>
</tr>
<tr>
<td>ID3</td>
<td>Farmers aim to create more wealth out of farming</td>
<td>(Jayakumar &amp; Velayudhan, 2002; Joseph, 1996; Kumar &amp; Chand, 2004; P. M. Thomas, 1999a; Viswanathan, 2002)</td>
</tr>
<tr>
<td>ID4</td>
<td>Variety of crops is a very important determinant</td>
<td>(Bari, 2015; Saleena, 2017), (Eapen, 1999; Geetha, 2006; Joshi, Gulati, Birthal, et al., 2004; Kumar &amp; Chand, 2004)</td>
</tr>
<tr>
<td>ID5</td>
<td>The decision cares for the safety and security of investment</td>
<td>(Deshpande &amp; Pradeep, 2007)</td>
</tr>
<tr>
<td>ID6</td>
<td>Farmers do futuristic investment</td>
<td>(Aleknevičienė, 2010; Coleman, 2007; Geetha, 2006; Râdulescu et al., 2014)</td>
</tr>
<tr>
<td>ID7</td>
<td>Farming decision is made if the funds are getting sanctioned fast</td>
<td>(Emerick et al., 2014; Geetha, 2006; Jayakumar &amp; Velayudhan, 2002; Kannan &amp; Pushpangadan, 1988)</td>
</tr>
<tr>
<td>ID8</td>
<td>Liquidity requirement is another factor</td>
<td>(A. Kuruvila, 2012; Exim Bank, 2007; Ficci-b2b.com, 2009; Jayakumar &amp; Velayudhan, 2002; Joseph, 1996; Karunakaran, 2014; Mani, 2006; Pillai, 1994; Sreenivasa &amp; Vishalakshi, 2007; T. P. Thomas, 2009; Veellingiri &amp; Thiyagarajan, 2007)</td>
</tr>
<tr>
<td>ID</td>
<td>Description</td>
<td>References</td>
</tr>
<tr>
<td>----</td>
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<td>------------</td>
</tr>
<tr>
<td>ID09</td>
<td>Decision depends on risk factors</td>
<td>(Aleknevičienė, 2010; P. Birthal, Jha, Joshi, &amp; DK, 2006; Coleman, 2007; Emerick et al., 2014; Eves, 2011; Mukherjee, 2012; Rădulescu et al., 2014; Ramaswami et al., 2008; Reddy &amp; Mishra, 2008)</td>
</tr>
<tr>
<td>ID10</td>
<td>Availability of special benefits for farmers like subsidies, grants are another factor</td>
<td>(Behera &amp; Mishra, 2007; Gupta, 2007b; Kumar &amp; Chand, 2004)</td>
</tr>
</tbody>
</table>

*Source: Literature Review*
### Table No: 2.4
Variable Identification Matrix  
(Investment Risk)

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Item label (Proxy Measure)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR1</td>
<td>Change in weather/climatic condition</td>
<td>(Behera &amp; Mishra, 2007), (Bhat et al., 1989), (Ficci-b2b.com, 2009; Mahesh, 2000),</td>
</tr>
<tr>
<td>IR2</td>
<td>Landslide, flood, drought, wind, etc.</td>
<td>(Ficci-b2b.com, 2009; Ramaswami et al., 2008; Shiyani &amp; Pandya, 1998)</td>
</tr>
<tr>
<td>IR3</td>
<td>Other geographical problems</td>
<td>(Acharya, 2006; Rădulescu et al., 2014; Reddy &amp; Mishra, 2008)</td>
</tr>
<tr>
<td>IR4</td>
<td>Interest and Repayment of loans</td>
<td>(Pillai, 1994; Saleena, 2017)</td>
</tr>
<tr>
<td>IR5</td>
<td>Cost of inputs (seeds, fertilisers, pesticides, equipment)</td>
<td>(Lathar et al., 1996; Mani, 2006)</td>
</tr>
<tr>
<td>IR6</td>
<td>Processing cost of agro-products</td>
<td>(Eapen, 1999; Saran, 2009; Shiyani &amp; Pandya, 1998)</td>
</tr>
<tr>
<td>IR7</td>
<td>Return uncertainty</td>
<td>(Aleknevičienė, 2010; P. Birthal et al., 2006; Coleman, 2007; Emerick et al., 2014; Eves, 2011; Mukherjee, 2012; Rădulescu et al., 2014; Ramaswami et al., 2008; Reddy &amp; Mishra, 2008)</td>
</tr>
<tr>
<td>IR08</td>
<td>Commodity price volatility</td>
<td>(Ramesh Chand et al., 2007; Eves, 2011; Mukherjee, 2012; S. Peter, 2007; Sekhar, 2004; Utpal, 2003)</td>
</tr>
<tr>
<td>IR09</td>
<td>Marketing constraints</td>
<td>(Acharya, 2006; Behera &amp; Mishra, 2007; Deshpande et</td>
</tr>
<tr>
<td>IR10</td>
<td>Tax policies, legal barriers, import-export restriction</td>
<td>(Thakur &amp; Ravinath, 2007; Vandana Tyagi, 2012)</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>IR11</td>
<td>Unavailability of govt. loans, grants and subsidies</td>
<td>(Goswami &amp; Challa, 2004; Ramaswami et al., 2008; Sakeer, 2011; Saran, 2009)</td>
</tr>
</tbody>
</table>

**Source:** Literature Review
### Table No: 2.5
**Variable Identification Matrix**
*(Crop Diversification Portfolio)*

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Item label (Proxy Measure)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPD1</td>
<td>Crop portfolio is the best option for risk diversified cultivation</td>
<td>(Behera &amp; Mishra, 2007), (Bhat et al., 1989), (Mahesh, 2000),</td>
</tr>
<tr>
<td>CPD2</td>
<td>Divide and cultivate ensures a stable return on investments</td>
<td>(Aleknevičienė, 2010; P. Birthal et al., 2006; Coleman, 2007; Emerick et al., 2014; Eves, 2011; Mukherjee, 2012; Rădulescu et al., 2014; Ramaswami et al., 2008; Reddy &amp; Mishra, 2008)</td>
</tr>
<tr>
<td>CPD3</td>
<td>Multiple crop cultivation requires much thinking, and analysis on the timing fertilisers etc. which increases the burden</td>
<td>(Behera &amp; Mishra, 2007; Emerick et al., 2014)</td>
</tr>
<tr>
<td>CPD4</td>
<td>Investment pattern should follow equality for all crop in crop portfolio cultivation</td>
<td>(Dasgupta &amp; Bhau Mik, 2014; Lakshmi &amp; Pal, 1988; Mani, 1997; Mukherjee, 2012; Rădulescu et al., 2014)</td>
</tr>
<tr>
<td>CPD5</td>
<td>Climate plays a key role in crop portfolio cultivation</td>
<td>(Behera &amp; Mishra, 2007), (Bhat et al., 1989), (Ficci-b2b.com, 2009; Mahesh, 2000),</td>
</tr>
<tr>
<td>CPD6</td>
<td>Extra labours requirement makes multiple crop cultivation less acceptable</td>
<td>(Birthal et al., 2013), (Joshi et al., 2004), (Deshpande et al., 2007; Deshpande &amp; Pradeep, 2007)</td>
</tr>
<tr>
<td>CPD7</td>
<td>Govt is providing agricultural training on crop timings and cultivation are made supportive for crop portfolio cultivation</td>
<td>(Goswami &amp; Challa, 2004)</td>
</tr>
</tbody>
</table>

*Source: Literature Review*
### Table No: 2.6
Variable Identification Matrix
(Agriculture Growth Perception)

<table>
<thead>
<tr>
<th>Item Name</th>
<th>Item label (Proxy Measure)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG1</td>
<td>Unfavourable climatic conditions are the important determining factor for growth</td>
<td>(Behera &amp; Mishra, 2007), (Bhat et al., 1989), (Ficci-b2b.com, 2009; Mahesh, 2000)</td>
</tr>
<tr>
<td>AG3</td>
<td>Availability and maintenance of the Soil quality is essential</td>
<td>(Karunakaran, 2014)</td>
</tr>
<tr>
<td>AG4</td>
<td>Favourable topographical situations are important for positive growth</td>
<td>(Bhat et al., 1989), (Ficci-b2b.com, 2009; Mahesh, 2000)</td>
</tr>
<tr>
<td>AG5</td>
<td>Infrastructural facilities like irrigation, power, transportation, warehousing</td>
<td>(Lakshmi &amp; Pal, 1988; Narayana &amp; et al, 1991)</td>
</tr>
<tr>
<td>AG6</td>
<td>Availability of finance and credit facilities for agriculture is scarce</td>
<td>(Goswami &amp; Challa, 2004; Ramaswami et al., 2008; Sakeer, 2011; Saran, 2009)</td>
</tr>
<tr>
<td>AG08</td>
<td>The cheap labour force is unavailable</td>
<td>(Deshpande et al., 2007; Deshpande &amp; Pradeep, 2007), (Exim Bank, 2007), (Mahesh, 2000),</td>
</tr>
<tr>
<td>AG09</td>
<td>Lacks Infrastructural facilities like irrigation, power, transportation, warehousing in the area</td>
<td>(Karthick &amp; Chandrasekar, 2016; Saleena, 2017; Tyagi, 2012)</td>
</tr>
<tr>
<td>AG10</td>
<td>Lacks agricultural services like insurance, financial services, advertising etc.</td>
<td>(Ficci-b2b.com, 2009; V. M. Rao &amp; Gopaloppa, 2004)</td>
</tr>
<tr>
<td>AG11</td>
<td>Market access is difficult for agricultural products and services</td>
<td>(Acharya, 2003; Lathar et al., 1996)</td>
</tr>
<tr>
<td>AG12</td>
<td>Cost of processing agricultural products is more</td>
<td>(Eapen, 1999; Saran, 2009; Shiyani &amp; Pandya, 1998)</td>
</tr>
<tr>
<td>AG13</td>
<td>Government training and education programmes for agriculturist and farmers is inadequate</td>
<td>(Goswami &amp; Challa, 2004)</td>
</tr>
<tr>
<td>AG14</td>
<td>Government aided loans, subsidies and grants</td>
<td>(Goswami &amp; Challa, 2004; Ramaswami et al., 2008; Sakeer, 2011; Saran, 2009)</td>
</tr>
<tr>
<td>AG15</td>
<td>Favourable export-import policies have to be drafted</td>
<td>(Deepika, 2007b; J. P. Peter, 1981; Saran, 2009)</td>
</tr>
<tr>
<td>AG16</td>
<td>The government must directly supply the seeds, fertilisers etc at concessional rates to farmers</td>
<td>(Joshi, Gulati, Birthal, et al., 2004; Nasurudeen, Kuruvila, &amp; Rajini, 2007; Sreenivasa &amp; Vishalakshi, 2007; Thakur &amp; Ravinath, 2007; Veellingiri &amp; Thiyagarajan, 2007)</td>
</tr>
<tr>
<td>AG17</td>
<td>Government procurement must procure agro-products directly</td>
<td>(Ramesh Chand, 2004; Gupta, 2007a; Sakeer, 2011)</td>
</tr>
<tr>
<td>AG18</td>
<td>Public Distribution System is inefficient and has to be improved</td>
<td>(Kannan &amp; Pushpangadan, 1988; Pillai, 1994)</td>
</tr>
<tr>
<td>AG19</td>
<td>Opening shops in busy markets and special occasions are to be promoted</td>
<td>(J. P. Peter, 1981; Saran, 2009)</td>
</tr>
<tr>
<td>AG20</td>
<td>More Research and Developmental Activities has to be approved</td>
<td>(Ghosh, 2007; Mahesh, 1999; Sakeer, 2011; Shiyani &amp; Pandya, 1998)</td>
</tr>
</tbody>
</table>

*Source: Literature Review*
2.8 Research Gap and Intervention

After going through an extensive literature review, it has been found that there is insufficient study analysed "crop portfolio investments" in Kerala with the special focus on Malabar. Most of the studies related to Kerala agriculture was undertaken were in the areas of the shift in cropping pattern and land utilisation on agriculture. However, the majority of the literature showed that there is less number of ground level analysis by consulting the farmers itself. Farmers are the best go-to persons who can input the actual scenario existing in agriculture. It is also noted that there have been a few studies carried out by consulting the agrarians and their preferences. Thus, the investment preference in agriculture and subsequent diversifications has been studied at a limited level.

Hence, this research is intervening with an aim to see the Changing Scenario in Investing Portfolio of Agrarian Society: With a Study of Malabar Region of Kerala. The study is taking various variables or factor like investment size, investment preference, investment decisions, investment risk, Investment methods that lead to the crop portfolio diversification into consideration. Therefore, the present study is an earnest attempt to analyse agricultural area, production and productivity and the growth trend of different crops in the state, also analyse various components which leads to positive changes on the increase in return on agricultural investment. The study also tries to suggest various strategies which help to strengthen the growth and development of the agriculture sector of the Kerala State, especially in the Malabar region.
References


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Chapter II

Review of Literature


