SOCIO-ECONOMIC ANALYSIS OF CROP INSURANCE SCHEMES IN HARYANA

Thesis Submitted for the Award of the Degree of

DOCTOR OF PHILOSOPHY

in Economics

By

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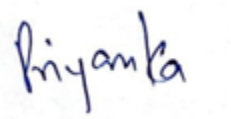
DECLARATION

I, hereby declared that the presented work in the thesis entitled "Socio-*Economic Analysis of Crop Insurance Schemes in Haryana"* in fulfilment of degree of **Doctor of Philosophy (Ph.D.)** is outcome of research work carried out by me under the supervision of Dr. Rajender Singh as Professor, in the Mittal School of business of Lovely Professional University, Punjab, India. In keeping with general practice of reporting scientific observations, due acknowledgements have been made whenever work described here has been based on findings of other investigator. This work has not been submitted in part or full to any other University or Institute for the award of any degree.



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Certificate

This is to certify that the work reported in the Ph.D. thesis entitled "Socio-*Economic Analysis of Crop Insurance Schemes in Haryana*" submitted in fulfillment of the requirement for the award of degree of **Doctor of Philosophy (Ph.D.)** in the Mittal School Of Business, is a research work carried out by Priyanka Awasthi 12021188, is bonafide record of her original work carried out under my supervision and that no part of thesis has been submitted for any other degree, diploma or equivalent course.

Name of supervisor: Dr. Rajender Singh

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Abstract

Crop insurance has emerged as a vital instrument for mitigating agricultural risks and protecting farmer incomes in India, where dependence on monsoon-driven agriculture and increasing climate variability expose farmers to frequent production uncertainties. Haryana, despite being one of India's agriculturally prosperous states with a strong irrigation network and mechanization, faces recurring risks from pests, market fluctuations, and climate-induced challenges. Within this context, crop insurance programs such as the Pradhan Mantri Fasal Bima Yojana (PMFBY) and the Weather-Based Crop Insurance Scheme (WBCIS) have been introduced with the dual aim of stabilizing farmer incomes and promoting sustainable agricultural practices. However, the effectiveness of these schemes hinges upon farmers' awareness, accessibility, affordability, and trust in the system. This study undertakes a comprehensive socio-economic evaluation of crop insurance schemes in Haryana, focusing on their determinants, challenges, and opportunities for improvement, while examining how these schemes affect farmers' financial resilience and livelihood security. The research employed a descriptive design and adopted a mixed-methods approach to capture the multidimensional aspects of crop insurance adoption and effectiveness. A total of 300 farmers across key districts of Haryana were surveyed using a structured questionnaire, ensuring representation from marginal, small, medium, and large landholding categories. The questionnaire was structured into six components capturing demographic and farming characteristics, income patterns, insurance awareness and benefits, challenges faced in scheme implementation, suggestions for improvement, and overall satisfaction levels. Quantitative data were analyzed using SPSS through descriptive statistics, chi-square tests, normality tests (Kolmogorov-Smirnov and Shapiro-Wilk), and frequency distributions to identify patterns and associations. To mitigate concerns of common method bias, Harman's Single Factor Test was employed, and the results confirmed the reliability and validity of the data. In parallel, qualitative data were collected through in-depth interviews with key stakeholders including insurance agents, extension officials, and government representatives. Responses were analyzed thematically using NVivo software, enabling the identification of recurring themes, farmer narratives, and experiential insights beyond numerical data. The findings reveal that while awareness of crop insurance exists among farmers, it is moderate at best, with a sizeable proportion lacking clarity on the scope, coverage, and specific benefits of the schemes. Awareness is particularly low among marginal and small farmers, who are also the most vulnerable to risk.

Accessibility to insurance agents emerged as a significant challenge, with farmers often reporting difficulties in approaching intermediaries for enrollment or claim processes. Similarly, affordability of premiums was identified as a barrier, particularly for farmers with smaller landholdings, with many respondents perceiving premiums as disproportionately high relative to their income levels. A critical determinant of adoption is the trust in claim settlement mechanisms; farmers who experienced delays or a lack of transparency in claim assessments expressed reluctance to renew their insurance, whereas timely and fair claim processing strongly influenced continued participation. The study also highlights systemic operational challenges, including complex enrollment procedures, inadequate availability of local enrollment centers, bureaucratic hurdles, and most importantly, delays in claim settlement that disrupt farmers' credit repayment cycles and increase financial stress. Despite government subsidies aimed at reducing the burden of premiums, farmers indicated dissatisfaction with both the adequacy and fairness of subsidy distribution. Government support and communication campaigns, while impactful in raising baseline awareness, have been limited in reach and effectiveness. Farmers consistently emphasized the need for more localized and targeted awareness campaigns tailored to their cropping systems and literacy levels. Qualitative insights further enriched these findings, highlighting issues of mistrust in institutional actors, gender exclusions in decision-making, and concerns about the digital shift in insurance systems. While policy initiatives increasingly promote the use of mobile apps, online platforms, and satellite-based loss assessments, many farmers expressed discomfort with these technologies due to low digital literacy or poor internet access. Women farmers, in particular, were found to be underrepresented in insurance-related decisions despite their significant role in agricultural labor, indicating the need for a gender-sensitive approach to scheme promotion and design.

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List of Abbreviations

S. No.	Abbreviation	Full Form
1	SEI	Socio-Economic Indicators
2	CI	Crop Insurance
3	CIP	Crop Insurance Policy
4	PIS	Public Insurance Scheme
5	PMFBY	Pradhan Mantri Fasal Bima Yojana
6	NAIS	National Agricultural Insurance Scheme
7	MNAIS	Modified National Agricultural Insurance Scheme
8	WBCIS	Weather Based Crop Insurance Scheme
9	RABI	Rabi Season
10	KHARIF	Kharif Season
11	SHG	Self Help Group
12	FPO	Farmer Producer Organization
13	KYC	Know Your Customer
14	DBT	Direct Benefit Transfer
15	AAY	Antyodaya Anna Yojana
16	BPL	Below Poverty Line
17	APL	Above Poverty Line
18	GDP	Gross Domestic Product
19	NITI Aayog	National Institution for Transforming India
20	MSP	Minimum Support Price
21	NABARD	National Bank for Agriculture and Rural Development
22	RBI	Reserve Bank of India
23	SECC	Socio-Economic and Caste Census
24	FCI	Food Corporation of India
25	AIC	Agriculture Insurance Company of India
26	AI	Artificial Intelligence
27	ML	Machine Learning
28	ICT	Information and Communication Technology
29	IoT	Internet of Things
30	GIS	Geographic Information System
31	NGO	Non-Governmental Organization
32	SC	Scheduled Caste
33	ST	Scheduled Tribe
34	OBC	Other Backward Class
35	PWD	Persons with Disabilities
36	HH	Household

Chapter 1:
Introduction

Introduction

Chapter 1 introduces the foundation of the study by presenting the background, emphasizing the growing significance of crop insurance in ensuring agricultural sustainability and financial security for farmers, particularly in Haryana. It underscores the significance of the study by highlighting the need to evaluate farmers' awareness, satisfaction, and the effectiveness of crop insurance schemes. The statement of the problem outlines the existing gaps in implementation and perception of these schemes. The objectives and research questions are framed to explore various dimensions such as scheme awareness, affordability, compensation adequacy, and overall satisfaction. The chapter also states the hypotheses, designed to test the relationships among key variables. The scope and delimitations specify the study's geographical focus on Haryana and its reliance on farmers' perceptions. Lastly, the organization of the thesis provides a structural roadmap for the chapters that follow, guiding readers through the research process and findings**.**

1.1 Background of the Study

Agriculture is an essential industry all over the globe since it supplies food, fiber, and other resources necessary for human existence to continue. Additionally, agriculture is the source of income for one-third of the economically engaged people. Small-scale and subsistence farmers, pastoralists, fishermen, and indigenous peoples from Asia and Africa are responsible for producing the great majority of the world's food, often on tiny plots of land. These individuals also produce the bulk of the world's food. Small-scale and subsistence farmers have often been seen as "phase-out models" of a pre-industrial mode of production by agricultural policy and international institutions, as well as by corporations and public agricultural research organizations, during the last several decades. Over more than half a century, the notion of "grow or die" has been the guiding premise of development for both capitalism and communist policies, with just a few notable exceptions. Historically, it was widely believed that only large economic units were capable of achieving competitive productivity advances via the use of modern and rationalized agricultural practices, mostly consisting of chemical inputs and equipment. It was believed that a global increase in productivity was necessary to provide food for the rapidly expanding population of the globe. It is estimated that over 3.4 billion people, or 45 percent of the total population of the world, live in rural areas. More than two billion people, or 26.7% of the total population of the

world, are dependent on agriculture. As of the year 2016, more than 57% of Africans were living in rural areas. There were over 866 million individuals who were technically employed in the agricultural sector in 2017, which meant that 53 percent of the population was economically active in agriculture. Numerous governments worldwide have embraced crop insurance and incorporated it into the agriculture industry. agricultural insurance is especially necessary since because traditional redressal procedures, which were first intended to handle hazards related to agricultural production, are failing. Farmers have continuously needed to protect their finances from the hazards associated with agricultural production ever since the crop was first produced on a significant scale. Governments have therefore taken steps to guarantee the long-term effectiveness of these risk-mitigation techniques. The evolution of agricultural growth in India is the main topic of this study. An analysis of the nation's agriculture insurance programs' historical expansion can provide a more comprehensive picture of crop output and safety. Given that the Indian government has developed several crop insurance programs since independence, a thorough evaluation of them would also highlight the peculiarities of the nation's agricultural output and offer solutions for related issues. In doing so, it will also be possible to analyze the advantages crop insurance has brought to the Indian agriculture industry. The study has also examined farmers' perceptions of various crop insurance programs. Examining their viewpoints not only helps us gauge the effectiveness of the nation's many programs but also enables the insurance companies to create more appropriate and cogent crop insurance plans. The study also examines how the New Crop Insurance Scheme is perceived by Indian farmers. Such an investigation reveals the applicability of various programs in the nation's agricultural environment and the degree to which they can be implemented successfully. Furthermore, the related obstacles to the adoption of crop insurance programs in India have also been covered. The study is multidimensional thus it was important to separate the different insurance-using groups. Documentation of the perspectives of loanee and non-loanee farmers is necessary to comprehend the disparate reactions of various target groups to these initiatives. As a result, the study focuses on the insurance itself as well as the individuals who use it and are affected by it. By doing this, the study hopes to offer recommendations on how agricultural insurance might be enhanced in various situations to serve a wider audience and enhance the state of agriculture as a whole. As a result, the study may also be viewed as a thorough manual for reducing and managing several problems that crop insurance companies face. A Report on Haryana Agriculture and Farmers' Welfare published by the Indian Council of Food and

Agriculture 2015-2016.Farmers can safeguard their income from the risks associated with crop production that are outside their control by purchasing crop insurance (Vyas and Singh, 2006). It's a financial safety net for farmers, who have to factor in a wide range of variables that could affect their harvest success before they can rest easy knowing they won't go hungry (Manoj et al, 2003). In a country like India, where weather extremes and widespread pest and disease outbreaks threaten agricultural yields, crop insurance is crucial. Protecting farmers from agricultural productivity uncertainties caused by nearly entirely natural, uncontrollable causes is one goal of crop insurance (Sinha, 2005; Gurdev and Singh, 2010). By pooling the huge percentage of uncertainties that influence agricultural yields, this financial mechanism minimises the uncertainty of crop yield loss and allows the weight of loss to be divided more evenly (Nnadi et al., 2013). Natural, societal, economic, and individual dangers are only some of the threats that crop farmers face every day. However, the utter reliance on Mother Nature that characterises agricultural production sets it apart from all others. Unlike nearly any other endeavour, crop production must be carried out amidst persistent uncertainty brought on by a wide range of environmental and societal causes. Crops typically take the biggest hit since they are exposed to the weather for extended periods of time (weeks to months). Thus, crop production unpredictability is one of the primary risks that all farmers must face, to variable degrees, across all nations, developed or developing. The vast majority of farmers in developing nations, especially in the tropics, are poor and have very few resources at their disposal, making them especially vulnerable to these threats. They are unable to control the possibility of a disastrous crop failure. Technical procedures and enhancements to the social and official framework could indeed help reduce the current crop production uncertainty in developing countries like India. Many separate efforts are needed to achieve this goal. Despite this, there will always be some degree of uncertainty because no measure can guarantee crop production in the absence of all- natural factors. The proposed physical measures also need a cost-benefit analysis to back them up. While it's possible that flooding could have been prevented in many locations, the cost of doing so would have been excessive. Spending more money on risk prevention than the cost of the risk itself is bad economics. Second, since it is so prone to failure, no part of it could be given up for cultivation as long as the 6 population is growing and pressing against the land. When there are occasional risks of calamity, it is in the best interest of the country and the individual owners to keep such lands under the plough. The process of preparing for potential risks in agriculture is intricate. Insurance is ineffective in the agricultural

sector because of its susceptibility to universal and covariate risk (a single peril affecting a huge number of possessions across huge environmental sections). It is already challenging to design a workable crop insurance scheme, and the lack of historical yield figures, smallholding, low-value yields, and reasonably high insurance premiums only add to the complexity. Indian policymakers have discussed crop insurance programs since the country gained independence, despite these limitations. However, it wasn't until the 1970s that the first serious attempt was made. After America and China, India has the largest agriculture insurance program (Swiss Re, 2014) the following is a summary of schemes that have been made in recent years. Crop insurance is a way for those in the agricultural sector to shield themselves from the financial fallout of a crop failure. Farmers are protected from financial difficulties by their safety net (family and farming). By getting crop insurance, which protects them against adverse weather conditions like drought, flooding, hail, and other natural disasters, farmers may protect themselves against financial loss brought on by variations in production. Crop insurance considers the various elements that can impact harvests and helps to mitigate the financial impact of a decline in farm income. Risk management is achieved by shifting production risk to other stakeholders in return for a financial contribution. Insurance plans may provide compensation to farmers who lose money as a result of bad weather. This tactic can be advantageous to farmers as well as the government. Farmers can easily obtain actuarially sound insurance with fast claim settlement and no government bureaucracy. Rain covering is used to shield from the damaging impacts of precipitation. In other words, crop insurance guards against risks to yield but not those related to weather. In both cases, producers suffer a loss of revenue in return for transferring the risk of crop yield uncertainty to another party. Agricultural production is inherently dangerous due to its reliance on ideal weather conditions, which is why insurance is essential for farmers. Determining and implementing appropriate insurance strategies for agriculture is consequently a difficult and intricate task. There are two primary approaches for structuring crop insurance policies: the individual method, which employs yield loss on individual farms to calculate indemnity payments, and the homogeneous area approach, which bases yield and payouts on a standard crop area (Dandekar, 1976; Mishra, 1995). over the purpose of actuarial computation, premiums in all scenarios require precise yield data over the previous 8–10 years. One advantage of the homogeneous area approach is the yield variation data that is available. Farmers who suffer a loss covered by crop insurance are compensated using both area-wide and individual methods. In the first scenario, meteorological

information relevant to his acreage will be evaluated together with individual farmer assessments of losses. Furthermore, he will receive compensation for the full amount of the loss if his farm crop yield is lower than the anticipated normal output (Dandekar, 1976; Mishra, 1995). A huge workforce, a technical team, and sufficient meteorological infrastructure are necessary for this technique to be implemented, and these resources are only available in countries like the US and Europe. To calculate indemnities, developing nations will therefore need to apply the area technique. By using crop-cutting experiments to measure yield loss against risks incurred and typically expected farm output, this approach treats all farmers in a given region as a unit rather than individual farmers. If yield loss occurs, farmers are indemnified accordingly (Dandekar, 1976; Mishra 1995). This time, yield projections will be made for a select few farmers rather than for each farmer. It is usually employed by developing countries that do not have the personnel to carry out extensive tests on crop cutting. The issue of basis risk consequently will be increased since fewer farmers who sustain actual crop loss won't receive any compensation. The actual harm suffered by farmers is therefore not adequately reflected in claims. All types of hazards are typically covered by yield- based crop insurance schemes, but loss assessment is not done scientifically. In contrast, industrialized economies have efficient crop insurance programs because they have enough infrastructure, staff, and funding.

1.2 Statement of the Problem

Agriculture remains the backbone of India’s economy, providing livelihood to more than 60% of the population, yet it continues to be plagued by uncertainties such as erratic weather, pest infestations, and fluctuating market prices, which severely affect farmers' incomes and economic security (Chand et al., 2015; Raju & Chand, 2008). In an agrarian state like Haryana, which is one of the major contributors to India's food grain production, the socio-economic vulnerability of farmers becomes even more critical due to over-reliance on mono-cropping, declining water tables, and exposure to climate variability (Deshpande & Prabhu, 2005; Singh et al., 2021). Crop insurance schemes were conceptualized as a risk-mitigating tool to offer financial security and enhance the resilience of farmers against unforeseen agricultural losses (Mishra, 2009; Giné et al., 2012). Despite the launch of several flagship schemes like the National Agricultural Insurance Scheme (NAIS) and the Pradhan Mantri Fasal Bima Yojana (PMFBY), the actual penetration and effectiveness of these schemes remain questionable in states like Haryana (Carter et al., 2014; Narayanan, 2015). Several studies suggest that crop insurance adoption is unevenly distributed

and significantly influenced by factors like landholding size, education level, awareness, financial literacy, and trust in institutions (Ghosh, 2013; Bhende, 2005; Kumar et al., 2017). Moreover, problems such as delayed compensation, complex claim procedures, and poor outreach strategies further alienate small and marginal farmers from availing insurance benefits (Rao et al., 2011; Kalavakonda & Mahul, 2005). The lack of tailored communication and local customization of policies has made these schemes less attractive to the actual target beneficiaries—smallholder farmers in vulnerable regions (Patnaik et al., 2021; Seth & Sinha, 2020). While policymakers envision crop insurance as a socio-economic equalizer, existing literature reveals that socio-economic disparities among farmers influence not only their participation but also their level of benefit derived from such schemes (Meher & Sahu, 2016; Sulaiman & Murthy, 2012). This situation creates a paradox where the most vulnerable farmers are either unaware of or disillusioned by the very schemes intended to protect them (Aggarwal et al., 2019; Chakravarty & Singh, 2018). In Haryana specifically, studies have highlighted gaps in scheme awareness, problems in policy execution, and limited understanding among farmers about the scope and utility of crop insurance, thus affecting scheme participation and satisfaction levels (Singh & Sirohi, 2006; Sharma et al., 2020). Despite the presence of an extensive network of agricultural officers, cooperative societies, and rural banks, the information dissemination related to crop insurance remains poor, especially among women farmers, smallholders, and tenants (Babu et al., 2017; Tripathi et al., 2019). Moreover, the complex web of intermediaries and digital registration barriers have created accessibility issues for illiterate and technologically unsavvy farmers (Bhandari & Pandey, 2018; Jha et al., 2020). These operational inefficiencies and administrative loopholes have led to growing mistrust among farmers about insurance schemes, ultimately defeating their purpose of financial risk mitigation (Bhattacharya & Pal, 2020; Mohapatra et al., 2021). Furthermore, the role of socio-economic status—such as income levels, household size, type of crops grown, and dependency on farm income—has not been sufficiently integrated into scheme design, resulting in one-size-fits-all policies that may not be effective in diverse farming landscapes like Haryana (Roy et al., 2016; Venkatesh & Rani, 2022). What remains underexplored is how these socio-economic conditions influence the perception, participation, and impact of crop insurance schemes on farmers' income levels, particularly in a high agricultural output state like Haryana (Mitra et al., 2013; Singh & Dey, 2017). The identification of specific determinants—such as affordability, accessibility, awareness, and availability of services—and their empirical

analysis are crucial to improving policy effectiveness (Gulati & Terway, 2020; Reddy et al., 2022). Additionally, while insurance schemes claim to offer compensation for crop loss, there is limited empirical evidence on whether these schemes actually translate into measurable income stabilization for farmers post-claim settlement (Nair et al., 2019; Srivastava et al., 2021). It is in this context that the present study is both timely and significant, as it seeks to bridge the empirical gap by conducting a socio-economic analysis of crop insurance schemes in Haryana, focusing on key dimensions such as the socio-economic conditions of insurance holders, the determinants influencing adoption, the challenges in implementation, and the actual impact on farmers' income. This will not only contribute to academic discourse but will also provide actionable insights for policymakers, practitioners, and stakeholders engaged in agricultural risk management in India. Over more than half a century, the notion of "grow or die" has been the guiding premise of development for both capitalism and communist policies, with just a few notable exceptions. Historically, it was widely believed that only large economic units were capable of achieving competitive productivity advances via the use of modern and rationalized agricultural practices, mostly consisting of chemical inputs and equipment. It was believed that a global increase in productivity was necessary to provide food for the rapidly expanding population of the globe. It is estimated that over 3.4 billion people, or 45 percent of the total population of the world, live in rural areas. More than two billion people, or 26.7% of the total population of the world, are dependent on agriculture. As of the year 2016, more than 57% of Africans were living in rural areas. There were over 866 million individuals who were technically employed in the agricultural sector in 2017, which meant that 53 percent of the population was economically active in agriculture. In the 1950s, the prevalent assumption was that the only way to accomplish economic progress was via the process of industrialization. When the 1990s rolled around, however, there was a paradigm change that emphasized the central role that agriculture plays in the growth of the country. This revision was made in response to the realization that a sizeable proportion of the population in several nations was involved in activities related to primary agriculture. A significant number of industrialized countries, including the United States of America, Canada, and members of the European Union, provide major agricultural subsidies to assist its farmers. By providing these countries with financial assistance, which is intended to increase domestic agricultural output and guarantee food security, these nations can gain a competitive edge in the international market. On the other hand, developing and less developed nations are put in a difficult situation as a result

of this preferential treatment and financial aid. These subsidies have the potential to disrupt global agricultural commerce, making it more difficult for farmers from less developed countries to successfully compete with their counterparts. As a consequence of this, these nations often find themselves on the margins of society, with very restricted access to worldwide markets. Not only does this inequality impede the economic progress of these countries, but it also makes food insecurity and poverty levels much worse. The World Trade Organization (WTO) plays a critical role in regulating global agricultural trade to promote fair competition and sustainability. Agriculture is governed under the WTO's Agreement on Agriculture (AoA), which aims to reform trade and make policies more market- oriented. The World Trade Organization (WTO) has expressed concerns over these imbalances, highlighting the need for fair and equitable agricultural trade policies. Without addressing these issues, the agricultural sectors in many developing and less developed countries continue to struggle, facing significant obstacles in achieving sustainable growth and prosperity. The agricultural sector is a significant contributor to India's economy. According to the Census completed in 2011, 54.6% of the labour force is employed in agriculture and allied industries. This sector is expected to contribute 18.6% of India's gross value added in 2021–2022, supposing that prices remain the same. Several steps have been put into place by the Indian government to guarantee the industry's continued expansion in light of the importance of the sector. Around sixty percent of India's labour force is employed in the agricultural sector, which is responsible for seventeen percent of the country's gross domestic product. 2013 Arjun Kekane Maruti). Due to the rapid growth of the industrial and service sectors, the percentage of India's gross domestic product that is contributed by agriculture has decreased from 35% in the 1990–1991 fiscal year to 15% in the most recent fiscal year, according to the government. The proportion of the economy's total Gross Value Added (GVA) that is contributed by agriculture has declined from 35% in the 1990–1991 fiscal year to 15% in the 2022–2023 term. A more prominent indicator of the downturn is the rapid expansion of the gross value added (GVA) of the industrial and service sectors, as opposed to the decline in the GVA of agriculture. The majority of people who live in rural parts of India rely on agriculture and activities linked to agriculture as their main source of income. The livelihood of some people is directly dependent on agriculture, while the livelihood of others is dependent on agriculture indirectly. Consistently, the government makes an effort to motivate farmers by announcing a variety of projects in the agricultural sector that have the potential to boost agricultural production. We assist individuals in a variety of methods, including

but not limited to the provision of low-interest subsidized loans, affordable housing, up-to-date farming and agricultural expertise, and subsidized loans that allow the purchase of critical agricultural equipment. There are also assistance packages available from the government for farmers who have had problems or losses as a consequence of natural catastrophes. Crop insurance is a crucial tool for farmers to protect themselves against financial losses due to natural disasters. It helps farmers increase crop output and improve their financial situation, but it does not replace the need for effective networks of extension services, input supply, storage, and market facilities. Climate change has become an urgent concern for the industry's current operations and future viability. Agriculture is heavily reliant on weather patterns, economics, politics, and people, making it difficult to control natural calamities. The growth rate of agriculture in India has decreased from 0.2% in 2014-2015 to 2.9% in 2018- 2019, with only 26% of cultivated land insured for the 2017-2018 season. The agricultural industry is a particularly dangerous economic sector, as it relies heavily on weather patterns. The development and implementation of adequate insurance platforms for agricultural purposes are complex and difficult to understand. The agricultural industry faces several threat factors, including manufacturing risks, marketing risks, and financial risks. Production risks include fires, droughts, floods, and volatility in input and output prices. Marketing risks involve farmers having little control over supply and demand, while financial risks include defaulting on loans and lack of access to cash. Agriculture production is becoming more commercialized, leading to increased loss caused by adverse occurrences. To mitigate these risks, agricultural management strategies and practical tools have been developed, such as advanced contracting, diversification of commercial operations, and agriculture insurance, which protects both crops and livestock. Contribution of the Agricultural Sector to GDP According to the Second Advance Estimates of National Income, 2022-23 released by the Ministry of Statistics & Programme Implementation (MoSPI), the share of Gross value added (GVA) of agriculture and allied sectors in the total economy and growth of GVA of agriculture and allied sectors for the years 2020-21, 2021-22, and 2022-23 are as under:(Ministry of Agriculture & Farmers Welfare)

Table 1.1 Agriculture Share to GVA (in %)

Year	Share of GVA of agriculture and allied sectors in total economy (%) at current prices	Growth of GVA of agriculture and allied sectors (%) (at 2011-12 prices)

2020-21	20.3	4.1
2021-22	19.0	3.5
2022-23	18.3	3.3

(Source: Ministry of Agriculture & Farmers Welfare)

The Central Pool is a national repository system that receives contributions from a significant amount of Haryana's surplus food grain, which includes wheat and rice, among other types of grains. Despite the fact that it is a relatively small state that accounts for just 1.3% of the total area of the country, Quick Estimates of 2022–2023 indicate that Haryana makes a contribution of 3.7 percent at real prices to the gross domestic product of the nation. A considerable portion of the state's economy is derived from agriculture, and the majority of the population is either directly or indirectly dependent on agriculture and the businesses that are associated with it. As a consequence of this, the State has placed a significant amount of importance on the Agriculture Sector ever since it was created on November 1, 1966. The state's agricultural economy received the much-needed boost it required as a result of the creation of robust infrastructure projects. These projects included the building of market yards, huge canal networks, rural electricity, metaled roads, and market yards. The construction of these facilities, the funding of agricultural research, and the use of an effective extension network to educate farmers on improved farming methods all contributed to the achievement of greater results.

Table 1.2 Growth of Gross Value Added at Constant (2011-12) Basic Prices

Industry	2019-20	2020-21	2021-22	2022-23	2023-24
Agriculture, forestry & fishing	**6.2**	**4.0**	**4.6**	**4.7**	**0.7**
Crops	5.7	2.6	3.2	4.7	-
Livestock	7.5	6.2	6.4	5.0	-
Forestry and logging	6.1	5.8	0.6	1.0	-
Fishing and aquaculture	4.5	3.8	13.7	7.6	-

Source: National Statistical Office (NSO)

Note: @: Third Revised & Final Estimates, `: Second Revised & Final Estimates; #: First Revised Estimates;

*: Second Advance Estimates (As on 29.02.2024)

Gross Value Added (GVA) of Agriculture & Allied Sector

According to the National Statistical Office (NSO), Ministry of Statistics & Programme Implementation's Provisional Estimates of National Income, 2021-22, agriculture and related sectors accounted for approximately 18.6% of India's GDP at current prices in 2021-22. GVA of agricultural and allied sectors and its percentage in overall GVA of the nation at current prices for the previous six years is as follows:

Table 2.3 Share of agriculture, forestry, and fishing in GVA at current prices (Rs. In Crore)

Year	GVA at current prices		Share%
	Entire economy	Agriculture, forestry, and fishing	
2019-20	18,381	3,368	18.3
2020-21	18,211	3,706	20.4
2021-22	21,636	4,099	18.9
2022-23	24,659	4,484	18.2

Source : MoAgFW India's Position in World Agriculture during 2020, Agricultural Statistics at a Glance 2023,

The Gross Value Added (GVA) of the agriculture and allied sectors in India has increased from 2.10% in 2018-19 to 3.96% in 2022-23, according to Union Agriculture and Farmers' Welfare Minister Arjun Munda. The growth rate has been attributed to various policies, reforms, and developmental programs since 2014. The Ministry of Agriculture and Farmers' Welfare has seen its budget allocation increase from, 30,223.88 crores in 2013-14 to? 1,25,035.79 crores in 2023-24. Munda also noted that the shift in the workforce from primary to secondary and tertiary sectors is a normal phenomenon in India. The Central government supports state governments through various Centrally sponsored schemes to ensure the growth and development of the agriculture sector. The agriculture sector of the Indian economy is confronted with two challenges: unpredictability and dangers that are both controllable and unmanageable. Diseases that affect crops, improper application of fertilizer and pesticides, weeds, pests, and seeds are all instances of manageable hazards that farmers may be able to manage. Conditions such as excessive heat, hailstorms, strong winds, fog, and water are examples of uncontrollable dangers. Other examples include not enough rain, not enough rainfall, and extreme heat. There is a potential for a reduction in agricultural risk via the use of modern inputs, effective monitoring, and technology. When it comes to dealing with hazards that cannot be controlled, risk minimization is a problem. The production connections in agriculture are not as accurate as they are in industry. This is because farmers are unable to control every environmental factor that influences crop and animal outputs. For this reason, it is not feasible to accurately predict the outcome of any productive process in

agriculture. There is always a possibility of variance, which results in a certain amount of uncertainty about the precise outcome of a certain productive activity over a specific period. The vast majority of this unpredictability may be attributed to the biological component of agriculture. Any unknown or quantitatively or empirically observable result is referred to as risk. It's not necessary to know the conclusion for every single item. All that needs to be established for a significant number of cases or observations is the probability of outcome or less. Consequently, a situation is considered to be at risk when a certain level of probability for the future can be anticipated. Probabilistic phenomena, such as risk, have unknown outcomes that can only be predicted in a probabilistic manner (Schaffnit et al., 2010). Conversely, events to which probability values can be ascribed are referred to as uncertain occurrences. When future knowledge is incomplete, meaning it is impossible to ascertain the parameters of the probability distribution, uncertainty always results. At most, one can estimate a range in which uncertainty might arise.Two main kinds of uncertainty occur when a producer invests his resources in production now and then has to wait till later for the results. Agriculture requires a lot of waiting, like here. They produce uncertainty, specifically about the final product prices. Similar to this, tenure uncertainty and ambiguity over input pricing and quality are significant sources of uncertainty in agriculture (Girdžiūtė, 2012). This kind of uncertainty in agriculture is mostly caused by the biological aspects of the agricultural sector. In contrast to the products of non-farming sectors, this makes the yield far more dependent on natural variables. Epidemics, droughts, floods, and other natural disasters can have abrupt and sometimes multiple effects on agricultural productivity. High summer temperatures can nevertheless have a major effect on livestock productivity, even though raising livestock is less weather-dependent than growing crops. Furthermore, a livestock outbreak is always a potential (Schaffnit et al., 2010). Certain places are probably going to experience yield fluctuations to a larger extent than others. Tropical locations exhibit a higher likelihood of yield uncertainty in comparison to temperate places. Furthermore, some crops, like cotton, have more unpredictable yields than others, like wheat. Since it relates to the variations in the production coefficient of a particular technique, yield uncertainty is also known as technical uncertainty. In addition to uncertainty over yield and technology, there is also uncertainty around agricultural product prices. For the individual farmer, price is essentially an unpredictable or exogenous issue. The market system in which the farmer works is comparable to perfect competition; so, any policy or course of action he may adopt will have no bearing whatsoever on the price he gets for a

commodity of a particular value. Rather than setting prices, he is a price-taker. Overall farmer behaviours, weather-induced random output variations, changes in national income and prospects, and irregular cobweb production cycles are examples of external influences influencing prices. Although there are price variations in non-farm businesses as well, there is significantly less pricing uncertainty in these sectors than in agriculture. The main explanation for this is that non-farm sectors get more control over their product prices due to their monopolistic market structure, which also makes them less vulnerable to weather-related price changes. Manufacturing is expected to see even smaller price swings because, in contrast to agriculture, it is simpler to modify the supply of its products in response to shifts in demand (Schaffnit et al., 2010). In farming, another type of uncertainty is the ambiguity around tenure. We are aware that land is leased to renters in general. It worries the tenant that he won't be able to access the land for a long while. Consequently, he will be hesitant to undertake long-term land improvements since he is uncertain that he will be able to generate enough revenue from them during the tenancy. With the variety of agricultural produce offered over extended periods, farmers need to budget for investments that they will only be able to recoup after the commodity is marketed. This could make it harder to transfer money, which is made worse by credit constraints, high loan expenses, and limited access to insurance. Reimbursement liability is also created. Risks to credit and finances include rising interest rates, creditors' calls for loans, and the controlled acknowledgment of the grower's capacity. A significant cause of uncertainty for farmers is institutional risk, which arises from unforeseen changes in laws that affect the practices of growers. The effectiveness of agricultural events may be significantly impacted by changes in aid, market conditions, financial services, policy, and revenue provision payments. Extra risk-taking indicates things like personal relationships or problems with human well-being that can interfere with cultivation. Like any other financial enterprise, farming families deal with personal hazards related to the health and well-being of individuals who labour in the farmhouse, as well as risks from natural disasters like floods, cyclones, and droughts. They also run the danger of having manufacturing equipment and other agricultural properties stolen or damaged. Agriculture risk, as previously mentioned, is mostly brought on by the potential for negative outcomes such as weather volatility, crop loss from disease and pests, and challenges with harvesting schedules. trade policy, market instability, and unanticipated changes in national and international trade regulations. Agricultural activities are impacted and interrupted by the aforementioned conditions. To ascertain the probability of such

adverse events transpiring and to alleviate their aftermath, effective risk management strategies are necessary. Therefore, risk management in agriculture needs to have a proper grasp of crop insurance coverage. By reducing production discrepancies, securing the lowest price, or guaranteeing a specific amount of money, risk and uncertainty management aims to minimize revenue loss. This process is referred to as risk assessment and mitigation in agriculture. The strategies aimed to accomplish this are labeled as alternatives to risk management. In the parts that follow, these are discussed. Avoiding uncertainty and danger: A large portion of the production risks are avoidable. Removing riskier efforts, for instance, would lower risk, but at the expense of a decline in total output or profits. A dawdler's constant goal is to avoid danger and uncertainty. According to Schaffenit et al. (2010), they opt for initiatives that are guaranteed but have minimal profitability. By enticing early action, some risks can be repeatedly avoided. In agricultural output, for instance, the risk of insect-related harm might be eliminated with future preventive pest control. According to Schafnit et al. (2010), the price of preventative pest control is the cost of this replacement risk management. The risk of sharing, which is a substitute for India's approach to risk management is generally mutual. Shared land leases with tenants are the primary example of risk distribution. The landlord and the tenant split the risks associated with farming production according to the share of inputs and output. This landlord stand-in would cost the same as the difference between the renter's net income and what they are paid for the duration of the lease. The risk of switching from one group or farmer to another. Customers may bear the burden of marketing, for example, when advertising an agreement. This promise will cover the cost of the plant's future recognition at a fair market value. The difference in produce value between the contracted price and the postharvest or market price is what is referred to as this cost. Crop insurance is one instance of transferring the threat of production to another system. In case crop predictions fall short of the minimum assured, the associated expenses will be reimbursed through proportionate insurance. The growers pay this alternative price, which is known as a premium. To alter the degree of risk and, naturally, the quantity of net revenue, the same risk management strategy can be applied to several projects. People acknowledge this as a change. Modification can take the form of mixed crop production, separated agriculture, or even more diverse farming methods. For example, it will guarantee that some income from projects or crops is generated even in unfavorable weather. The cost of this substitution would be the difference between the two since net profits from the highest-paying crop would outweigh net profits from combining various

businesses or crops (Lipinska, 2015).Risk-taking: Since there is no attempt to reduce risk in agriculture, farmers' ability to take on risk may likewise be used as a stand-in for risk when the administration price is zero. The understanding is to aim for maximum profits despite the significant risk involved. Innovation pioneers and early adopters are the two demographic groupings that are always willing to take a chance. For high-risk, high-reward projects, these are exhilarating. Risks associated with agriculture can be controlled or uncontrolled. Threats that are under your control include viruses, weeds, crops, pests, and improper use of pesticides or fertilizers. Uncontrollable hazards include, among other things, rainfall excesses or deficits, rainfall dispersion, extremely high or low temperatures, hailstorms, wind speeds, humidity, and fog. Effective technology, effective monitoring, and input utilization reduce controllable risk. The challenge lies in reducing unpredictable risks. In Indian agriculture, a variety of risk-reduction strategies are relevant, such as crop insurance, labour markets, credit, crop diversification, intercropping, and self-insurance (Singh, 2018). Insurance policies are primarily designed to shield risk-averse individuals from the effects of random, natural occurrences (Singh, 2018). Large numbers form the foundation of the insurance market's ideology, regardless of how risk is allocated among individuals. Because insurance offers the option of risk shifting, it encourages people to participate in dangerous activities that they otherwise would not have (Ahsan et al., 1982). It is not up to individuals to decide whether a dangerous accident happens or not. The insurance agent possesses compiled, yet reasonably trustworthy, information about the insured. This isn't the case, though, about agriculture or crop insurance. Unlike most other forms of insurance, crop risk is not allocated to the covered parties consistently or separately. Whether favorable or unfavourable, weather can have a big effect on the people living in a place. Therefore, for a former farmer, crop insurance is crucial (Singh, 2018).

1.2. Agriculture of Haryana

Haryana became a state on November 1, 1966, and its people make up less than 2% of India's overall population. The size of this state is 44.2 thousand square kilometers, which is about 1.37 percent of the total land area of the country. Haryana has its character even though it has only been around for less than thirty years. According to the World Bank, Haryana has the third highest per capita income in India. For the fiscal year 2016–17, it was 214,509 rupees, which is US$3,300. This is higher than the national average of 112,432 rupees, which is US$1,800. Since 2000, Haryana has regularly received the most investment per person in India. This has made it one of

the richest and most economically developed areas in South Asia. Haryana, which is sometimes called the "Bread Basket of India," has been a leader in new farming methods. On the other hand, it is one of the states that produce the most crops in the country. The agricultural industry is very important to the state's economy, and most of the people there depend on farming or activities linked to it in some way. Haryana, a small state in India, has significantly boosted its agricultural sector since its inception in 1966. The state has made significant contributions to the national GDP, with the agriculture and related sectors contributing significantly to the GDP. The state produces all of its food and ranks second in India for grain output. The state's contribution to the National Gross Domestic Product at real prices is 3.7% as per the Quick Estimates of 2022-23. The state has established infrastructure facilities such as metalled roads, rural electricity, canal networks, and market yards, which have contributed significantly to agricultural growth. However, the contribution of the Services Sector has grown, resulting in a fall in the Agriculture and Allied Sectors. The state's economic development has been more reliant on the expansion of industry and services sectors. The state's contribution to the national GDP has increased from 3.4% in 2011-12 to 3.7% for the fiscal year 2023-24. The state has significantly contributed to the Central Pool, accounting for fourteen percent of the total, in addition to generating sixteen hundred and thirty-three thousand metric tons of food grain. During the Kharif season, farmers primarily focus on growing rice, jowar, bajra, corn, cotton, jute, sugarcane, sesame, and groundnut. The planting season for these crops begins in April or May, and harvest time is in November. Most crops planted during the Rabi season are wheat, mustard, linseed, rapeseed, gram, and tobacco. Late October or early November is when these crops are sown, and March is when they are harvested. Approximately 86% of the total land area may be considered arable, with 96% of that area being cultivated. A vast network of canals and tube wells irrigates more than 75% of the area in the region. Nearly two-thirds of the state has assured irrigation, making it ideal for a rice- wheat farming system. Half of the state is covered by rain-fed terrain, which is ideal for growing rapeseed, mustard, pearl millet, cluster beans, agroforestry, and desert horticulture. Positioned perfectly between the National Capital Region and the international airport, the state provides easy access to several major markets. Major crops with a lot of room for growth both inside and outside the traditional agricultural system include rice, wheat, rapeseed, mustard, bajra, cotton, and sugarcane. A few of the most promising horticultural crops right now include guava, onion, potato, tomato, chili peppers, and know. The state of Haryana is sometimes called the "Food Mine" of

India. The agricultural sector provides direct or indirect support to almost 80% of the state's population. With its abundant arable land, Haryana can satisfy its own food grain needs and also contributes significantly to those of other Indian states. Basmati rice is famous all over the world, and this area is a big producer of it. The majority of the state's grain production goes into maize, wheat, rice, and bajra. There are two main seasons for harvesting crops in Haryana, and they are called Rabi and Kharif. The state grows a variety of crops during the kharif season, but some of the most significant are sugarcane, groundnuts, and maize paddy. Some minor crops that are cultivated during the kharif season are pulses, vegetables, chili, bajra, and jawar. In the northwest corner of the state, you can grow wheat, rice, vegetables, and temperate fruits; in the southwest, you may grow tropical fruits, exotic veggies, medicinal herbs, and high-quality agricultural goods.When it comes to the inclusive and long-term growth of the Indian economy, agriculture, and related industries are still crucial.In addition to ensuring that everyone has enough to eat, the agricultural industry in India provides direct and indirect employment for a large percentage of the population. Despite accounting for only 17.4% of the nation's Gross Value Added in the 2016–2017 fiscal year (at current prices), agricultural output plays a substantial role in demand formation. It has become more difficult for farmers to cover the increasing costs of production, such as personnel salaries, due to a mismatch between their income and these costs. So, the case for agricultural and farm technology that can replace human work is strong. Similarly, keep in mind that many tasks have strict deadlines; failing to complete them by the appointed time would almost certainly result in financial loss for the farmer. A good solution to these problems would be to automate agricultural processes. Farm mechanization, or more precisely agricultural mechanization, will free farmers and wage workers from the monotony of manual labour while simultaneously increasing labour productivity. This is on top of the fact that activities using machines need certain types of expertise. State governments have launched programs like the Pradhan Mantri Fasal Bima Yojna to help farmers out financially if certain crops don't do as well as expected. In the Kharif season, these crops include rice, bajra, maize, and cotton; in the Rabi season, they include wheat, barley, gram, and mustard. Government support for organic farming extends to the establishment of organic communities. A fifty-acre cluster is being established and certified under the "Paramparagat Krishi Vikas Yojana." The government has suggested a plan for straw management equipment, training, and demonstrations to reduce the amount of agricultural leftovers that is burned and improve its management.

1.3 Significance of the Study

This study will provide helpful recommendations to encourage increased farmer participation in crop insurance schemes, given the government's current emphasis on crop insurance schemes as a key strategy for removing agricultural uncertainty and distress to achieve agricultural development, and in line with Indian national agricultural insurance policies like NAIS, MNAIS, and the recently launched PMFBY to revive the agricultural sector's contribution to the national economy. The findings of this study will benefit several organizations or groups, such as farmers, insurance professionals, staff members of agricultural departments, and bank employees who are involved in the development, implementation, planning, participation, and assessment of crop insurance programs either directly or indirectly. Specifically, the following will find significance and utility in this study: At the federal and state levels, the Ministry of Agriculture is in charge of developing crop insurance policies, deciding on premium subsidies, and figuring out how crop insurance programs will develop in the future. The Agriculture Insurance Company of India Limited: This Company is responsible for overseeing the overall planning and execution of the development operations for different crop insurance activities. Stakeholders of the Crop Insurance Schemes: This group consists of the various parties involved in the crop insurance plans that are put in place for Indian farmers. Personnel in the insurance industry This thesis offers significant recommendations to raise farmers' understanding and participation in crop insurance schemes at the municipal, state, and federal levels—one of the major stakeholders in these programs. Banking Staff: In India, crop insurance is linked to the banking industry. Loanee farmers must subscribe to crop insurance. The thesis would offer some helpful suggestions to improve the banker's role in advocating for the crop insurance program. Agriculture personnel: They are essential to many parts of agriculture, although their influence in the execution of crop insurance plans is restricted. Accordingly, research recommends them for the most effective implementation and harvest insurance program success. Farmers use crop insurance as a very useful and practical instrument to shield their crops against unanticipated threats. Crop insurance assists farmers in reducing the risks associated with farming in developing nations such as India, where most farmers rely on the quality and quantity of the harvest they produce for their livelihood. In addition to helping farmers keep their financial stability, it also enables them to make loan payments even if their crops fail. Crop insurance also allows farmers to experiment with innovative farming techniques and cutting-edge technologies with the least amount of risk. To safeguard farmers' farms and help them

comprehend the impact of natural disasters, insurance firms also organize awareness campaigns. To safeguard their crops, farmers might utilize forecasting techniques to comprehend climate change and weather patterns. In India, where agriculture is still not a profitable industry, it is imperative to employ data, technology, and financial services to address weather-related difficulties. According to the Indian Council of Food and Agriculture's Report on Haryana Agriculture and Farmers' Welfare (2015– 2016), with 44.96% of the population working in agriculture, Haryana has the 15th-largest agricultural population in India. Sixty-seven percent of the 16.2 lakh active holdings in Haryana are minor or marginal in size. The fact that large holdings have historically made up a very small percentage of all holdings and that the average holding size has been continuously dropping over time further helps to explain the need for crop insurance. Thus, farmers' ability to invest in cutting-edge technologies and increase yields is constrained by the modest size of their estates. Without the use of cutting-edge technologies, the agriculture sector cannot be transformed into a lucrative one. When farmers practice farming in accordance with technology, crop insurance is very beneficial to them. Because it reduces the risk, farmers are given more boldness. It is one of the furthermost influential tools available in agriculture for protecting farmers' economic losses (Vyas and Singh, 2006). Risk management in farming is receiving transformed attention from governments and experts in the emerging universe, as weather transformation is probable to increase the inconsistency of weather circumstances and climate variability, resulting in uncertainty in the agriculture sector. Through reinsurance arrangements in international markets, it transfers the financial risk burden across time and space. CI, as a result, reduces hazards in agriculture. CI boosts productivity and stabilizes farm income and peace of mind over time (Nahvi et al., 2014). This will save small and marginal farmers from poverty traps who own less than two acres of agricultural land, have few financial options, and rely heavily on agricultural income alone. It is especially important for farmers in purely rain-fed areas without irrigation facilities in India. Farmers will be protected by this risk management tool from potential losses resulting from agricultural risks over which they have no control. CI, on the other hand, neither excludes risk nor increases farmers' income. It is simply a safety net put in place to protect their investments during the agricultural season. Even though agriculture employs a larger percentage of the worldwide population, particularly in emerging countries, farmers participate in crop insurance schemes at a low rate because of a lack of awareness and ignorance. It is a method in which losses suffered by an insufficient are met by farms gathered through

insignificant contributions completed by many people who are showing similar risks (Rathore et. al., 2011). Techniques are crop replacements that are uncertain when irregular climate circumstances appear and are used in the absence of a formal risk management mechanism (Cole et al. 2013). It protects farmers from crop failure losses and, as a result, ensures farm income stability. Co-ops and other forms of agricultural financing are bolstered as a result, as its farmer members are able to make good on their loan repayment obligations even in crop failure years. protecting farmers' economic interests against potential risk or damage accelerates the adoption of innovative agricultural practices. It reduces rural indebtedness that is traceable to crop disaster. It also lessens the burden on the government budget for responding to disasters with relief efforts. It may act as an anti-inflationary measure by concentrating some resources in rural areas. Approaches of Crop Insurance Individual and area approaches are used to reimburse farmers in the occurrence of a loss covered by crop insurance. In the case of the first approach, each farmer will be assessed separately for losses incurred, as well as weather data for his specific farmland. Finally, if his farm crop yield is less than the expected normal output, he will be compensated to the extent of the loss (Dandekar, 1976; Mishra, 1995). However, adopting this approach necessitates a large staff, technical staff, and adequate weather infrastructure, which can be found only in nations such as the United States and Europe. As a result, developing countries will need to use the area approach to determine indemnities. Instead of individuals, all farmers in a particular region are considered as a unit in this approach, and loss assessment is done through crop-cutting experiments to measure yield loss against risks suffered and normally expected farm output; if there is yield loss, farmers are indemnified accordingly (Dandekar, 1976; Mishra 1995). Instead of each farmer, only a few yield estimates will be made here. It is typically used by emerging nations that lack adequate staff to conduct large-scale crop-cutting experiments. As a result, the problem of basis risk will be magnified, as few farmers will be left with no indemnities despite actual crop damage. As a result, claims do not accurately reflect the actual damage incurred by farmers. Commonly, yield- based crop insurance schemes cover all types of risks, but loss assessment is not done scientifically, whereas, in developed economies, the schemes are run efficiently due to adequate staffing, infrastructure, and fiscal support. Crop Insurance Pre-Independence Period Even in the past, the agricultural sector was very important to the Indian economy. It was the principal source of earnings for princely states and kings in the form of land tax in the past. A Vision has been providing insurance coverage for the agricultural sector for over

100 years. J.S. Chakravarthi wrote several articles between 1915 to 1920 for providing insurance coverage to farmers for crops, and he proposed ―Rainfall index insurance. J.S. Chakravarthi proposed this to protect farmers from severe droughts, which used to result in lower crop yields and revenue losses (Mishra, 1995; Vyas and Singh, 2006). His theory was based on the relationship between average rainfall in agricultural fields and crop yield. Premiums were calculated in his concept based on the amount of land tax for a part of the land. If the rainfall is less than two-thirds of the normal amount, an indemnity is payable. In his dream crop insurance scheme, both landowners and tenants are eligible, and he advocated for an area approach to insurance unit consideration based on similar agro-climatic zones.

1.4 Research Gap

Crop insurance has been globally recognized as a critical tool to mitigate agricultural risks, especially in developing economies where agriculture remains the backbone of rural livelihoods (Hazell et al., 2010; Mahul & Stutley, 2010). In India, various crop insurance schemes have been launched over the years—ranging from the Comprehensive Crop Insurance Scheme (CCIS) to the most recent Pradhan Mantri Fasal Bima Yojana (PMFBY)—to provide a financial safety net to farmers against unpredictable losses due to natural calamities, pest attacks, and market fluctuations (Raju & Chand, 2008; Choudhury, 2021). While these schemes have gained policy traction and financial investment, their real-world efficacy remains under scrutiny, particularly in agrarian states like Haryana, where the agricultural sector significantly contributes to the state's GDP (Singh & Sirohi, 2006; Sharma et al., 2020). Though several studies have attempted to evaluate crop insurance adoption patterns in India, a majority have either focused on national-level assessments or selected pilot regions, leaving a substantial research vacuum in terms of state-specific, micro-level socio-economic evaluations (Ghosh, 2013; Tripathi et al., 2019).

1. The existing literature has largely highlighted common issues related to crop insurance, such as lack of awareness, delayed claim settlements, and administrative inefficiencies (Bhende, 2005; Narayanan, 2015; Rao et al., 2011). However, there is a limited empirical understanding of how farmers' socio-economic profiles—including variables like landholding size, education, income levels, and financial literacy—influence both participation in and the perceived usefulness of crop insurance schemes in Haryana (Babu et al., 2017; Jha et al., 2020; Meher & Sahu, 2016). Haryana, despite being one of India’s leading states in terms of food grain production, is characterized by wide disparities in land

ownership, irrigation access, and income levels across different farming communities (Deshpande & Prabhu, 2005; Singh et al., 2021). However, these internal disparities are often overlooked in broader studies, resulting in policy frameworks that fail to account for localized socio-economic realities (Aggarwal et al., 2019; Mitra et al., 2013).

2. Moreover, the determinants of crop insurance adoption remain under-theorized and under-explored, especially in Haryana's context. While some studies have examined factors like awareness and affordability, other critical variables such as accessibility, availability of service providers, digital literacy, and trust in government institutions have not been adequately analyzed (Gulati & Terway, 2020; Kumar et al., 2017; Bhattacharya & Pal, 2020). A few studies have tried to correlate socio-economic characteristics with insurance adoption, but they often lack depth in terms of regional specificity and farmer categorization, such as marginal versus large farmers or tenant versus land-owning farmers (Venkatesh & Rani, 2022; Roy et al., 2016). Furthermore, the intersection of gender, caste, and tenancy status with crop insurance adoption remains a sparsely addressed dimension in existing literature, thereby necessitating a more inclusive analytical framework (Chakravarty & Singh, 2018; Patnaik et al., 2021).
3. Additionally, the impact of crop insurance on income stabilization—a key policy objective—remains largely unquantified in region-specific studies. Most impact evaluations have either been anecdotal or conducted without a longitudinal framework to assess pre- and post-insurance income patterns (Mishra, 2009; Nair et al., 2019). While crop insurance is often promoted as a mechanism for enhancing farmers' economic resilience, there is little evidence to show whether it actually results in measurable changes in income levels, consumption patterns, or investment in agricultural inputs in Haryana (Sulaiman & Murthy, 2012; Carter et al., 2014). Studies conducted in other Indian states have shown varied outcomes, often influenced by differences in scheme implementation and socio-economic contexts, thus indicating the need for contextual, Haryana-specific data to validate or challenge such findings (Kalavakonda & Mahul, 2005; Mohapatra et al., 2021).
4. Compounding this issue is the lack of robust, mixed-method approaches in evaluating crop insurance schemes. Most research efforts rely heavily on quantitative data, often overlooking qualitative insights into farmers' perceptions, attitudes, and lived experiences

with insurance mechanisms (Seth & Sinha, 2020; Reddy et al., 2022). This creates a skewed understanding, as socio-economic analysis is inherently multi-dimensional, requiring both numerical and narrative data for a holistic assessment (Carter et al., 2014; Srivastava et al., 2021). The absence of such an integrated methodology is particularly noticeable in Haryana-focused studies, where empirical analysis is usually restricted to survey-based approaches with limited interpretive depth (Giné et al., 2012; Mitra et al., 2013).

5. Furthermore, policy evaluations often overlook farmer feedback, and there is a significant lack of participatory research in the crop insurance space. Farmer perspectives—particularly regarding claim processes, policy understanding, and perceived benefits—are either superficially addressed or entirely missing in many studies, especially those focused on Haryana (Bhandari & Pandey, 2018; Kalavakonda & Mahul, 2005). This exclusion of grassroots insights leads to policy prescriptions that may be technically sound but socially disconnected from farmer realities (Mahul & Stutley, 2010; Ghosh, 2013). Additionally, given the increasing digitization of crop insurance enrollment and monitoring, the digital divide among rural farmers in Haryana poses another under-researched challenge that directly affects scheme accessibility and inclusion (Tripathi et al., 2019; Sharma et al., 2020).
6. In summary, while crop insurance is seen as a transformative intervention for risk mitigation in agriculture, its region-specific effectiveness, adoption determinants, and socio-economic impacts remain under-researched in the context of Haryana. There is a pressing need for a comprehensive study that not only explores the socio-economic conditions of farmers enrolled in crop insurance but also investigates the factors influencing their decision to participate, identifies challenges in implementation, and evaluates the actual impact on farmers' income. The lack of such nuanced, localized, and empirically grounded research represents a critical research gap, which this study aims to fill by conducting a multidimensional socio-economic analysis of crop insurance schemes in Haryana. By doing so, the study will contribute to the academic discourse on agricultural risk management and offer practical recommendations to enhance the design, delivery, and impact of crop insurance policies tailored to Haryana's diverse farming population (Choudhury, 2021; Srivastava et al., 2021; Narayanan, 2015).

1.5 Research Questions

To guide the investigation and ensure a focused approach toward achieving the set objectives, the present study formulates specific research questions that address the core areas of inquiry. These questions are designed to explore the socio-economic profile of farmers enrolled in crop insurance schemes, understand the key factors that determine their participation, uncover the challenges faced in scheme implementation, and assess the influence of crop insurance on farmers' income levels in Haryana. The following research questions have been developed to direct the study:

1) What are the socio-economic conditions of crop insurance holders in Haryana?
2) What are the key determinants influencing the adoption and effectiveness of crop insurance schemes in Haryana?
3) What problems are encountered in the implementation of crop insurance schemes in Haryana?
4) How does crop insurance affect the income levels of farmers in Haryana?

1.6 Objectives of the Study

The present study is aimed at exploring the socio-economic aspects of crop insurance schemes in Haryana by examining the real-life experiences and challenges faced by farmers. The research intends to gain an in-depth understanding of the socio-economic profile of crop insurance holders, determine the various factors influencing the adoption and effectiveness of such schemes, and identify the key issues encountered in their implementation. Furthermore, it seeks to evaluate the extent to which crop insurance impacts the financial well-being and income stability of farmers in the region. The objectives of this study are as follows:

1. *To study the socio-economic conditions of crop insurance holders in Haryana.*
2. *To identify the determinants of crop insurance schemes in Haryana.*
3. *To evaluate the problems in implementation of crop insurance schemes in Haryana.*
4. *To analyse the impact of crop insurance on income levels of farmers in Haryana.*

1.7 Hypotheses of the Study (if applicable)

In line with the research objectives and questions, the present study proposes hypotheses to test the relationship between crop insurance schemes and various socio-economic variables. These hypotheses aim to statistically validate the assumptions related to determinants, implementation issues, and the income impact of crop insurance among farmers in Haryana. By testing these

hypotheses, the study seeks to provide empirical evidence on the effectiveness and limitations of crop insurance schemes, and thereby contribute to policy recommendations for improving their reach and performance.

Hypotheses of the Study:

H_1: There is a significant relationship between farmers' socio-economic conditions and their participation in crop insurance schemes in Haryana.

H_2: Crop insurance schemes have a significant positive impact on the income levels of farmers in Haryana.

1.8 Scope of the Study

The scope of the present study, titled "Socio-Economic Analysis of Crop Insurance Schemes in Haryana," lies in its focus on understanding, analyzing, and evaluating the various socio-economic dimensions of crop insurance and how it functions within the agricultural economy of Haryana. The study is designed to cover the multifaceted aspects of crop insurance from the lens of the farmers who are the primary beneficiaries and stakeholders. Haryana, being a leading agricultural state in India, serves as an appropriate region to examine how crop insurance schemes have been adopted and implemented to safeguard the interests of the farming community against the uncertainties of crop failure, climate volatility, and market risks. This research attempts to bring to light the actual ground realities, implementation bottlenecks, and the socio-economic implications of crop insurance at the micro-level. The study encompasses a comprehensive exploration of the socio-economic conditions of farmers who are holders of crop insurance policies. It seeks to evaluate their demographic profiles, landholding sizes, types of crops cultivated, sources of income, education levels, and access to agricultural support services. These parameters are critical in determining the extent of inclusion and participation in insurance schemes. By capturing this data, the research aims to ascertain whether crop insurance is reaching the intended population and serving the purpose for which it was introduced. Furthermore, the scope includes an analysis of how socio-economic disparities among farmers influence their level of awareness, accessibility, and willingness to adopt insurance schemes.Another critical area within the scope is the identification of the key determinants that influence the adoption and effectiveness of crop insurance schemes. These determinants may include institutional factors such as government policies, awareness campaigns, premium rates, claim procedures, and the presence of intermediaries like insurance agents and banks. Personal and economic factors like risk

perception, previous experiences with claims, peer influence, and financial literacy are also considered. The scope involves exploring how these determinants collectively influence farmers' decisions and experiences related to crop insurance participation. By doing so, the study sheds light on the facilitating and hindering elements that shape the success of these schemes. The research also covers a thorough evaluation of the challenges and problems associated with the implementation of crop insurance schemes in Haryana. Although multiple insurance schemes such as the Pradhan Mantri Fasal Bima Yojana (PMFBY), the Weather-Based Crop Insurance Scheme (WBCIS), and others have been introduced, their real-world execution faces several obstacles. These include delayed compensation, complicated procedures, lack of timely information, and limited grievance redressal mechanisms. The study aims to capture farmers' perceptions and experiences regarding these issues. It also investigates the role of institutions like banks, local government bodies, and private insurers in the effective dissemination and functioning of these schemes. This component of the study ensures that the voices and ground-level realities of farmers are incorporated into the evaluation of the policy framework. One of the most significant aspects covered under the scope of this study is the impact of crop insurance on the income and livelihood security of farmers. By comparing income levels, risk mitigation behavior, and investment patterns of insured and uninsured farmers, the study aims to evaluate whether crop insurance has successfully contributed to financial stability and improved socio-economic outcomes. The scope includes understanding how compensation received from insurance claims helps farmers recover from crop loss and invest in future agricultural activities. It also delves into whether insurance encourages the adoption of modern and sustainable farming practices by reducing the fear of financial ruin.In terms of geographical coverage, the study is restricted to the state of Haryana, with a focus on selected districts representing diverse agro-climatic zones and cropping patterns. Haryana, being an agrarian economy with a considerable number of farmers depending on seasonal crops, provides an ideal setting to examine crop insurance dynamics. The state has seen significant agricultural development, but at the same time, it has also faced the adverse effects of climate change, crop failures, and farmer distress. Hence, the findings of this study have the potential to be relevant not only for Haryana but also for other agrarian states facing similar challenges.The time frame for the study encompasses recent years during which crop insurance schemes have been prominently implemented and revised. This ensures that the analysis captures the most recent trends and reforms in the crop insurance landscape, including the implementation of PMFBY and

its subsequent modifications. The study aims to include recent data, responses from currently enrolled farmers, and ongoing policy shifts, making it relevant to current policy discussions and practical improvements. From a methodological standpoint, the study adopts a mixed-method approach involving both quantitative and qualitative data. The scope includes surveys of farmers using structured questionnaires to collect primary data on socio-economic variables, scheme participation, challenges faced, and the impact on income. In addition, interviews with stakeholders such as insurance officials, agricultural officers, and bank personnel are also within the scope to enrich the understanding of policy and operational dimensions. This approach ensures a comprehensive and holistic analysis of the crop insurance scenario in Haryana.Furthermore, the study also includes a policy analysis component that compares existing crop insurance models with international best practices and suggestions provided in the academic literature. This comparative perspective will help in identifying gaps in the Indian crop insurance ecosystem and recommending suitable reforms. The scope, therefore, extends to academic, policy, and practical dimensions, making it a well-rounded investigation into crop insurance schemes. In the academic realm, the study contributes to the growing body of research on agricultural risk management, rural finance, and social protection. By focusing specifically on the socio-economic aspects, the study fills a niche that goes beyond mere economic calculations and includes a human development angle. The insights derived can be useful for researchers, students, policymakers, NGOs, and other stakeholders working in the field of rural development and agriculture.Despite its wide coverage, the scope of the study has some limitations which are acknowledged to maintain transparency. The study does not aim to evaluate the actuarial soundness of crop insurance pricing or to conduct a financial audit of insurance agencies. It is also limited to registered insurance holders, and hence, does not extensively analyze the reasons behind non-participation of uninsured farmers. Additionally, the study is limited by the availability and accuracy of primary data as provided by respondents, and the findings are specific to Haryana, which may not be directly generalizable to all states.In conclusion, the scope of this study is broad yet focused, addressing critical socio-economic, institutional, and financial dimensions of crop insurance schemes in Haryana. It offers a micro-level understanding of how these schemes are perceived, adopted, and experienced by farmers, while also drawing policy-level insights for enhancing their effectiveness. Through a comprehensive approach, the study aspires to contribute meaningfully to the discourse on agricultural risk mitigation and farmer welfare in India.

1.9 Definition of Key Terms

1. Crop Insurance: *Crop insurance is a vital agricultural risk management instrument designed to shield farmers from financial losses due to crop failure caused by unforeseen calamities such as drought, floods, hailstorms, or pest attacks. It ensures stability in farm income and encourages continued investment in agriculture. According to Miranda and Farrin (2012), crop insurance plays a pivotal role in supporting agricultural sustainability by mitigating risks that farmers cannot control.*

2. Socio-Economic Analysis: *Socio-economic analysis refers to a comprehensive examination of how social and economic factors such as income, education, occupation, landholding size, and access to services influence individuals' or communities' decision-making and quality of life. Adger (2000) notes that this type of analysis is essential for policy formulation, especially in rural and agrarian settings, as it uncovers systemic inequalities and barriers to development.*

3. Agricultural Risk: *Agricultural risk encompasses the uncertainties that affect agricultural outcomes, such as climatic variations, market price fluctuations, pest infestations, and input cost volatility. These risks can cause significant losses in income and crop yield. Hardaker et al. (2004) emphasize that understanding and managing such risks is fundamental for designing insurance schemes and financial instruments to stabilize farm operations.*

4. Moral Hazard: *Moral hazard in crop insurance occurs when farmers, due to being insured, become less cautious in their agricultural practices, knowing that losses may be compensated. Smith and Goodwin (1996) argue that moral hazard leads to inefficient resource allocation and higher claims, which challenges the sustainability of insurance schemes.*

5. Adverse Selection: *Adverse selection happens when high-risk individuals are more likely to buy insurance than low-risk individuals, thus increasing the overall risk profile of the insured pool. Coble et al. (1997) contend that without proper risk categorization and awareness campaigns, crop insurance schemes may disproportionately attract those more prone to losses, affecting their financial viability.*

6. Pradhan Mantri Fasal Bima Yojana (PMFBY): *PMFBY is a government-backed agricultural insurance scheme in India that offers comprehensive coverage for crop failure due to various risks at a nominal premium rate. The scheme, launched in 2016, seeks to ensure income security for farmers and promote the adoption of modern agricultural techniques (Ministry of Agriculture & Farmers Welfare, 2016).*

7. Weather-Based Crop Insurance Scheme (WBCIS): *WBCIS is an alternative to traditional crop insurance that links compensation to measurable weather parameters like rainfall or temperature, rather than actual yield loss. Raju and Chand (2008) highlight its efficiency in providing faster claim settlements and reducing moral hazard since assessments rely on independent weather data.*

8. Yield Insurance: *Yield insurance protects farmers against a shortfall in yield relative to a predetermined benchmark. It is a key form of insurance that stabilizes income by compensating for the difference between actual and expected yields (Mahul & Stutley, 2010), ensuring continued production and investment in agriculture.*

9. Farm Income: *Farm income represents the total earnings of a farming household from crop cultivation and allied activities like dairy and poultry. It reflects the financial well-being and consumption capacity of the household. Bhalla and Singh (2009) suggest that stable and increased farm income is crucial for reducing rural poverty and enhancing farmers' socio-economic conditions.*

10. Claim Settlement: *Claim settlement in crop insurance refers to the process by which insurers assess, verify, and compensate farmers for declared losses. It is often cited as a bottleneck in the success of schemes. Choudhury (2016) stresses the importance of timely and transparent settlement processes to maintain farmer trust and scheme credibility.*

11. Agricultural Sustainability: *Agricultural sustainability involves farming in ways that meet current needs without compromising the ability of future generations to produce. It requires balancing productivity with environmental care. Pretty (2008) argues that crop insurance contributes indirectly to sustainability by supporting farmers during environmental shocks.*

12. Risk Mitigation: *Risk mitigation entails strategies employed to minimize or control the impact of potential adverse events. In agriculture, this includes diversification, crop rotation, and insurance coverage. Anderson and Dillon (1992) assert that effective risk mitigation is foundational to enhancing resilience among farming communities.*

13. Agricultural Finance: *Agricultural finance is the field concerned with financial services tailored for the agricultural sector, including loans, savings, credit, and insurance. Binswanger and Rosenzweig (1986) state that access to such services is crucial for capital investment in modern farming techniques and risk reduction.*

14. Financial Inclusion: *Financial inclusion is the process of ensuring that all individuals, especially the underserved rural populations, have access to formal financial services. Sarma and*

Pais (2011) link crop insurance to broader goals of financial inclusion by integrating farmers into formal financial systems.

15. Awareness Level: *Awareness level refers to the extent to which individuals know about and understand the features, benefits, and procedures of crop insurance schemes. Patel and Patel (2017) found that low awareness levels significantly hamper scheme uptake and successful implementation.*

16. Premium Subsidy: *A premium subsidy is the share of the insurance premium paid by the government to lower the cost burden on farmers. Hazell et al. (1986) argue that subsidies are essential for making crop insurance accessible to small and marginal farmers in developing countries.*

17. Livelihood Security: *Livelihood security encompasses access to resources and opportunities that enable individuals to sustain their living standards. Chambers and Conway (1992) highlight the role of insurance in enhancing livelihood security by offering financial buffers against agricultural shocks.*

18. Institutional Support: *Institutional support refers to assistance provided by government agencies, cooperatives, banks, and NGOs in delivering and implementing insurance schemes. Dev (2006) points out that strong institutional frameworks are key to increasing adoption and ensuring accountability in crop insurance programs.*

19. Indemnity Level: *The indemnity level is the percentage of the total insured sum that a farmer receives as compensation upon crop loss. Mishra et al. (2014) explain that the adequacy of the indemnity level affects the satisfaction and continued participation of farmers in the scheme.*

20. Income Stabilization: *Income stabilization involves ensuring that farmers' earnings do not fluctuate drastically from season to season, especially due to uncontrollable factors. Ellis (2000) emphasizes that crop insurance is a practical tool for smoothing income, enhancing food security, and reducing rural indebtedness.*

1.10 Organization of the Thesis

The present thesis is systematically organized into five chapters to provide a comprehensive understanding of the socio-economic analysis of crop insurance schemes in Haryana. Each chapter builds upon the previous one, leading to a coherent narrative that supports the study's objectives and findings.

1) Chapter 1: Introduction – This chapter outlines the background of the study, highlighting

the relevance and necessity of crop insurance in the Indian agricultural context, especially in Haryana. It elaborates on the statement of the problem, research questions, hypotheses (if applicable), objectives, scope, and significance of the study. Furthermore, it defines key terms and discusses the research gap identified through preliminary investigation.

2) Chapter 2: Review of Literature – This chapter reviews theoretical frameworks and empirical studies related to crop insurance, socio-economic conditions of farmers, risk mitigation strategies, and the implementation of agricultural policies. The literature review identifies existing research, theoretical underpinnings, conceptual frameworks, and gaps that the present study aims to fill. It also helps in understanding the trends, challenges, and outcomes of crop insurance schemes as discussed in previous studies.
3) Chapter 3: Research Methodology – This chapter presents the research design and methods used for the study. It explains the research philosophy, approach, and strategy adopted. It details the population, sample size, sampling techniques, data collection methods (primary and secondary), tools used for analysis, and the rationale for using specific statistical techniques. It also discusses the reliability and validity of the instruments employed in the study.
4) Chapter 4: Data Analysis and Interpretation – This chapter includes detailed statistical analysis and interpretation of the data collected from crop insurance holders in Haryana. It presents the socio-economic profile of the respondents, explores the determinants of crop insurance, identifies problems in scheme implementation, and analyses the impact of crop insurance on farmers' income. The results are discussed in relation to the research objectives and existing literature.
5) Chapter 5: Findings, Suggestions and Conclusion – The final chapter summarizes the key findings of the research. It offers practical suggestions and policy implications for improving the effectiveness of crop insurance schemes in Haryana. It also highlights the limitations of the study and suggests areas for future research, concluding the thesis with final remarks on the socio-economic impact of crop insurance on the farming community.

This chapter-wise structure ensures logical sequencing and thorough coverage of all dimensions of the research topic, facilitating a deeper understanding of crop insurance schemes and their socio-economic implications in the state of Haryana.

Chapter 2:
Literature Review

2.1 Introduction to Literature Review

Chapter 2 of the thesis, titled "Literature Review," provides an in-depth examination of the existing body of knowledge on crop insurance schemes, particularly in the context of Haryana. The chapter begins with an introduction to the literature review, highlighting the importance of understanding previous studies to contextualize the research objectives. It explores the concept and evolution of crop insurance, covering its global history, its evolution in India, and an overview of various crop insurance schemes offered in the country, along with policy initiatives and government interventions. The chapter then delves into the socio-economic profile of farmers and how factors like demographics, economic status, education, and financial literacy influence the adoption of crop insurance. A significant section of the literature review focuses on the determinants of crop insurance adoption, including accessibility, affordability, trust in providers, and the role of institutional support through extension services. The chapter also highlights the problems and challenges in implementing crop insurance schemes, such as administrative bottlenecks, delays in claim settlements, lack of awareness, and technological constraints. Furthermore, it examines the impact of crop insurance on farmers' income levels and their livelihoods, particularly in terms of income stabilization, risk mitigation, and investment in agriculture. The chapter includes empirical case studies that provide real-world evidence of these effects. Finally, the chapter identifies the research gaps from the reviewed literature, lays out a conceptual framework for the study, and concludes with a summary of key findings. This review lays a solid foundation for the subsequent chapters and guides the research process by identifying areas that require further exploration.

2.2 Concept and Evolution of Crop Insurance

The concept and evolution of crop insurance have played a pivotal role in safeguarding farmers from the uncertainties of agricultural production. Crop insurance is a risk management tool designed to protect farmers against crop losses due to natural calamities, pests, and diseases (Rao, 2010). Globally, crop insurance originated in Europe and the United States during the early 19th century, where weather-related crop failures prompted the development of indemnity-based models (Mahul & Stutley, 2010). In India, the idea of crop insurance began taking shape in the 1940s, but formal implementation started in 1972 with the Comprehensive Crop Insurance Scheme (CCIS), which was later replaced by the National Agricultural Insurance Scheme (NAIS) in 1999 (Vyas, 2004; Raju & Chand, 2008). Over time, the system evolved into more advanced models

like the Weather-Based Crop Insurance Scheme (WBCIS) and the Pradhan Mantri Fasal Bima Yojana (PMFBY) introduced in 2016, which aimed at providing comprehensive risk coverage with increased transparency and farmer inclusiveness (Chand & Singh, 2016; GoI, 2016). These developments were influenced by factors such as the need for agricultural sustainability, the vulnerability of small and marginal farmers, and the increasing impact of climate change (Sharma, 2011; Bhende, 2005). Scholars like Narayanan (2013) and Mishra (2017) argue that the evolution of crop insurance in India reflects a shift from a government-centric to a market-oriented approach, though implementation challenges remain. The evolution also reflects attempts to address regional disparities, simplify claim procedures, and incorporate technology for better monitoring (Kumar et al., 2019). Despite its growth, the crop insurance system still grapples with low penetration, lack of awareness, and delays in settlements, necessitating further policy reforms and increased stakeholder participation (Shukla & Pathak, 2018; Singh et al., 2020). Hence, the journey of crop insurance in India is one of gradual progress, policy experimentation, and continuous adaptation to emerging agricultural risks.Philip D. (1988) conducted a study entitled "An empirical preview of the proposed agricultural insurance scheme in Nigeria." The survey of 70 poultry producers in Nigeria revealed that the majority of them were both aware of and interested in the proposed agricultural insurance scheme. But a lot of farmers were worried that insurance wouldn't be enough to cover all their losses, particularly if a lot of farms were hit at once. More often than not, farmers were characterized as risk-loving or risk-neutral, but they were prepared to pay a premium to protect their chicken companies, according to the poll. Because risk aversion is better aligned with sector profit maximization, this is an issue for the insurance scheme's long-term viability. The government should establish standards to identify insurance firms that can cover farmers' losses, either in whole or in part. As a result, farmers would have more faith in the insurance market and be better equipped to pick a dependable insurance provider. To aid farmers in protecting themselves against financial losses, the Nigerian government is putting up an insurance program for agriculture. Farmers are enthusiastic about the plan, according to the study, but many wonder whether the insurance firms can cover their losses. For the plan to be a success, the government must guarantee that the insurance firms are solvent. Hazell p. (1992) conducted a study entitled "The appropriate role of agricultural insurance in developing countries" which employed secondary data to determine that agricultural insurance is inadequate for effectively managing risks for farmers and agricultural development banks. Not only is it pricey, but it isn't always effective.

The financial viability of insuring many agricultural hazards is questionable. But there's room for improvement when it comes to protecting agricultural assets, rural residents' health and livelihoods, and crop and animal production from certain risks. If governments were to lift some of the significant restrictions that commercial insurers face, the private sector might step up to the plate and provide more of this kind of insurance. The most pressing issue is developing affordable insurance policies to protect low- income rural families from natural disasters. It is possible that simple lottery systems could be useful in insuring against catastrophic weather catastrophes detected by local weather sensors. In sum, the brief contends that agricultural insurance isn't very useful for risk management in agriculture, but that there's room for expansion in protecting certain farm assets, rural residents' health and well-being, and crop and animal production from some particular dangers. Should governments take action to alleviate some significant restrictions that commercial insurers face, the private sector may step up its efforts to provide such insurance. Put another way, this disproves the idea that agricultural insurance adequately protects farmers from potential dangers. Not only is it pricey, but it isn't always effective. On the other hand, there are further measures that may be taken to safeguard farmers' assets, life, and health, as well as their crops and cattle against certain dangers. If governments made it simpler for the private sector to provide this kind of insurance, they could do more to meet the need. Preventing natural disasters that affect farmers living on low incomes is the most pressing issue. To protect ourselves against devastating weather disasters, we may institute simple lottery methods. Goodwin B. (1993), a study entitled "An Empirical Analysis of the Demand for Multiple Peril Crop Insurance" was conducted. The study employed regression analysis techniques and primary and secondary data. The demand for crop insurance is a critical topic, as it impacts the profitability and integrity of crop insurance programs. Iowa corn growers' demand for crop insurance is elastic, according to this research. This means that farmers will buy less insurance if the price goes up. Researchers also discovered that various manufacturers' degrees of loss risk result in distinct variations in demand elasticity. This conclusion has consequences for the actuarial soundness of the crop insurance sector, since producers with lower loss-risk tend to have a more elastic demand for crop insurance. This means that they are more likely to cut their insurance purchases if the price rises. An rise in premium rates for all producers will cause cancellations from those with low loss risk, which will raise the average loss risk for the remaining covered pool. The so-called "adverse selection" issue might set in motion a downward circle of falling participation and rising premiums.

In order to fix the issues caused by a poorly chosen pool of participants, the research recommends rethinking current premium rate-setting methods. Changing to area-wide loss metrics is one option that might lessen the effect of producer risk on premiums. Ultimately, the findings of this research shed light on the importance of crop insurance and its impact on the industry's actuarial stability. Particular impacts on participation rates and the crop insurance industry's profitability and actuarial stability should be the focus of future studies examining different pricing structures. Barnett and Mahul (2007) conducted a study titled "Weather Index Insurance for agriculture and rural areas in lower-income countries." The author employed secondary data. Weather index insurance products are one example of an innovation that lower-income nations might use to transfer risks associated with natural disasters. The findings include a connection between weather risk and poverty, background information on weather index insurance products, requirements for implementation, and potential roles for governments, donors, and international financial institutions in facilitating implementation. There has been a brief review of recent efforts to provide weather index insurance products in rural areas of some middle- and lower- income countries. One important goal is to reduce poverty in these areas through effective risk transfer mechanisms, which can stimulate investment and economic growth. A simple idea that, under certain conditions, may successfully transfer spatially covariate weather risks is weather index insurance. Weather index insurance has only been around for a short time, so it's too soon to say how long it will last. However, what we do know from Mexico and India indicates that these products could help the rural poor transfer risk in certain areas. Some ways that governments, donors, and international financial institutions could help get weather index insurance out there include subsidizing premiums so that farmers can afford it, funding more weather monitoring and data collection so that policies are more accurate, and teaching farmers how to use their policies to safeguard their businesses. Raju, and Chand, (2008) conducted a Study on the “Performance of the National Agricultural Insurance Scheme and Suggestions to Make it More Effective” The author used secondary data and used simple technique average and basic statistics techniques. Crop failure as a result of pests diseases or natural disasters is one of several dangers that Indian farmers confront. The research also indicated that various general insurance firms in the nation may be given appropriate goals to cover agricultural insurance, which is crop insurance's only way to shield farmers from these dangers. One possible starting point is to set the goal at the same percentage as agriculture's contribution to the national revenue.

2.2.1 History and Global Perspective of Crop Insurance

Crop insurance, as a risk mitigation tool, has a rich historical trajectory globally, beginning as early as the 19th century in developed nations. The concept was first institutionalized in Europe and North America, where farmers were exposed to frequent weather-induced crop failures and sought protection against such vulnerabilities (Skees & Barnett, 2006). The first formal crop insurance program was introduced in France in the 1820s, followed by efforts in the United States in the 1930s under the Federal Crop Insurance Act of 1938, which laid the foundation for organized public sector crop insurance (Glauber, 2013). Initially, these schemes faced challenges such as high administrative costs and adverse selection but gained momentum with government subsidies and technological improvements in risk assessment. In the global south, particularly in Asia and Africa, the adoption of crop insurance emerged much later, with varying degrees of success. Countries like Japan implemented successful models post-World War II, emphasizing community-based approaches and high farmer participation (Hazell et al., 1986). In contrast, many developing nations struggled with poor infrastructure, lack of data, and financial illiteracy among farmers, making large-scale implementation difficult (Mahul & Stutley, 2010). Over time, international institutions like the World Bank and FAO started promoting index-based insurance models to overcome traditional limitations. Weather-based index insurance and area-yield insurance became prominent in regions such as Sub-Saharan Africa and South Asia, where data collection for individual farm losses was impractical (Miranda & Farrin, 2012). In recent decades, technological innovations such as satellite imagery, geographic information systems (GIS), and remote sensing have transformed crop insurance globally, enhancing transparency and efficiency (Hazell & Hess, 2010). Public-private partnerships have also played a crucial role in expanding the reach of crop insurance in both developed and developing economies. For example, the United States and Canada operate under a hybrid model where private insurers deliver publicly subsidized crop insurance programs (Glauber, 2004). Meanwhile, countries like China and Brazil have launched extensive government-supported schemes tailored to their agrarian structures and climate vulnerabilities (Iturrioz, 2009). Overall, the global evolution of crop insurance reflects a growing consensus on its importance for food security, rural income stabilization, and agricultural resilience, especially in the face of increasing climate risks and economic uncertainties (Clarke et al., 2012). The international experience highlights the need for contextualized solutions, institutional capacity building, and farmer-centric designs to ensure sustainable crop insurance

adoption worldwide.

2.2.2 Evolution of Crop Insurance in India

The evolution of crop insurance in India has been shaped by the country's agrarian economy, high dependence on monsoons, and vulnerability to natural calamities. The concept of crop insurance was first proposed in India in the 1940s, but it wasn't until the 1970s that pilot schemes were seriously considered. The earliest form was introduced by Professor V.M. Dandekar, often referred to as the father of crop insurance in India, who advocated for a yield-based insurance model to mitigate agricultural risks (Dandekar, 1976). This led to the formulation of the First Crop Insurance Scheme (FCIS) in 1972–73, launched on a pilot basis in Gujarat by the General Insurance Corporation (GIC), covering H-4 cotton (Mishra, 1996). Building on this, the Comprehensive Crop Insurance Scheme (CCIS) was introduced in 1985 by the Government of India in collaboration with state governments and the GIC. It was based on the area approach and linked to institutional credit, but it faced criticism for limited crop and farmer coverage (Raju & Chand, 2008). In response to these limitations, the Experimental Crop Insurance Scheme (ECIS) was briefly introduced in 1997–98, followed by the National Agricultural Insurance Scheme (NAIS) in 1999, which marked a significant development by offering coverage to all farmers, including loanee and non-loanee categories, and expanding the range of crops (Vyas, 2004). The Weather-Based Crop Insurance Scheme (WBCIS), introduced in 2007, shifted from yield-based assessment to weather parameters like rainfall, temperature, and humidity. This model was praised for faster claim settlements and reduced administrative burden (Mahul & Stutley, 2010). In parallel, the Modified NAIS (MNAIS) was launched in 2010 to address the shortfalls of NAIS, offering actuarial premium rates with government subsidies and improved technology for loss estimation (Chand & Singh, 2016). The most comprehensive and ambitious scheme to date is the Pradhan Mantri Fasal Bima Yojana (PMFBY), launched in 2016. PMFBY aimed to increase the insurance coverage area and simplify the premium structure by capping the farmer’s share at 2% for Kharif crops, 1.5% for Rabi crops, and 5% for commercial crops, with the balance subsidized by the government (GoI, 2016). The scheme introduced the use of modern technology like remote sensing, drones, and smartphones for crop cutting experiments and claim assessments, intending to bring transparency and reduce delays in compensation (Chand et al., 2018). Despite its promise, PMFBY has also faced challenges such as non-participation by insurance companies in some regions, delayed compensation, and low farmer awareness (Narayanan, 2020). Over the years, India’s crop

insurance journey has evolved from a limited, credit-linked model to a large-scale, technology-driven initiative aiming to provide financial security to millions of farmers. However, for crop insurance to be truly effective, continuous policy refinement, increased awareness, better institutional coordination, and enhanced grievance redressal mechanisms are essential (Kumar et al., 2019; Shukla & Pathak, 2018). As climate change continues to amplify agricultural risks, the role of robust and inclusive crop insurance schemes will become even more critical in ensuring sustainable livelihoods for Indian farmers. Nair, R. (2010) conducted a study entitled "Crop Insurance in India: Changes and Challenges." The assessment of the crop insurance program in India was conducted through the multi-peril yield-based National Agricultural Insurance Scheme (NAIS). In addition to the more conventional crop insurance, you should push for weather-based insurance. As a result, farmers would have more alternatives and face less fundamental risk. The claim settlement procedure has to be made more efficient. This would alleviate some of the financial strain on farmers who have experienced crop failure. Increase the number of areas and crops covered. More farmers would be able to afford crop insurance and risk inequities would be lessened as a result. Singh, G. (2010) conducted a study titled "Crop Insurance in India." This paper describes the dependence of Indian agriculture on unreliable rainfall and the other production and marketing risks that farmers encounter, which are contingent upon their commodities and regions. Farmers in India face production risks due to their reliance on the unpredictable rains, according to the report. Depending on their commodities and the areas in which they reside, farmers also confront marketing hazards. Crop insurance may help with risk management, but there are certain issues with the solutions that are presently on the market. In order to lessen the impact of basis risk, the recommendations are to make crop output predictions more precise and updated more often. Make it easy for farmers to enroll in crop insurance and raise knowledge about it. The claims settlement procedure needs to be made more efficient. Create crop insurance policies that are better suited to the unique requirements of various farming communities and geographical areas. Investigate the potential of cutting-edge innovation like big data and satellite photography to enhance crop insurance delivery. Raise premium subsidies to make crop insurance more accessible to farmers. Create crop insurance policies that address more comprehensive risks, including those associated with post-harvest losses and price variations. Encourage farmers to diversify their crops to lower their risk exposure. Put money into agricultural R&D to create new crop types that can withstand the effects of climate change. The Indian government may enhance

crop insurance's ability to assist farmers in risk management and improving their lives by adopting these proposals. researched Indian crop insurance and the reliance of Indian farmers on risk. Woodard et. al, (2010), conducted a study titled “Revenue Risk-Reduction Impacts of Crop Insurance in a Multicrop Framework”. Instead of using a single-crop framework, the author used a multi-crop one. Misleading Single-Crop Analysis: Research highlights that insurance policies based solely on single crops can lead to inaccurate conclusions, especially when multi-crop farming is common. Impact of Modeling Frameworks: Comparing single-crop versus multi-crop environments revealed that risk reduction effectiveness varies significantly. For example, individual revenue products like RA-HP were less effective in multi-crop settings than group-based products like GRIP-HR.Illinois Study: The analysis of crop insurance options for Illinois corn and soybeans showed that the choice of modeling framework heavily influenced outcomes, emphasizing the need for tailored risk-reduction strategies.Tamil Nadu Research: A study using Probit and Tobit models in Tamil Nadu revealed farmers' knowledge and perceptions of crop insurance are crucial for adoption. Farmers with larger planted areas, higher risks, and multiple income sources are more likely to purchase insurance. Dissatisfaction stems from high premiums, a lack of transparency, and unfair loss assessments. Barriers to Adoption: High costs, opaque loss assessment procedures, and limited farmer education reduce crop insurance uptake. The conclusion are Farmers should consider their risk-reduction goals and farm-specific characteristics when choosing insurance plans, especially in multi-crop settings. Transitioning to multi-crop frameworks could better reflect real-world scenarios and improve risk management. For Tamil Nadu, making crop insurance affordable and transparent is critical. Lowering premiums, ensuring fair loss assessments, and improving farmer education can enhance accessibility and satisfaction, encouraging broader adoption of crop insurance as a risk mitigation tool. Governments must prioritize transparency, fairness, and education to improve the effectiveness of crop insurance programs and secure farmers’ livelihoods. Heenkenda, S. (2011) researched the topic of "Index-Based Microinsurance for Paddy Sector in Sri Lanka: An Evaluation of Demand Behavior." Researchers in Sri Lanka's Ampara area used the contingent value approach to evaluate rice farmers' insurance needs. According to the research, rice farmers in the study region have a significant prospective demand for IBMS. Farmer age, income, level of knowledge, and irrigation method are the most important variables in determining whether they will enter IBMS. Where farmers are located has a significant impact on their willingness to pay for IBMS. Insurance is less

common and WTP is lower among farmers in rain-fed areas compared to those in irrigated areas. The prevalence of social capital significantly affects farmers' inclination towards IBMS. Researchers in Sri Lanka discovered that index-based microinsurance is in great demand among rice farmers, but that the factors influencing this demand vary greatly depending on the study's geographic area. If the government of Sri Lanka wants to meet the unique needs of its farmers across the country, it should think about creating an index-based microinsurance program that takes regional differences into account. This would be a more discriminating and adaptable approach than a uniform pricing policy. Farmers should be able to choose the appropriate degree of coverage within the program's adaptability. Flexible enough to enable farmers to pick the degree of coverage that is best for them. When planning and implementing the program, consider the impact on social capital and farmer groups. Creating effective institutional structures and infrastructure to back up the launch of an IBMS program is another key finding of the research. Coble and Barnett (2012) conducted a study titled "Why do we subsidize crop insurance" The Findings are the influence of Subsidies on Farmers' Decisions Subsidies affect farmers' choices in crop production, technology adoption, and risk management strategies. Behavioral aspects like cognitive biases influence farmers' ability to anticipate and prepare for risks. Large farms may benefit disproportionately compared to smaller farms. Geographical disparities exist, with certain areas or regions benefiting more than others Questions arise about whether subsidizing crop insurance is the most cost-effective way to manage agricultural risks. Alternative strategies might achieve similar goals at a lower cost. Subsidies may encourage unsustainable farming practices that harm the environment. There's potential to design schemes that incentivize sustainable agricultural practices. Current subsidy structures may inadvertently promote moral hazard (risky behavior due to insurance) and adverse selection (disproportionate participation by high-risk farmers) Changes in premium subsidies impact the demand for crop insurance, indicating the need for further research into how elastic demand is. The conclusions are Current crop insurance subsidy models may create inefficiencies in resource allocation and market dynamics. The design of subsidies often benefits larger farms more significantly, leading to equity concerns. Unintended environmental impacts must be addressed to ensure sustainability. Cognitive limitations and behavioral tendencies among farmers need to be considered when designing insurance schemes. The recommendations are to evaluate and adjust subsidy structures to ensure smaller farms and disadvantaged regions receive equitable benefits. Explore alternative risk management strategies,

such as savings accounts, weather derivatives, or community-based risk-sharing programs, that may reduce dependency on subsidies. Design crop insurance programs to incentivize sustainable farming practices and discourage harmful methods. Incorporate behavioral economics into policy design to address farmers' cognitive biases and improve risk preparedness. Investigate the long-term effects of subsidies on production decisions, market distortions, and ecological outcomes and how adjustments in premium subsidies impact insurance uptake and risk management behavior. Implement measures like tiered premiums, stricter monitoring, or caps on claims to reduce risky behaviors and balance program participation. These steps can help policymakers create a more efficient, equitable, and sustainable framework for crop insurance subsidies. Deshmukh and Khatri (2012) conducted a study titled "Agricultural insurance in India- a paradigm shift in Indian agriculture." The study reviewed the existing literature on agricultural insurance in India. The critical evaluation and historical development of agricultural insurance in India is the subject of this article. The significance of crop insurance as a tool to mitigate risk and safeguard farmers from natural disasters is emphasized. Mn. If we want to make sure everyone has the coverage they need, we need to speed up the process of public-private partnerships (PPPs) and let independent private insurers in. To be positioned as a flagship plan at the national level, NAIS must first be corrected, although it has been a somewhat superior scheme thus far. Some have proposed that the government do away with policies that make it harder for farmers to get crop insurance, such as the way farmers are classified according to debt penalties. Private insurers should be encouraged to join the farm insurance market by the government. The government needs to enhance the systems in place for agricultural insurance, including the method for estimating crop yields. Crop insurance and ways to reduce risk should be made more widely known to farmers by the government.

2.2.3 Types of Crop Insurance Schemes in India

Crop insurance schemes in India have evolved significantly over the decades to cater to the diverse agricultural landscape, risk profiles, and socio-economic conditions of farmers. Broadly, these schemes can be categorized into yield-based insurance and weather-based insurance models. The yield-based crop insurance schemes focus on actual yield loss in a particular area, while weather-based schemes indemnify farmers based on deviations in weather parameters from the normal range (Raju & Chand, 2008). One of the earliest yield-based schemes was the Comprehensive Crop Insurance Scheme (CCIS) launched in 1985. It was linked with institutional credit and

covered food crops and oilseeds. However, the coverage was limited to loaned farmers and suffered from low participation (Mishra, 1996). This was followed by the National Agricultural Insurance Scheme (NAIS) in 1999, which extended coverage to all farmers, including non-loanees. It offered protection against crop failure due to natural calamities, pests, and diseases. Though NAIS marked a significant improvement, issues such as delayed claim settlements and reliance on outdated loss assessment methods remained (Vyas, 2004). To address some of these shortcomings, the Modified NAIS (MNAIS) was introduced on a pilot basis in 2010. It incorporated improvements like actuarial premium rates, improved claim settlement mechanisms, and the use of technology for more accurate yield estimation (Chand & Singh, 2016). Alongside MNAIS, the Weather-Based Crop Insurance Scheme (WBCIS) was launched in 2007. Unlike traditional schemes, WBCIS used weather parameters like rainfall, temperature, and humidity as proxies for crop performance. It allowed faster claim settlements and reduced administrative costs, making it more scalable (Mahul & Stutley, 2010). The Pradhan Mantri Fasal Bima Yojana (PMFBY), launched in 2016, consolidated and replaced earlier schemes like NAIS and MNAIS. PMFBY is a comprehensive scheme that offers the lowest premium rates for farmers, with the balance being subsidized by central and state governments. It covers pre-sowing to post-harvest losses and uses advanced technology such as remote sensing and GPS for crop yield estimation (GoI, 2016; Narayanan, 2020). India's crop insurance landscape comprises multiple schemes that have gradually evolved to become more inclusive, efficient, and technology-driven. However, challenges related to farmer awareness, claim delays, and insurer participation persist, necessitating ongoing reforms and better stakeholder coordination (Shukla & Pathak, 2018; Kumar et al., 2019).Mahul et. al, (2012) conducted a study titled "Improving Farmers' Access to Agricultural Insurance in India." The results of the study indicate that farmers insured under the MNAIS have reported quicker claims resolution periods than those insured under the existing scheme. Unexpectedly high levels of farmer engagement have been seen in the MNAIS. Subsidies provided by the government have been reduced as a result of the MNAIS. Some recommendations. It is essential that the government keeps a close eye on the MNAIS's performance and makes necessary modifications. The government need to collaborate with insurers from the private sector to guarantee that they are fulfilling their responsibilities under the MNAIS. The government need to raise farmers' awareness of the MNAIS and inspire them to take part. As a whole, the MNAIS is an innovative strategy for crop insurance in India that shows promise. Better risk protection for

farmers may be possible, and it may even fix the issues with the current plan. In spite of substantial government subsidies, 954 million farmer families remain uninsured due to design issues, including those pertaining to prolonged claim settlement processes. More rapid claims settlement, less skewed distribution of government subsidies and cross-subsidies across farmer groups, and lower fundamental risk are all features of the new program's architecture that improve upon the old plan. Methods for estimating yield using the examined area yield index and data from crop-cutting experiments. They concluded that one must not underestimate the political and economic components. A favourable policy environment and substantial political will from many agricultural and financial ministries are necessary for NAIS-scale reforms.Mani et. al, (2012) conducted a study titled "Adaptability of Crop Insurance Schemes in Tamil Nadu". The researcher used primary data and secondary data and this study is based on data from 90 farmers in three districts of Tamil Nadu who are enrolled in the National Agricultural Insurance Scheme (NAIS). The author used the percentage method. The findings are farmers say that the main problem with the NAIS scheme is that people don't know enough about it. It takes too long to get paid when you make a claim, the process is too complicated, the premiums are too high, and the yields from the actual farms are very different from the yields from the experimental farms. Farmers in the Nagapattinam district say that the main problems with the Varsha Bima scheme are that they have not received any benefits from the scheme since it was implemented and they don't know enough about the details of the weather insurance schemes. The rainfall on their farms is very different from the rainfall at the weather station. The suggestions are crop insurance is expensive in India because there are many small farms and it is difficult to know how much each farm produces. To make crop insurance more affordable and effective, the government and insurance companies should: Tell farmers more about crop insurance and how it works, create new insurance products that are better for small farms and different farming conditions, and use technology to make it easier and cheaper to see how much damage has been done to crops and to pay out claims.Mahajan et. al, (2012) conducted a study on the "Growth of National Agricultural Insurance in India." The Findings are long wait times for data due to administrative hurdles. Limited crop eligibility for crop-cutting experiments (CCEs). Delays in publishing official statistics after CCEs, lead to claim settlement delays. Pradhan Mantri Fasal Bima Yojana (PMFBY) fell short of its goals due to inadequate policy implications, lack of farmer awareness, poor performance of implementing agencies, and insufficient federal and state support. The National Agricultural Insurance Scheme

(NAIS) is Ineffective in covering all crops and relies heavily on CCEs for yield predictions. Potential Benefits are improved awareness and adoption of crop insurance could boost food grain production and reduce crop losses. The Conclusion is while crop insurance is a critical tool for risk management in India's agricultural sector, its effectiveness is hindered by administrative delays, limited crop coverage, and insufficient institutional support. Addressing these issues is essential to unlock the full potential of insurance in securing farmers' livelihoods and enhancing agricultural productivity. The recommendations are to conduct educational campaigns to inform farmers about the benefits and enrollment processes of crop insurance. Include more crops under insurance schemes to increase their relevance and accessibility. Use satellite imaging, big data, and other technologies to reduce dependence on CCEs and speed up yield assessments. Minimize the time lag between damage assessment and claims disbursement to improve farmer satisfaction agencies with adequate resources and training to enhance efficiency and service delivery increase premium subsidies and provide robust financial and logistical backing from federal and state governments. By implementing these measures, crop insurance can become a more reliable and effective tool for safeguarding farmers against agricultural risks.Varadan and Kumar (2012) conducted a study entitled "The Influence of Crop Insurance on Rice Farming in Tamil Nadu." To gauge how 600 farmers felt about crop insurance programs, the author conducted a poll. Constraints on the usage of crop insurance were considered with the author's use of crop diversity, crop cost, and income as factors influencing rice farming. The majority of farmers are familiar with government programs that reduce risk, but only 50% are aware of the goods offered by crop insurance schemes. The authors also noted that insured farmers had a better chance of making a profit than those without insurance. Farmers have noticed that the crop insurance program has caused them to spend more money on higher-value inputs like seeds and fertilizer for plant production, in addition to identifying certain problems with the National Agricultural Insurance Programme's functioning. Several factors have been identified by the author as having a significant and positive impact on farmers' adoption of crop insurance schemes. These include the gross cropped area, income from non-agricultural sources, the presence of risk in farming, the number of workers in the farm family, satisfaction with the premium rate, and affordability of the insurance premium amount. There should be an effort to teach farmers about these programs because, according to the report, the insurance service- providing companies are the primary source of all significant restraints. The study found that farmers are more likely to use crop insurance schemes when certain factors are

taken into account. These factors include the gross cropped area, income from sources other than agriculture, the presence of risk in farming, the number of workers in the farm family, satisfaction with the premium rate, and affordability of the insurance premium amount. Therefore, it is necessary to develop more innovative crop insurance products that require minimal human intervention. Kwadzo et. al, (2013) conducted a study titled "Food Crop Farmers' Willingness to Participate in Market-Based Crop Insurance Scheme: Evidence from Ghana," the researchers examined the topic of market-based crop insurance and sought to determine the level of interest among food crop farmers in Kintampo North Municipal, Ghana. In April 2010, 120 farmers were questioned for the research. To find out what characteristics affect Kintampo North Municipal farmers' likelihood to participate in a crop insurance scheme, a binary logistic regression model was used. A total of 120 farmers growing food crops in Kintampo North Municipal, Ghana, were surveyed to gauge their interest in a market-based crop insurance scheme. According to the research, bushfires, drought, and floods pose the greatest threat to agricultural food production. There has to be market-based insurance to cover these risks since they generate considerable agricultural losses. Yams, cassava, and plantains are staple crops in the region, although they are vulnerable to theft. Also, plantain crops might be ruined by high winds. Selling agricultural assets or beginning other enterprises are two typical risk management strategies used by farmers in Kintampo North Municipality. To protect themselves against a hypothetical loss of GH¢1,000 in revenue from their farms, farmers are prepared to spend an average of GH¢24.43 for insurance. When asked what variables impact their propensity to enroll in crop insurance, farmers often mention farm size, family size, and animal diversity. Policymakers, insurers, NGOs, and development groups in Kintampo North Municipality and surrounding areas should take family size, farm size, and livestock activities into account when creating and executing crop insurance programs, according to this study. Bushfires and droughts are two examples of the many risks that affect agricultural production often and severely. Because of the potential magnitude of the compensation, insurers should give these risks serious consideration. Mukherjee and Pal (2013) conducted a study titled "Improving Awareness about Crop Insurance in India." The study discovered that, despite premium subsidies, only 4% of farmers cited affordability concerns as a deterrent to insurance, indicating low crop insurance coverage. Over 90% of uninsured farmers said that they did not insure their crops because they were unaware of the need of doing so. Greater bank branch density and the frequency of financial transactions in a given area did not substantially

raise knowledge of crop insurance, indicating a lack of influence from financial inclusion. Farmers who had access to technical assistance or training in agriculture were more likely to be familiar with crop insurance, suggesting that agricultural extension services play an important role in raising awareness. Obstacles to current extension services: Farmers are not effectively reached by agricultural extension services due to a lack of access, inadequate resources, and mismatched incentives. In conclusion, the main reason why crop insurance coverage is poor in India is because people aren't aware of the need for it. In order to raise crop insurance knowledge and adoption rates, it is essential to enhance agricultural extension services. For knowledge distribution to be successful, it is important to strengthen and extend the current extension infrastructure while also addressing concerns with resources and incentives. To raise knowledge about crop insurance, financial inclusion programs may not be enough. Aidoo et. al., (2014) conducted a study titled "Prospects of Crop Insurance as a Risk Management Tool Among Arable Crop Farmers in Ghana." To determine what variables impact farmers' propensity to get crop insurance, this research combines secondary and primary data using a binary logistic regression model. The research was placed in two agricultural regions of the Sunyani Municipality, where cassava and maize are the primary crops. Using a systematic questionnaire, 120 farmers were questioned. According to the research, farmers are open to purchasing crop insurance to hedge against potential financial setbacks caused by pests, illnesses, or bad weather. Age, land ownership system, and educational level are the primary determinants of whether or not farmers purchase crop insurance. Those farmers who own their property outright, have advanced degrees, and are older are the ones most likely to invest in crop insurance. Since farmers are only prepared to pay a little premium for crop insurance, private companies would need government subsidies to provide the policy. Despite farmers' interest in purchasing crop insurance, the survey indicated that many are not prepared to pay a premium for the policy. To make crop insurance cheap for farmers, the government would have to fund it. Farmers should learn about crop insurance and put money aside so they can purchase it, according to the report. If farmers are generating more money, they are more likely to want crop insurance, but it's important for them to know about it and have the means to pay for it. Thus, crop insurance might find an audience in a program that boosts farmers' incomes. In conclusion, crop insurance may need government funding to be viable, given farmers' low willingness to pay. Coble et. al, (2014), researched the title "Crop Insurance in the Agricultural Act of 2014," the 2014 Act significantly revised the crop insurance program and introduced two

new area- triggered supplemental insurance products to better shield farmers from financial loss. With an emphasis on neglected agricultural commodities, specialized crops, and cattle, the Act also broadens the function of crop insurance within the government safety net for crop producers. To further address these farmers' requirements, the Act mandates that the USDA undertake research and create new goods. More specifically, the Act mandates that the USDA increase its study toward comprehensive agricultural revenue insurance with greater coverage levels. Products for underutilized agricultural commodities are the primary focus, including sweet sorghum, biomass sorghum, peanuts, sugarcane, alfalfa, pennycress, rice, and specialty crops. Insuring specialty crop producers for food safety and contamination-related losses, swine producers for catastrophic disease events, catfish producers for losses due to a shrinking profit margin, commercial poultry producers for losses due to catastrophic disease events, biomass sorghum or sweet sorghum producers for losses due to business disruptions caused by integrator bankruptcies, alfalfa crop insurance, and whole farm diversified risk management insurance plans are all things that need to be studied or put into policy. Appropriates $10 million for the USDA Risk Management Agency to launch two or more pilot programs between 2014 and 2018 to help underserved crop and livestock producers (including those working with specialty crops) afford private weather insurance based on an index. We hope that by making these adjustments, crop insurance will become more widely available and inexpensive, allowing more growers to better manage their risks. Mosley and Krishnamurthy (2014) conducted a study “Crop Insurance Effective? "The Case of India" examines the Indian Comprehensive Crop Insurance Scheme's (ICCIS) performance from 1985 to 1993 and concludes that to be sustainable, it requires change. A huge and increasing financial deficit and the lack of a commensurate improvement in resource allocation or repayment performance are the two main issues affecting the Indian Comprehensive Crop Insurance Scheme at the moment. Three tools are available to the government to deal with these issues: the extent to which the plan is complete, which affects the amounts of money spent, money made, and economic gain. The premium rate: This would make the program more financially viable by lowering the magnitude of the deficit. There are a number of possible safeguards against adverse selection and moral hazard, but none of them are in use at the moment. Raising the premium from 1% of the insured amount to 2% might be a workable approach. This would make the plan more financially viable by lowering the deficit. Nevertheless, if the program remains optional at the state level, some states that receive enough rainfall or have adequate

irrigation infrastructure may choose not to participate. This would decrease the likelihood of risk-spreading and the impact of a higher premium on the program's financial sustainability. Reducing the scheme's level of comprehensiveness is another potential approach. To do this, the scheme's coverage area would have to be reduced. The author argues that the Indian Comprehensive Crop Insurance Scheme requires reform for its sustainability and that this would leave impoverished farmers, who produce with few fixed assets, exposed to natural disasters. The optimal combination of these measures is currently a topic of great debate. There isn't a unanimous agreement on the best course of action, but there are a number of possibilities to explore. The writers advocate raising prices and narrowing the scope of insurance policies. In addition, they imply that a different strategy, wherein farmers get direct drought insurance, might work better.

2.2.4 Major Policy Initiatives and Government Interventions

The Government of India has played a pivotal role in designing and implementing crop insurance schemes to safeguard farmers against agricultural risks such as droughts, floods, pest attacks, and other natural calamities. Over the years, several policy initiatives and government interventions have been launched to expand coverage, reduce farmers' premium burden, and ensure timely compensation. One of the earliest efforts was the Comprehensive Crop Insurance Scheme (CCIS) in 1985, which aimed to provide financial support to farmers in the event of crop failure. However, due to limitations in reach and effectiveness, it was later replaced by more structured schemes (Mishra, 1996; Raju & Chand, 2008). In 1999, the government introduced the National Agricultural Insurance Scheme (NAIS) to provide a wider coverage to all farmers and crops, regardless of their loan status. This was followed by the Weather-Based Crop Insurance Scheme (WBCIS) in 2007 and the Modified NAIS (MNAIS) in 2010, which incorporated the use of technology and private sector participation to enhance efficiency (Chand & Singh, 2016; Mahul & Stutley, 2010). The landmark policy intervention came in 2016 with the launch of the Pradhan Mantri Fasal Bima Yojana (PMFBY), which aimed to address the gaps in earlier schemes by offering uniform premium rates, increased transparency, and a simplified claim settlement process using remote sensing and GPS technologies (GoI, 2016; Narayanan, 2020). Additionally, the government has periodically revised operational guidelines of PMFBY to make it more farmer-friendly, such as making participation voluntary, improving grievance redressal mechanisms, and encouraging state-level customization (Shukla & Pathak, 2018). Other initiatives include capacity-building programs, farmer awareness campaigns, and digital platforms like the National Crop

Insurance Portal to enhance accessibility and transparency. These interventions reflect the government's commitment to making crop insurance an integral part of risk management and rural resilience in India (Kumar et al., 2019). Mohapatra and Dhaliwal (2014) conducted a study titled "Review of Agricultural Insurance in Punjab State of India." The study employed a descriptive research design to review and analyse the past, present, and scope of agricultural insurance schemes in Punjab state. Research for the research drew from a wide range of publications on agricultural insurance in the Indian state of Punjab. Research shows that agricultural insurance hasn't worked so well in India, although it could help Punjabi farmers diversify their crop yields. In India, the Agricultural Insurance Company (AIC) plays a crucial role in the public sector's agricultural insurance. Due to the lower risk associated with the paddy-wheat crops farmed in Punjab, the National Agricultural Insurance Scheme (NAIS), India's largest agricultural insurance program, was not operational there. In Punjab, weather-based insurance products might be a useful tool for reducing risk. By protecting them from financial ruin in the event of a crop failure, agricultural insurance might encourage Punjabi farmers to grow a wider variety of crops. The government should support agricultural insurance and provide policies tailored to the dangers that Punjabi farmers face, according to the suggestions. Subsidies from the government might ease the financial burden of crop insurance payments for farmers. A portion of the power subsidies already in place might be reallocated to crop insurance premium subsidies. Farmers in Punjab may benefit from agricultural insurance if it helps them diversify their crops and lowers their risk. Agricultural insurance might need some help from the government in the form of subsidies and the encouragement of public-private partnerships. A portion of the power subsidies that are already in place might be reallocated to agriculture insurance premium subsidies, according to the author. Insurance for farmers should be encouraged by the government, and plans should be tailored to the specific dangers that Punjabi farmers encounter. Babcock. B, (2015) conducted a study titled "Applying cumulative prospect theory to explain anomalous crop insurance coverage choice." The author employed a straightforward percentage procedure and secondary data. The results show that farmers' choices on the amount of crop insurance they purchase aren't always logical. Despite the available government subsidies and the advantages of crop insurance, they may still select for inadequate coverage. The first of them is that farmers are naturally risk-averse. This indicates that the delight of acquiring an equivalent amount of money is less satisfying to them than the sorrow of losing it. The purpose of crop insurance is to shield farmers from financial ruin, yet this might

cause them to disregard its advantages. How crop insurance is structured influences the choices made by farmers. Farmers could be more inclined to get crop insurance if it is presented as a way to mitigate risk on their farms. Crop insurance may not sell as well if presented to farmers as an independent investment. These considerations should be taken into account by policymakers and insurance firms when crop insurance schemes are being designed and marketed. Promoting crop insurance as a means to mitigate agricultural risk could persuade more farmers to buy policies, therefore lowering their exposure to financial losses caused by crop failures. Insurance firms and policymakers should emphasize how beneficial crop insurance is for risk management on farms. Additionally, they need to clarify to farmers the various coverage options and premium subsidies. DU et al. (2016) conducted a study titled "Rationality of choices in subsidized crop insurance markets." The authors examined the crop insurance choices of farmers in the United States, a market that is distinctive due to its high level of government subsidies and actuarially fair premium rates. They discover that farmers often make irrational decisions, such as rejecting contracts that transfer relatively more subsidies while keeping relatively less risk in favor of contracts that transfer relatively fewer subsidies while keeping more risk. The results show that farmers often make out-of-the-ordinary decisions when it comes to crop insurance, such as rejecting contracts that retain less risk but transfer more subsidy in favor of contracts that do the opposite. Prospect theory, regret aversion, and saliency are some of the theories that might explain these out-of-the-ordinary decisions. Prospect theory, regret aversion, and saliency are among the authors' proposed reasons for these out-of-the-ordinary decisions. The authors go on to explain the results' policy implications and offer some suggestions for how lawmakers might assist farmers in making more informed decisions about crop insurance. One suggestion is to raise awareness among farmers about available but underutilized transfers. Make getting crop insurance easier. Assist farmers in encouraging more thoughtful decision-making by providing a broader perspective within which crop insurance choices are made. More transparent and anonymous data on farmers' crop insurance preferences should be made available. The authors stress that collecting and analysing data on farmers' crop insurance decisions consistently is the first step in identifying the root of anomalies and implementing the remedy. Researchers will therefore be able to craft strategies that have a better chance of successfully resolving the observed behavioral anomalies by identifying the critical elements impacting farmers' actions.Fadhliani (2016) conducted a study titled "The Impact of Crop Insurance on Indonesian Rice Production." This study establishes a theoretical model of

the yield-based MPCI crop insurance policy for a risk-averse rice farmer in Indonesia. This research shows the results of a comparative statics investigation of policy factors' impacts on yield via wealth, insurance, and coupling. Additionally, the research utilizes numerical optimization to construct the model and investigates how various policies impact input utilization, certainty equivalents, indemnity payments, and premiums. The maximum coverage level is preferred by farmers when it comes to certainty equivalent. The biggest payment is given to farmers for the highest coverage level and subsidies when it comes to predicted indemnity and insurance payments. While the research did find a coupling effect for changes to the premium subsidy, it did not find one for changes to the coverage level. Farmers may influence the amount of their payments by modifying inputs and, therefore, production. Assuming manufacturing costs are greater than market prices, the wealth impact becomes murky. Wealth impact is negative for subsidy levels and unclear for coverage levels when market price is lower than average production cost. Coverage levels have a positive insurance impact, whereas subsidy levels have a negative one. So, if the subsidy level goes up, the farmer will use fewer inputs, but if the coverage level goes up, the farmer will use more. There is a moral hazard effect with MPCI crop insurance. The farmer anticipates indemnity payments, which cause a decrease in input consumption, when coverage levels reach or exceed 40%. Both the maximum coverage and subsidy levels are highly preferred by farmers. To lessen the impact of moral hazard, it could be best to provide modest premium subsidies with generous coverage. Based on the study's findings, the Indonesian government is recommended to implement MPCI insurance with cheap premium subsidies and high coverage levels. The findings of this research may be used by policymakers in Indonesia's Ministry of Agriculture to support the implementation of MPCI crop insurance by providing empirical data.

2.3 Socio-Economic Profile of Farmers and Insurance Adoption

The socio-economic profile of farmers significantly influences their awareness, access, and adoption of crop insurance schemes in India. Key socio-economic variables such as age, education, landholding size, income level, and access to institutional credit play a critical role in shaping insurance uptake behavior (Raju & Chand, 2008; Kumar et al., 2019). Farmers with higher levels of education and financial literacy are generally more likely to understand the benefits and processes involved in crop insurance, thus demonstrating higher participation rates (Mahul & Stutley, 2010). Education not only enhances risk perception but also empowers farmers to navigate bureaucratic procedures and understand policy frameworks (Chand & Singh, 2016). Landholding

size is another influential factor. Marginal and small farmers, who constitute over 85% of the Indian agricultural population, often have limited surplus income, making them more vulnerable to crop loss but also less capable of affording even subsidized premiums (Dev, 2012). Large landholders, on the other hand, are more likely to insure their crops due to higher asset value and institutional linkages. Studies have shown that farmers with access to institutional credit, such as loans from banks or cooperatives, are more likely to be insured, primarily because of mandatory insurance clauses linked to such loans (Mishra, 1996; Vyas, 2004). Social factors like caste, gender, and community norms also affect insurance participation. Female farmers and farmers from marginalized communities often face systemic barriers to formal financial services, resulting in lower adoption rates (Narayanan, 2020). Moreover, the geographical location—such as proximity to agricultural offices or insurance agents—also affects awareness and enrollment (Shukla & Pathak, 2018). Awareness campaigns, extension services, and peer influence within villages are critical in bridging this gap. Farmers' past experiences with crop failures and previous insurance claims also affect future adoption. Trust in insurance providers, particularly in timely and fair claim settlement, is a major determinant of recurring participation (Bhende, 2005). The lack of timely compensation, bureaucratic red tape, and miscommunication often dissuade farmers from future participation (Giné et al., 2008). In essence, the socio-economic profile of Indian farmers determines not just their ability but also their willingness to adopt crop insurance schemes. Therefore, for crop insurance to be inclusive and effective, it must be tailored to address the distinct socio-economic disparities within the farming community (Kaur & Kaur, 2020; Ramaswami, 2014). Fahad et. al, (2017) conducted a study titled “Evaluation of Pakistani farmers’ willingness to pay for crop insurance using contingent valuation method: The case of Khyber Pakhtunkhwa province” The study used both primary and secondary data. In this research, one popular survey-oriented non-market valuation approach was the contingent valuation (CV) method. Access to finance and extension services, irrigation availability, income source, land ownership, family size, education level, age, and exposure to previous bad weather events were some of the characteristics that the research discovered to affect crop insurance demand in the study region. Insurance to safeguard farms from the possibility of catastrophic destruction was mostly purchased by subsistence agriculturalists with huge tracts of land, according to the research. The idea of crop insurance was unappealing to many rural farm families, especially smallholders, and they were hesitant to purchase insurance policies. Researchers in Pakistan found no evidence of a

standardised crop insurance market structure. Damage to crops and the amount people are ready to spend for repairs are both affected by the specifics of the catastrophe and the local economy. The report also suggested that responsible parties, such as the government, should stop concentrating on ways to manage disaster risk after the fact and start focusing on ways to reduce disaster risk before it happens. To encourage small-scale farmers to get insurance policies, it would be ideal if the government offered financial assistance via crop insurance programs. As a result, crop insurance in Pakistan, especially via cost-shared and targeted programs, has the potential to be an effective strategy for reducing disaster risk in the lead-up to future financial losses caused by natural disasters. Kumar (2017) Conducted a study titled "Problems and prospects of agriculture insurance in Telangana state." This study analysed the past, present, and scope of agricultural insurance schemes in Telangana state. This research surveyed previous works on the topic of agricultural insurance in the Indian state of Telangana. The evaluation focused on the state's agriculture insurance programs that work. Public crop insurance programs in India have failed to provide farmers with enough risk reduction, according to the report. The Agricultural Insurance Company (AIC) is India's preeminent public sector insurer for agricultural risks. Crop insurance is also provided by private businesses like ICICI Lombard Insurance Company Ltd. and IFFCO Tokio General Insurance Company Ltd. Though it is the country's largest crop insurance program, Telangana state does not participate in the National Agricultural Insurance Scheme (NAIS). Another promising area for weather-based insurance products in Telangana state for risk reduction was identified in the research. The research found that farmers in Telangana state may benefit from agricultural insurance as it protects them from financial loss in the event of crop diversification-related hazards. The research concludes that, given the current status of agriculture in Telangana, crop insurance should be vigorously pursued at the policy level, with clearly defined risk products. Kumari et. al, (2017) examined the study titled “Role of Socio-economic Variables in Adoption of Crop Insurance: A Discriminant Function Approach”. The authors used primary data collected from 200 farmers from the study area. The study applied discriminant analysis based on the criteria values of standardized canonical coefficient and correlation matrix by using indicators like educational level, farm size, satisfaction level, awareness and access to source of credit, age, income level, and number of earning members. They found that awareness about the crop insurance scheme, satisfaction level of farmer respondents concerning the insurance scheme, and access to source of credit were the highest discriminant variables. The study made it clear that the

socio-economic characteristics of farmers exert a significant influence on their adoption of crop insurance schemes. The authors concluded that awareness about the schemes and their benefits has to be created among the farmers to motivate them to go for insurance for their crops. Mote et. al, (2017) studied a titled “Impact of Crop Insurance on Farmers' Income in the Pune District of Maharashtra”. Using judgmental and snowball sampling techniques, the author gathered primary and secondary data for the research. The data was analysed using basic statistical methods. Due to the present crop insurance system's inefficiency, many farmers simply do not have the time to research and enroll in the program, according to the results. If they don't have crop insurance, many farmers will have to depend on government aid in the event of a crop failure. According to research, financial institutions' awareness initiatives were a major motivating factor for 75% of farmers to enroll in crop insurance programs. On the other hand, only 18.33% of farmers cited financial stability as their primary motivation for purchasing crop insurance. It seems that farmers may be lacking complete knowledge about the advantages of crop insurance. Some ways the government might help spread the word about crop insurance include subsidizing premiums, spreading the word about the program's advantages to farmers, and streamlining the enrolment process. This indicates that the program's promotion to farmers needs further effort.Nayak (2017) studied the titled “Perception and Awareness Level of Farmers on Crop Insurance in Odisha: A Case Study of Selected Villages of Champua Block in Keonjhar District”. The study used primary and secondary data. The researcher selected ten villages in the Champua Block of Keonjhar District was randomly selected for the study. The chi-square test was used to study the relationship between farmers' awareness of crop insurance and their educational background. The study found that there is no link between farmers' education and their awareness of crop insurance. Most farmers are not aware of crop insurance. The study suggests that the government should give more subsidies on crop insurance premiums to encourage more farmers to participate in the scheme. The study also recommends regular awareness campaigns and education programs for farmers to improve their knowledge about crop insurance. The study concludes by stating that there is a strong need to review and improve existing crop insurance schemes to ensure that more farmers in Odisha have access to crop insurance.Pradeepika (2017) researched the title “Insights into the New Crop Insurance Scheme in Haryana state”. The survey was conducted in cluster-II of Haryana State to understand the challenges in implementing the PMFBY scheme. The author used the percentage method. The findings are Some officials in the Agriculture Department are speaking negatively

about the scheme, which is making farmers less likely to participate. The scheme is not being marketed well to farmers who do not have loans. Process: Employees of the Agriculture Department are busy with many different schemes, so they do not have enough time to help farmers with the PMFBY. There are not enough people to implement the scheme. The scheme is difficult to implement and requires a lot of paperwork, which makes it hard for farmers to participate. Crop-cutting experiments are an extra task for the Agriculture Department, and they are difficult to do because there are not enough staff. Crop-cutting experiments are not always done properly. Farmers are not always involved in crop-cutting experiments. The results of crop-cutting experiments are not always accurate. Price: The premiums and claims are too high." the suggestions are that it is important to educate rural people about insurance as a concept and as a product to implement this new crop insurance scheme effectively.

2.3.1 Demographic Factors Affecting Insurance Uptake

2.3.1 Demographic Factors Affecting Insurance Uptake (400 Words) Demographic factors play a crucial role in determining the uptake of crop insurance among farmers in India. These include age, gender, education level, household size, and farming experience, all of which influence the decision-making process regarding risk management tools like insurance. Age is a significant factor; younger farmers are generally more open to adopting new technologies and financial instruments, including crop insurance, as they are more likely to be aware of government schemes and modern agricultural practices (Mahul & Stutley, 2010). Older farmers, although having more experience, may resist change and show reluctance in participating due to a lack of trust or familiarity with digital processes involved in insurance registration and claim settlements (Raju & Chand, 2008). Gender also influences insurance adoption, with male farmers having higher participation rates compared to female farmers. Women often face systemic barriers such as land ownership issues, limited access to credit, and lack of representation in agricultural extension services, resulting in lower awareness and utilization of crop insurance schemes (Narayanan, 2020; Kaur & Kaur, 2020). However, studies suggest that empowering women through inclusive programs and awareness campaigns can improve their participation in such schemes. Education is a key enabler in crop insurance adoption. Educated farmers are better equipped to understand the policy terms, claim procedures, and risk coverage details. They are also more likely to assess the cost-benefit of enrolling in an insurance scheme (Chand & Singh, 2016; Giné et al., 2008). In contrast, illiterate or less-educated farmers often perceive crop insurance as a complicated and

unreliable service, which discourages participation. Household size and dependency ratio also impact insurance decisions. Larger families dependent on agriculture are more likely to insure crops as a safeguard against income loss (Dev, 2012). Moreover, farming experience shapes risk perception; experienced farmers are more aware of recurring risks and may see insurance as a necessary tool, whereas new entrants may rely on informal coping strategies (Bhende, 2005). Demographic characteristics have a significant influence on the uptake of crop insurance schemes. Policymakers must consider these factors while designing and implementing insurance schemes to ensure inclusive participation across different farmer demographics (Shukla & Pathak, 2018; Kumar et al., 2019). Rajendran (2017) Conducted a study titled "Economic analysis of crop insurance: a critical review." This paper examines the economic significance of crop insurance in India. Farmers may protect themselves financially in the event of crop failures caused by natural disasters by purchasing crop insurance. Multiple crop insurance programs have been introduced by the Indian government in the last few years. Among the main points made in this paper's analysis of the literature on crop insurance in India are the following:(1) Indian farmers use informal risk management strategies like intercropping and borrowing from friends and family to a lesser extent than in the past. A lot of the danger that farmers confront has been reduced because to government programs and crop insurance plans. Low penetration, delays in claim payout, and excessive premiums are some of the issues plaguing the execution of crop insurance plans in India. More study on crop insurance in India is needed to enhance its implementation and efficacy, according to the paper's conclusion. Investigating what motivates farmers to take part in crop insurance programs and creating specialized policies for various farmers should be the primary goals of this study. Streamlining and bettering the procedure for settling crop insurance claims. In sum, the study stresses the significance of crop insurance in India and requests more studies to enhance the program's efficacy and administration. Ramirez and Shonkwiler (2017) researched the titled "A Probabilistic Model of Crop Insurance Purchase Decisions." Farmers are more inclined to get crop insurance if they feel the pricing is reasonable and have a strong awareness of their yield risks. Farmers taking on more risk are benefiting from the existing crop insurance program's bigger subsidies at the expense of farmers taking on less risk. The reason for this is that the mechanism currently used to estimate premiums is inaccurate. The authors of the research suggest a new way to estimate premiums and provide instructional programs to farmers so that they may learn to evaluate the risks to their produce more accurately. More farmers would sign up for crop

insurance if these reforms were implemented, as they would make the program more inexpensive and equitable. Farmers would be better protected financially in the event of crop failure if they participated in a more equitable and reasonably priced crop insurance policy, which is one of the recommended improvements. Although it has its flaws, the crop insurance program aims to assist farmers. Some farmers benefit more than others from it, and many more lack the knowledge to make informed judgments on crop insurance. More farmers might be willing to take part if the program was revised to be more inexpensive and equitable, according to the study's authors. With these adjustments, farmers would be better able to safeguard themselves against financial setbacks caused by failed crops. Sihem (2017) studied the titled “Economic and Socio-cultural Determinants of Agricultural Insurance Demand Across Countries”. The Researcher used a logistic regression modeling technique with 276 cross-section observations. The data came from a database of agricultural insurance information. The paper wants to find out why some farmers buy agricultural insurance and others don't. It looks at a variety of factors, including religious beliefs, as well as economic and social factors. The Findings are to provide policymakers and decision-makers with the information they need to develop effective agricultural insurance policies. It is also important to educate farmers about non-life insurance, especially agricultural insurance so that they can take advantage of the benefits it offers. The suggestions are to help farmers manage the risk of crop failure, the government and the private sector need to work together. The government can do this by subsidizing agricultural insurance or by providing financial assistance to farmers after a natural disaster. This helps farmers to afford insurance and reduces the cost of yield-risk management for insurance companies. Aditya et.al., (2018) Conducted a study titled "Adoption of Crop Insurance and Impact: insights from India." The data was sourced from the "Situational Assessment Survey of Farmers" conducted by the National Sample Survey Office (NSSO) in 2012-2013. The study highlights low adoption rates of crop insurance among farmers, with only 4.80% insured during the Kharif season and 3.17% during the Rabi season. Key adoption factors include education, extension contact, land size, and subsidies, while barriers include lack of awareness, basis risk, and financial constraints, particularly for small, marginal, and tenant farmers. Crop insurance had no significant impact on investment returns, production costs, or output value. Most insured farmers linked it to credit, indicating limited voluntary uptake. Farmers from lower-caste backgrounds and tenants were less likely to participate. Recommendations for improvement include: Strengthening extension services for awareness and education. Reducing

basis risk through better loss assessment methods. Expanding programs to include marginalized and tenant farmers. Tailoring products to farmers' needs and subsidizing premiums. Ghanghas (2018) Conducted a study titled "Awareness of Pradhan Mantri Fasal Bima Yojana among farmers of Haryana State". The study used primary and secondary data. Data was collected using a combination of purposive and systematic random sampling methods. The statistical measures of frequency, percentage, and overall percentage analysis were used to analyze the data. The study found that more than two-thirds of farmers were aware of basic and premium-related information about the crop insurance scheme, but less than half were aware of the seasonal requirements and risk coverage. Almost all farmers who borrowed money from banks were required to purchase crop insurance, but only a small percentage of farmers purchased it voluntarily. This suggests that the government and service providers need to work more closely with stakeholders such as banks, agricultural departments, and village panchayats to educate farmers about the benefits of crop insurance and to encourage them to purchase it voluntarily. Kishore et. al, (2018) evaluated the "Effects of crop insurance adoption within the Indian context." Factors motivating farmers to purchase crop insurance have been analyzed using data from NSSO (2012-13) and their subsequent implications. Effects on production investment, expenses, and farm income. Observations indicate that farmers' adoption of crop insurance remains low in both seasons, primarily due to insufficient awareness of the insurance options available. Farmers experiencing greater crop loss are more likely to purchase crop insurance, contingent upon their prior knowledge or formal training. Farmers with higher education levels and improved contract extensions were more inclined to utilize crop insurance compared to their less educated counterparts. The sizes of landholdings and subsidization rates were identified as significant factors influencing farmers' purchasing decisions. It is recommended that basis risk be minimized and awareness of insurance as a product be enhanced to serve a broader audience. Walters and Preston. (2018) conducted a study titled "Net income risk, crop insurance, and hedging." The authors created a Monte Carlo simulation model that generates a producer's net income (NI) distribution. This model incorporates historical producer risk, price-yield correlation as a copula, price risk, and production costs. Insurance is helpful for producers, according to the report, and combining public and private risk management strategies is key. Using county or state statistics might lead to an underestimation of a producer's risks, therefore it's important to focus on the dangers he encountered in 2014 in order to get an accurate representation. The outcomes, however, are quite producer-specific and dependent on

factors including the yield risk they confront, the predicted price of their 2014 crop insurance, and the price of their spring futures. Only pooled risks are included in the study's risk definition; producers are responsible for managing un-pooled risks. According to the research, the optimal frontier for the producer under consideration included a single kind of crop insurance policy (RP) and two levels of coverage (80% and 85%). The 1% ES risk was significantly reduced by $268/acre compared to the no insurance, no hedging portfolio when an RP policy with 80% coverage and no hedgings was implemented. Taking into consideration the farm's history yield-price connection, the research recommends that producers estimate producer NI risk using current year futures price and farm historical yields. According to the research, manufacturers may lower their NI risk by combining public and private risk management strategies. When selecting a crop insurance policy, growers should think about the premium, the price-yield connection, and the risks associated with yield, according to the research. According to the research, growers should think about their production methods and the kind of crop they are growing before deciding on a crop insurance policy. Further research is required to completely grasp the significance of crop insurance to the agricultural sector, according to the report. As a whole, the research helps understand the significance of crop insurance and identifies specific risks that farmers confront.

2.3.2 Economic Status and its Influence on Insurance Decisions

Economic status is a decisive factor influencing a farmer’s decision to adopt crop insurance. It encompasses variables such as income level, landholding size, access to credit, and overall financial stability. Farmers with higher income levels are generally more capable of affording insurance premiums, even in cases where government subsidies are limited or delayed. They also tend to have better access to institutional services and are more likely to perceive insurance as a viable risk mitigation tool (Mahul & Stutley, 2010; Raju & Chand, 2008). Conversely, economically weaker farmers, especially marginal and smallholders, often prioritize immediate needs like seeds, fertilizers, and daily consumption over long-term protective measures like insurance (Dev, 2012). Landholding size is another critical determinant. Farmers with larger landholdings are more inclined to insure their crops due to the higher potential for income loss and asset value. They are also more frequently engaged with formal credit institutions, which often require crop insurance as a precondition for loans (Chand & Singh, 2016). In contrast, small and marginal farmers, who make up nearly 86% of India's agricultural population, are less likely to be covered under crop insurance due to fragmented land, inadequate information, and distrust in claim

settlement mechanisms (Narayanan, 2020; Vyas, 2004). Access to institutional credit plays a dual role—it not only strengthens a farmer's financial position but also encourages insurance uptake, especially when insurance is linked to loan disbursement. Farmers without access to credit are less integrated into formal systems and may remain unaware or skeptical about insurance schemes (Kaur & Kaur, 2020; Kumar et al., 2019). Moreover, economic vulnerability increases dependence on informal networks and coping strategies, such as borrowing from moneylenders, which often leads to debt cycles. Studies also indicate that insurance adoption is positively correlated with farm investments. Farmers with better economic status are more likely to invest in high-yielding seeds, irrigation systems, and mechanization, all of which increase the perceived value of insuring their crops (Giné et al., 2008; Bhende, 2005). A farmer's economic standing significantly shapes their perception and willingness to adopt crop insurance. Policies aimed at enhancing inclusivity must address affordability issues, provide flexible premium options, and ensure timely claim settlements to build trust among economically disadvantaged farmers (Shukla & Pathak, 2018; Ramaswami, 2014). Carrer et. al., (2019) studied the study "Determinants of agricultural insurance adoption: evidence from farmers in the State of São Paulo, Brazil." Using a combination of primary and secondary sources, researchers examined 175 farmers during the 2015–2016 harvest using logit econometric models to determine what variables impact farmers' decisions to purchase agricultural insurance. The results show that agricultural insurance is more often used by farmers who have more education, better access to technical help, and bigger farms. Producer characteristics (education and risk propensity) and business/farm characteristics (use of technical assistance, management tools, soybean/corn production, and farm size) impacted the likelihood of using rural insurance. Farmers who grow soybeans and/or corn are also more likely to adopt insurance, while farmers who are more risk-averse are less likely to do so. The most important factors influencing insurance usage were producers' risk-taking tendencies and the use of management instruments. Additional research is needed to determine what factors impact farmers' decisions to insure a portion of their production, as well as how characteristics of regional development, such as infrastructure, market access, and government support programs, impact the adoption of agricultural insurance. Cariappa et. al., (2019) investigated the study titled "Why Do Farmers Opt for Crop Insurance? A Discriminant Analysis". The researcher used primary and secondary data. The author used discriminant Analysis and the Garrett Ranking Technique. A study of farmers in Karnataka found that farmers mainly buy crop insurance to protect themselves from drought.

Farmers who buy crop insurance are more likely to be educated, have larger farms, and borrow from non- institutional sources. Farmers who don't buy crop insurance say they don't know about it, can't afford to pay the premiums, or don't trust the insurance companies. The study also found that factors such as education, income, farm size, and previous compensation from crop insurance play a role in whether or not a farmer buys crop insurance. Farmers who have had a good experience with crop insurance in the past are more likely to buy it again. Feng et. al,. (2019) conducted a study titled "Depressed Demand for Crop Insurance Contracts, and a Rationale Based on Third Generation Prospect Theory." The findings of the study were that producers are willing to pay less than fair value for crop insurance, which contradicts the expectation that risk-averse individuals would be willing to pay more than fair value for risk mitigation. Contrary to expectations, producers do not place a larger value on coverage level than fair value. This suggests that producers are not as concerned about coverage level as they should be. Since subsidies lower the cost of insurance and encourage producers to buy it, this result is consistent with the anticipated outcome—that is, that subsidies may increase insurance coverage. It may be costly to participate in high-coverage programs due to factors such as producers' reduced sensitivity to coverage and the possibility of receiving substantial subsidies at lower levels. Underpayment and reduced coverage sensitivity may be explained by third-generation prospect theory (TGT), which takes into consideration decision weighting and reference points. Cost implications of high-coverage participation: High-coverage participation can be expensive due to potentially lower producer valuation and the possibility of large subsidies at lower levels. Crop insurance policy goals and intervention efficacy: While subsidies can increase participation, their social optimality depends on whether the underpayment reflects true preferences or behavioural biases. Mukherjee. and Pal, (2019) researched the title “On Improving Awareness about Crop Insurance in India”. The study used data from a nationwide survey of farm households conducted by the National Sample Survey Organization (NSSO) in 2012-2013. The study found that farmers who got technical advice or went to agricultural training were more likely to know about crop insurance. It also found that having more access to financial services did not make farmers more likely to know about crop insurance. These results were still true even after controlling for other factors that could have affected the results. The suggestion is that improving agricultural extension services may be important for increasing awareness of crop insurance in India, which could lead to more farmers buying crop insurance, and expanding agricultural extension services to reach more farmers can

help to increase awareness and uptake of crop insurance in India. Mathur and Gupta (2019) researched the title “Pradhan mantri fasal bima yojna and farm risk management: a study of Jammu district” The authors used the percentage method. This paper compares the PMFBY crop insurance scheme to previous schemes and studies its impact on farmers in Jammu District, Jammu and Kashmir. Data was collected from banks, insurance agencies, the Agriculture Department, bank employees, government staff, and farmers. Thematic analysis was used to analyze the data. They found that many were reluctant to participate in crop insurance schemes because the benefits were discontinued if they defaulted on loan repayments. This often happened during times of financial crisis when they needed support. The PMFBY scheme has been implemented in all states and union territories in India, but insurance officials have noted that states like Jammu and Kashmir, Punjab, Haryana, Madhya Pradesh, and Uttar Pradesh have lower insurance coverage than southern states. The suggestions The government's schemes often have a gap between their vision and mission, which is hampering the growth of the national economy and the farmers in particular. The need of the hour is to take serious action to address these shortcomings. The government should ensure that its schemes are well-designed, implemented, and monitored. It should also be more responsive to the needs of the farmers and other stakeholders. By taking these steps, the government can help to achieve the goals of its schemes and boost the national economy. Mukherjee and Pal (2019) Conducted a study titled “On Improving Awareness about Crop Insurance in India to find out what factors influence farmers' awareness of crop insurance; we used data from a nationwide survey of farm households conducted by the NSSO. The prevalence of crop insurance knowledge was higher among farmers who had received technical advice on farming or had participated in agricultural training, according to our research. No correlation was found between the number of bank branches or the volume of bank transactions in raising farmers' knowledge of crop insurance. While agricultural extension services in India are not new, the extent and quality of these programs differ among the country's states. While a small percentage of farmers may benefit from these services, the vast majority do not. More farmers would be aware of crop insurance and more would purchase it if agricultural extension programs were better designed to reach more farms. The study shows that farmers are more likely to be familiar with crop insurance if they get technical assistance or participate in agricultural training, but that this knowledge is unaffected by farmers' access to financial services. Even after taking into consideration additional factors that may have an impact on the outcomes, same conclusions hold.

In order to boost coverage, the Indian government has been subsidizing crop insurance rates. The research implies that enhancing agricultural extension services might be crucial in getting more farmers to learn about crop insurance. National statistics reveal that most farmers were unaware of the insurance scheme and so did not cover their crops.

2.3.3 Role of Education, Awareness, and Financial Literacy

Education, awareness, and financial literacy are pivotal in shaping farmers' understanding and adoption of crop insurance schemes in India. A higher level of formal education is positively correlated with better comprehension of insurance products, their benefits, terms and conditions, and procedures for enrolment and claims (Mahul & Stutley, 2010). Educated farmers are more adept at understanding the risk-mitigation potential of insurance and are therefore more likely to opt for such schemes. Chand and Singh (2016) found that literate farmers are more proactive in seeking information from institutional sources and are more responsive to government interventions. Awareness is another crucial factor influencing insurance adoption. Many farmers remain unaware of the existence or details of available crop insurance schemes, which significantly affects participation rates (Dev, 2012). Awareness levels are often lower in remote or rural areas where extension services are weak or absent. Government and non-governmental awareness campaigns, local agricultural fairs, village-level demonstrations, and mass media initiatives have shown success in enhancing farmers' understanding and motivating them to participate in insurance schemes (Narayanan, 2020; Kumar et al., 2019). Financial literacy complements education and awareness by equipping farmers with the skills to manage their finances and assess the long-term benefits of insurance. Financially literate farmers are better positioned to evaluate the cost-benefit ratio of paying a premium against the potential risk of crop loss (Giné et al., 2008). They are also more likely to engage with formal banking and insurance institutions, ensuring sustained participation and renewal of insurance coverage. Bhende (2005) emphasized that financial literacy encourages farmers to make informed decisions rather than relying on traditional coping mechanisms or informal networks. Moreover, studies suggest that a lack of clarity about insurance terms, misconceptions about claim procedures, and limited understanding of risk coverage often deter farmers from enrolling (Shukla & Pathak, 2018). Therefore, targeted training programs, the inclusion of insurance education in agricultural extension services, and simplified communication of policy terms are essential. Awareness, and financial literacy among farmers is critical to the success of crop insurance schemes. A multi-stakeholder approach involving

government agencies, financial institutions, and local organizations can bridge the knowledge gap and empower farmers to make informed risk-management decisions (Raju & Chand, 2008; Kaur & Kaur, 2020). 44. Shirsath et al. (2019) researched a titled “Designing weather index insurance of crops for the increased satisfaction of farmers, industry and the government” Weather-Based Crop Insurance (WBCI) is designed to stabilize farmers' income by linking payouts to weather parameters, offering timely compensation for adverse weather conditions. However, traditional designs often have flaws, such as high basis risk, which is the mismatch between actual losses and payouts. This study proposes an advanced methodology for designing insurance contracts to address these shortcomings. To assess historical weather impacts on crops. To predict crop behavior under varying conditions. To develop triggers that improves payouts without increasing premium costs. The Farmer Satisfaction Index (FSI) was introduced as a novel tool to evaluate insurance effectiveness by measuring the reduction in basis risk The Findings are the proposed methodology yielded better and more frequent payouts at no additional cost. An increased correlation between payouts and actual yield losses was achieved. Tested in districts of Maharashtra, India, the model demonstrated a 50% improvement in FSI for Soybean and 72% for Pearl Millet compared to existing contracts. Loss-Cost Ratio was reduced, enhancing the cost-effectiveness of the insurance scheme. Climate Risk Management: The model's selected triggers captured climate risks during critical growth stages effectively. Simulations using 100 years of synthetic climate data confirmed the model's robustness and reliability. The Conclusions are the new contract design significantly improves the alignment of payouts with crop losses, reducing basis risk and increasing satisfaction among farmers. The methodology ensures financial sustainability for insurers while maintaining affordability for farmers (no extra subsidy required). Enhanced satisfaction levels among farmers, insurers, and policymakers indicate the approach's broader applicability and benefits. The Recommendations are policymakers and insurance providers should integrate the model into existing WBCI schemes to enhance effectiveness and farmer satisfaction. Test the methodology in different regions and for various crops to evaluate its adaptability across diverse agricultural landscapes. Leverage modern tools like satellite monitoring, real-time data, and machine learning to refine trigger design and improve responsiveness. Conduct awareness programs for farmers and insurers about the new model’s benefits and implementation strategies. Maintain and update databases of weather and crop yield information to improve model accuracy and predictive power. By adopting this approach,

stakeholders can significantly improve WBCI's ability to mitigate risks posed by climate variability, ensuring more secure and reliable income for farmers. Sharon et. al., (2019) Conducted a study titled "A study on growth performance of crop insurance schemes in Andhra Pradesh and India." Secondary data were obtained from the Agriculture Insurance Company (AIC) of India. This article makes use of growth rate analysis to present statistics regarding the number of farmers insured through NAIS, WBCIS, and PMFBY, as well as the total area insured, premiums collected, subsidies received, and claims amount. These numbers are derived from the Comprehensive Crop Insurance Scheme (CCIS), which was India's first crop insurance scheme and ran from 1985 to 1999. The National Agricultural Insurance Scheme (NAIS), which began in 1999 and insured 27,12.05 lakh farmers, succeeded it. In terms of average area, number of insured farmers, premium paid, total insured, claims paid, and number of farmers helped, the NAIS has shown positive compound growth rates. This points to the scheme's consistent growth and the increasing number of farmers using it. Number of insured farmers, total insured, and gross premium have all increased at positive compound rates under the NAIS in the Indian state of Andhra Pradesh. Area coverage and the number of farmers who benefitted both had negative compound growth rates, however. That means the scheme's reach and coverage in Andhra Pradesh might be much more extensive. Crop insurance plans in India are generally seeing positive compound growth rates, suggesting that farmers are finding the schemes more popular and easier to use. Because crop insurance helps farmers avoid financial hardship in the event of a failed harvest, this is a positive development. Tom. J, (2019) examined the study titled “Crop Insurance Schemes in Kerala: Extent, Challenges and Solutions”. The study uses both primary and secondary data to analyze farmers' perceptions and participation in crop insurance schemes. Simple statistical tools were used to analyze the data and used chi-square tests to see if there was a relationship between different factors, and also used the Garret ranking technique to rank the farmers' preferences. The study found that the major reasons for farmers not participating in crop insurance schemes are non- satisfaction with crop coverage, complex documentation, claim settlement delays, lack of premium paying capacity, and dissatisfaction with the indemnity level and the service provided. The suggestions are government and insurance companies should educate farmers about crop insurance through programs and campaigns. The government and banks should improve these aspects to make crop insurance better, Modern technologies can be used to assess crop damage more accurately and efficiently. Incentives such as no-claim bonuses can be given to insured farmers to encourage them to stay in

the program, even if they don't experience crop loss., Technology solutions such as Kisan Call Centers, mobile apps, voice blasts, and SMS can be used to raise awareness of crop insurance products among farmers. Web portals and mobile apps with 24/7 access can be used to make it easier for farmers to register for and pay premiums for crop insurance., State-specific rules and regulations for crop insurance should be developed to address the disparities in crop insurance performance across states. Wang et. al., (2019) conducted a study titled "Are smallholder farmers willing to pay for different types of crop insurance? Using a logistic model and stratified sampling, the author conducted labeled choice experiments with Chinese maize farmers. The study compared the preferences of standard, recently emergent, and experimental insurance policies among Chinese maize farmers using a labeled choice experiment methodology. Under the present subsidy level, the study's empirical findings show that farmers would rather have insurance than none at all. Furthermore, the research discovered substantial preference heterogeneity, suggesting that crop insurance based on revenue, price, or weather index might be in demand so long as the government subsidy remains unchanged. Traditional yield insurance continues to have the biggest share among farmers, but these newly launched crop insurance contracts may take a significant chunk of the market. Furthermore, more than half of the farmers are prepared to spend an extra CNY 1–3 for every additional CNY 100 in insurance coverage. Insurance indentures are purchased by farmers with the help of government subsidies that lower the rate. Because of the speed and reliability of indemnity payments, farmers choose crop insurance policies issued by government-owned insurance firms. While farmers' desire to pay for alternative insurance programs is increased by favorable insurance experiences in the past, it may limit their willingness to pay for further coverage. The purpose of this research is to find out which crop insurance policies crop producers like and how much they are ready to pay for supplementary policies.

2.4 Determinants of Crop Insurance Adoption

The adoption of crop insurance by farmers is influenced by a range of interlinked determinants, including accessibility, affordability, trust, institutional support, risk perception, and socio-demographic characteristics. Understanding these determinants is vital for enhancing participation and improving policy effectiveness. One of the most significant determinants is accessibility to insurance services. In regions where insurance agents, agricultural extension officers, or banking infrastructure are limited, farmers often find it difficult to enroll in schemes or process claims (Mahul & Stutley, 2010). Studies by Raju and Chand (2008) indicate that accessibility is especially

low in remote or underserved areas, where the delivery of public services remains inadequate. Affordability, particularly the premium cost, is another key factor. While government subsidies exist for small and marginal farmers, the upfront payment of premiums still poses a burden for many. Dev (2012) and Chand & Singh (2016) argue that the cost-benefit perception among farmers greatly influences their willingness to pay, especially when previous claims have not been settled effectively or timely. In such cases, even subsidized schemes may not seem attractive. Trust in the scheme and implementing institutions—including both government and private providers—also plays a pivotal role. Farmers are more likely to enroll when they perceive the scheme to be transparent, reliable, and beneficial. Delays in claim settlements, poor grievance redressal mechanisms, and perceived corruption contribute to a lack of trust (Narayanan, 2020; Kumar et al., 2019). Another critical determinant is institutional support. The role of cooperatives, banks, panchayats, and agricultural extension services in promoting and facilitating crop insurance enrollment is widely acknowledged (Bhende, 2005). Their involvement helps in raising awareness, easing the enrollment process, and providing technical support during claims. Risk perception and previous experience with climatic events also significantly influence adoption. Farmers who have experienced losses due to drought, floods, or pest attacks are more inclined to opt for insurance (Giné et al., 2008). Moreover, exposure to other formal financial instruments like loans, savings accounts, and credit cards also increases the likelihood of insurance uptake (Kaur & Kaur, 2020).The adoption of crop insurance is not solely a matter of policy availability but is shaped by a confluence of economic, institutional, and perceptual factors. To increase uptake, strategies must address these determinants holistically by making insurance affordable, accessible, and trustworthy (Shukla & Pathak, 2018; Ramaswami, 2014).

2.4.1 Accessibility and Availability of Insurance Services

Accessibility and availability of insurance services are fundamental determinants of farmers' participation in crop insurance schemes. In many regions, particularly rural and remote areas, limited physical and institutional infrastructure severely hampers farmers' ability to access insurance products. The distance to insurance offices, lack of trained personnel, and irregular visits by insurance agents contribute to low awareness and poor enrolment (Mahul & Stutley, 2010). Studies such as Raju and Chand (2008) have emphasized that the proximity of service providers and the presence of outreach centers significantly influence the likelihood of farmers engaging with insurance schemes. Moreover, where insurance is only accessible through banks or

cooperatives, farmers without bank accounts or with limited interactions with formal financial institutions are often excluded from participation (Dev, 2012). The digitalization of services, while promising, has also presented new challenges in the form of digital illiteracy and inadequate internet connectivity in rural belts, further limiting accessibility (Narayanan, 2020). Availability is also affected by the limited number of insurance providers operating in specific regions. In some cases, the monopoly of a single insurer leads to inefficient service delivery, lack of competition, and poor responsiveness to farmers' queries and concerns (Chand & Singh, 2016). Institutional bottlenecks, such as cumbersome documentation processes and unclear timelines, deter even interested farmers from enrolling (Shukla & Pathak, 2018). Furthermore, the seasonal nature of agricultural activity means that the availability of insurance must be timely and well-coordinated with sowing and harvesting cycles to be effective. A lack of synchronization in these timelines reduces the utility and relevance of insurance offerings. Therefore, to improve participation, policymakers must enhance rural infrastructure, deploy mobile units, simplify processes, ensure the presence of multiple service providers, and strengthen the role of local institutions such as Panchayats and Self-Help Groups in facilitating insurance access (Kaur & Kaur, 2020; Kumar et al., 2019).Chander et. al., (2020) have a study titled "Socio-economic factors affecting the crop insurance scheme in Haryana – A sociological analysis" The researcher used primary data and secondary data and the study used the percentage method. The study found that farmers who are more educated, have more land, and are from higher socio-economic groups are more likely to buy crop insurance. The study also found that farmers are less likely to buy crop insurance if they are not aware of it, cannot afford to pay the premiums, or have had bad experiences with bank employees. The study recommends that the government make farmers more aware of crop insurance and help them understand its benefits. The Indian government needs to work together at the central and state levels to develop indexed insurance schemes that are relevant to the needs of Indian farmers. The suggestions are Farmers do not know enough about the crop insurance scheme, its benefits, or how to get paid if they lose crops. The government should make it easier for farmers to learn about crop insurance and to file claims. Some specific suggestions from farmers include Making the claims settlement process more transparent and efficient, setting up crop insurance information centers at the Gram Panchayat level, making individual farms the unit of assessment for crop losses, and setting up separate desks for crop insurance in banks. DeLay et. al., (2020) Conducted a study titled "The Impact of Crop Insurance on farm financial outcomes". Secondary

data is supplemented with primary data in this research. For this study, we analyzed Kansas Farm Management Association data to determine the impact of insurance indemnities and crop insurance liabilities on farm debt. This research challenges the risk balancing premise of federal crop insurance by finding no statistical association between debt and crop insurance liabilities using a simultaneous equations model with farm fixed variables. Although the author did discover that big insurance indemnity payments do lower the overall debt level, they do lessen the dependence on short-term debt by farmers. There are a number of ways in which policymakers might use our findings. There was no correlation between increasing crop insurance subsidies and rising debt levels among farmers, according to the research. This indicates that there is no correlation between rising subsidies and a rise in agricultural debt. Still, we found evidence that backs up the premise that farmers should handle their crop insurance and debts in tandem. Most likely, this is due to the fact that crop insurance is a condition of lending that is directly proportional to the loan amount. Farmers are now better able to lower their risk and reach their risk tolerance thanks to increases in insurance subsidies. Crop insurance indemnity payments, according to the author, aid farmers in paying off their short-term debt but do nothing to influence their long-term debt. So, indemnity payments tip the scales somewhat in favor of long-term obligations as a percentage of total agricultural debt. Importantly, indemnities have an effect on long-term leverage that is comparable to that of conventional agricultural income streams. This indicates that covered farms may meet their short-term operational expenses with the support of crop insurance indemnities, all without taking on any extra financial risk. Researchers also discovered that farmers would not require very much crop insurance to cover all of their risks. Some farmers may not choose the maximum level of subsidized coverage, and this might be the reason of not opting of Insurance. Ghosh et. al., (2020) Conducted a study titled “Demand for Crop Insurance in Developing Countries: New Evidence from India” This study collected data from farmers in four Indian states: Gujarat, Himachal Pradesh, Karnataka, and Uttar Pradesh. The 2017 monsoon season was the primary focus of the data obtained in early 2018. The Indian government provided funding for the data collection. Based on our findings, farmers would be willing to pay a premium for crop insurance comparable to what is already available under PMFBY. Paying out insurance claims takes too lengthy, which is a major problem for Indian lawmakers. Even farmers who suffer severe crop losses may not be eligible for compensation if there is proof that insurance company officials are reducing the threshold for claim payments. Roughly one-third of India's farmers had health

insurance prior to the current downturn. This is due, in part, to the fact that many farmers are unaware that the program exists. According to our findings, roughly 35% of farmers across four states are unfamiliar with PMFBY. Insurance firms don't seem to consider farmers who don't have loans as lucrative, which is another reason why crop insurance is necessary for farmers who borrow money. Some farmers may also find the transaction expenses associated with insurance and claim filing to be excessively costly.

2.4.2 Affordability and Premium Structure

Affordability and premium structure play a crucial role in determining the adoption and sustainability of crop insurance schemes among farmers, especially small and marginal ones who form the bulk of India's agricultural workforce. The perceived cost of premiums often becomes a deterrent, even when subsidies are in place. According to Raju and Chand (2008), many farmers view insurance premiums as an added financial burden, particularly when income levels are uncertain and input costs are rising. While schemes like the Pradhan Mantri Fasal Bima Yojana (PMFBY) have attempted to make premiums more affordable through heavy government subsidies—capping the premium at 2% for Kharif crops, 1.5% for Rabi crops, and 5% for commercial and horticultural crops—there still exists a gap in perceived and actual affordability, especially when claim settlements are delayed or denied (Narayanan, 2020). Several studies (Dev, 2012; Bhende, 2005) indicate that the lack of transparency in premium calculations, absence of region-specific pricing, and inadequate communication regarding subsidy structures further dissuade farmers. Farmers often remain unaware of how much of the premium is subsidized, what risks are covered, and what the claim settlement process entails. Additionally, the uniform premium model fails to accommodate the diverse risk profiles of different agro-climatic zones, making it relatively costlier for some regions (Chand & Singh, 2016). Moreover, delays in receiving compensation reduce the perceived value of the premium paid, discouraging future participation (Shukla & Pathak, 2018). To address these concerns, there is a need for flexible, regionally tailored premium structures, increased transparency in pricing, and the development of innovative payment models, such as staggered or post-harvest premium payment options. Enhancing financial literacy and leveraging technology for real-time updates can also significantly improve farmers' trust and willingness to invest in crop insurance (Kaur & Kaur, 2020; Giné et al., 2008). Jeyabalasingh et.al., (2020), researched the title "Crop Insurance in India: Evolution, Issues, and Future Directions." Secondary data was included in the research. Many factors make

crop insurance a challenge in India, including the vast array of agricultural techniques, varied soil and climate types, tiny and fragmented landholdings, and an absence of sufficient data. Most farmers are uneducated and living in poverty, therefore they don't know anything about crop insurance. A lot of farmers also just can't afford the crop insurance rates. Enrolling farmers in crop insurance programs is also made harder by the absence of precise land records. The geographical, seasonal, and crop-specific characteristics of agricultural hazards are posing further difficulties for crop insurance programs. Neither the individual nor the area-based approaches to crop insurance are cost-effective in mitigating these risks. Insurance firms have also been known to withhold important information from farmers in some instances. Because of this, people no longer have faith in crop insurance programs. If the Indian government is serious about making its crop insurance programs more successful, it should act on the recommendations made above. Improving the quality of land records, making crop insurance more cheap for farmers, and offering more information about crop insurance are all part of this. In addition, the government should coordinate with insurance providers to make sure that farmers are getting all relevant information. Kalimuthu. and Sounder, (2020) examined a study titled “Awareness and perceptions towards crop insurance scheme in special reference to Coimbatore District”. The researcher used primary data and secondary data, and the study was conducted with 120 farmers in Coimbatore District to understand their views on different aspects of crop insurance schemes. The author used Simple percentages, Likert scale analysis, and Ranking Analysis. The findings are farmers think crop insurance is best for large farms because it is too expensive for small and medium farms and does not cover much. Bank officials should tell farmers about the benefits of crop insurance, but they do not do this very well. Crop insurance should be made available to all farmers and they should be taught how it can help them reduce their risk. The suggestions are Farmers need to be more aware of crop insurance schemes and how to buy them. All crops should be covered by crop insurance to make it a more effective tool for reducing risk. Crop insurance payments should be large enough to cover the farmer's losses. It should be easy for farmers to buy crop insurance, and they should be able to do it close to home. Service providers can use SMS, billboards, TV, and radio to raise awareness of crop insurance. Möhringa et. al., (2020) conducted a study titled "Crop Insurance and Pesticide Use in European Agriculture." The authors employed regression analysis. Secondary data is used by the writers. An essential strategy for mitigating climate extremes is agricultural insurance, which is becoming more and more acknowledged. Researchers discovered

that pesticide usage was higher among farmers with crop insurance. Why? Because farmers may protect themselves financially in the event of a crop failure with crop insurance, which in turn encourages them to take chemical risks. Furthermore, compared to Switzerland, the research discovered that at the intense edge in France there is a greater correlation between crop insurance and pesticide usage. Reason being, French farmers probably have more disposable income from sources other than farming, so they can afford to spend more on pesticides. On the other hand, there isn't a ton of data on how insurance plays a part in scaling up adaptation and mitigation efforts in response whole climate change. Agriculture insurance is going to be a big part of risk management as nations work to achieve the SDGs and change their food systems in a sustainable way. This is because of the following: the role of insurance in covering severe losses; the alignment of insurance with climate action; the insurability of under-represented regions; the role of insurance in sustainable food production pathways; and the larger risk management agenda. The usage of pesticides and crop insurance go hand in hand. The study's results highlight the need for lawmakers to consider the impact of crop insurance on pesticide use when formulating agricultural laws. Pesticide spending would be 6–11% lower if crop insurance weren't an option, according to the results. Nevertheless, country-specific factors explain why the significance of extensive and intense margin connections varies between Switzerland and France.

2.4.3 Trust in Government and Private Insurance Providers

Trust in government and private insurance providers significantly influences farmers' decisions to participate in crop insurance schemes. In India, where many farmers have had negative experiences with delayed or denied claim settlements, trust becomes a pivotal determinant in the adoption of insurance. According to Narayanan (2020), farmers' willingness to pay premiums is closely linked to their past experiences with the effectiveness and transparency of insurance providers. When claim disbursements are delayed or communication is poor, it results in a trust deficit that deters future enrolment. Government schemes such as the Pradhan Mantri Fasal Bima Yojana (PMFBY) have been criticized for operational inefficiencies, lack of farmer-centric grievance mechanisms, and limited accountability of implementing agencies (Raju & Chand, 2008; Chand & Singh, 2016). Trust issues also extend to private insurance companies, which are often perceived as profit-driven and less accountable. While private participation has increased competition and introduced innovative practices, farmers often question the motives and long-term commitment of these companies, especially when service quality is inconsistent (Dev, 2012). Further, the lack of direct

interaction between insurers and farmers exacerbates the perception of disconnect. Kumar et al. (2019) highlight that middlemen or agents who fail to convey accurate information further damage trust in the system. Transparency in premium deduction, coverage details, and claim procedures remains limited, leading to suspicion and reluctance. Building trust requires consistent performance, timely claim settlements, proactive communication, and visible government oversight. Studies by Shukla and Pathak (2018) and Giné et al. (2008) stress the importance of training extension workers and local leaders who can act as trustworthy intermediaries. Additionally, creating accessible, farmer-friendly digital portals and helplines, along with regular awareness campaigns, can help bridge the information gap and rebuild confidence in both public and private insurers. A trusted insurance system is not only about financial compensation but also about building long-term resilience and credibility. Mukhopadhyay. and Mukherjee, (2020) conducted a study titled "Crop Insurance for an Agricultural Turnaround in India." Rice, wheat, groundnut, potato, cotton, and sugarcane yearly output were the subjects of the research, which relied on secondary data sourced from the Centre for Monitoring the Indian Economy (CMIE). The time frame covered by the data collection includes 1979–1980 through 2008–2009. For this study, researchers chose six large states: West Bengal, Uttar Pradesh, Gujarat, Andhra Pradesh, Madhya Pradesh, and Maharashtra. Major crop producers in these states have been part of the National Agricultural Insurance Scheme (NAIS) from the beginning, and the study's findings show that crop insurance helps farmers by lowering the variability of their output and raising the average value of their output. Having said that, the operation of NAIS has not resulted in a substantial structural interruption in output production. In order to increase productivity, stabilize farm revenue, and decrease regional inequality in food grain production, the research suggests a uniform crop insurance program. Additionally, the government must to promote crop insurance among farmers and urge private insurance firms to provide such plans. Farmers' production has been more stable due to crop insurance. During the NAIS period, the average value of output production was higher than it was before the NAIS period. As a result of NAIS's operation, there has been no major disruption to crop yield. The solution is to establish a system of crop insurance that all farmers and their crops may participate in. Raise farmers' awareness of the benefits of crop insurance. Prompt private insurers to provide crop insurance plans. Find a solution to the problem of uneven food grain production across regions. Nayak et. al., (2020) examined the study titled “Agriculture Insurance’s Outreach Constrained by Procedural Delays and Norms: Reflections from North

Karnataka, India." The study is based on primary data collected from a farmer survey in four districts, and secondary data collected from official documents. Simple statistical tools were used to analyze the data. The study found that crop insurance is necessary for farmers in Karnataka, given the adverse weather conditions in the state. Farmers initially responded positively to the PMFBY scheme, which increased awareness of crop insurance. Despite issues with claims and yield estimates, most farmers feel that crop insurance is essential. The coverage of farmers under crop insurance in Karnataka increased significantly for both the kharif and rabi seasons. The suggestions are Crop insurance adoption in India faces challenges due to delayed claim payments, inaccurate loss assessment, and violation of seasonal discipline. The government and insurance companies need to take steps to address these concerns to make crop insurance more effective and beneficial for farmers. This can be done by making timely claim payments, strictly following seasonal discipline, and conducting awareness campaigns to educate farmers about crop insurance. Sarwary et. al., (2020) explored the study titled "Socio-economic Impact of Climate Change, Adaptation, and Determinants of Willingness to Pay for Crop Insurance in Central Agro-climatic Zone of Afghanistan". The study used the Likert Scaling Method, a Binary Logistic Regression Model. The study used primary and secondary data. The researcher used the Random sample technique and a total sample of 105 respondents. In simpler terms, the study found that farmers in Afghanistan are adapting to climate change by changing how they grow crops, using less water, and planting different crops. The study also found that farmers are more likely to buy crop insurance if they are educated and have access to technical information. The study recommends that the Afghan government consider establishing crop insurance agencies at the provincial level, implementing weather-based crop insurance schemes, and developing new crop varieties that are more resistant to rising temperatures and water scarcity. These measures would help to protect farmers from climate-related hazards such as drought and floods. Swain. and Hembram, (2020) studied the study "Determinants of Adoption of Crop Insurance: Evidence from Bolangir District in Odisha." The author used Probit regression and stratified random sampling to establish the variables that influence the adoption of PMFBY, and the research incorporates both primary and secondary data. Crop insurance is more often purchased by farmers with bigger farms and higher earnings, perhaps because these farmers stand to lose more financially in the event of crop failure. It's possible that farmers who are less comfortable taking risks and younger farmers who are still learning the ropes are more prone to buy crop insurance. Farmers who have been in the business

for a while also have a better grasp on the potential downsides and upsides of crop insurance. Lastly, farmers whose income is heavily dependent on agricultural revenue may be less inclined to buy crop insurance. According to the proposals, private enterprises should cover less serious risks, while the government should cover more significant ones via crop insurance. Farmer access to crop insurance may be enhanced with the support of financial institutions, cooperatives, non-governmental organizations (NGOs), and others by raising awareness of the policy's advantages and streamlining the purchasing process. Wu et. al., (2020) conducted a study titled "Moral Hazard and Subsidized Crop Insurance" Insurance companies face two main problems: adverse selection and moral hazard. The practice of offering insurance to those who are more prone to making claims is known as adverse selection. Having health insurance makes individuals more willing to take chances, a phenomenon known as moral hazard. The research incorporates primary and secondary data, and the author employs a linear regression model. Researchers observed that reports of stopped planting were more prevalent in situations when either the anticipated market price was low or fertilizer expenditures were high. A potential moral hazard is brought to light by the substantial insurance payouts for avoided planting (PP) inside the crop insurance scheme. Only in cases when farmers are unable to sow their crops due to severe weather may they get payment for PP claims. But we also discovered that input and output prices, along with other market factors, impact PP claims. Especially in the Midwest's Prairie Pothole Region (PPR), this shows that farmers are sometimes submitting PP claims that are not true. The RMA lowered the maize PP coverage factor from 60% in 2017 to 55%. Since moral hazard seems to be an issue for growers of cotton, grain sorghum, and spring barley as well, we propose that the RMA think about doing the same for these commodities. There seems to be an issue with moral hazard in the US crop insurance program, since it seems to have a disproportionate impact on PP claims for maize and soybeans in the PPR. This, in turn, may lead to excessive insurance payouts.

2.5 Problems and Challenges in Implementation

The implementation of crop insurance schemes in India, particularly in states like Haryana, faces a multitude of structural, administrative, and socio-economic challenges that limit their effectiveness and outreach. One of the foremost issues is the delay in claim settlements, which undermines farmers' confidence in the system. Farmers often receive compensation months after the loss, which defeats the purpose of timely financial relief (Narayanan, 2020; Raju & Chand, 2008). Administrative bottlenecks, such as poor coordination among banks, insurance companies,

and government departments, contribute significantly to these delays (Dev, 2012). Moreover, lack of accurate and timely crop loss assessment—due to outdated technology or reliance on manual methods—further complicates claim processing and often results in disputes over compensation amounts (Chand & Singh, 2016). Another major challenge is low awareness and understanding among farmers regarding insurance schemes. Many do not know how to enroll, what the policies cover, or how to file claims, which reflects a significant communication gap between service providers and beneficiaries (Kaur & Kaur, 2020). In some cases, farmers are not even aware that a premium has been deducted from their loan account towards insurance (Shukla & Pathak, 2018). Furthermore, the non-availability of localized products tailored to specific crops, regions, or climatic risks reduces the relevance of schemes, thereby discouraging participation (Bhende, 2005). Technological limitations such as poor internet connectivity and low digital literacy restrict the use of online platforms for enrollment or grievance redressal. Moreover, fragmented landholdings and informal tenancy further complicate identification of beneficiaries, often leaving out tenant farmers from the insurance net (Mahul & Stutley, 2010). Addressing these issues requires a multi-pronged approach involving technological upgrades, robust monitoring mechanisms, simplification of procedures, capacity building of extension services, and greater community participation to make crop insurance more farmer-friendly, efficient, and inclusive. Kumar and Phougat (2021) conducted a study titled "Performance Evaluation of Crop Insurance Schemes in Haryana." The present study is based on secondary data and is intended to assess the effectiveness of Haryana's crop insurance schemes. The Agricultural Insurance Company has provided statistics on the crop insurance system. As the backbone of the Indian economy, agriculture is essential to the country's manufacturing and service industries. Nevertheless, weather and climate change continue to play a significant role in agriculture. If farmers want to safeguard themselves financially from calamities, crop insurance might be the way to go. The efficacy of Haryana's crop insurance policies is the focus of this research. For many years, data was evaluated from the Agriculture Insurance Company (AIC) annual reports and the Haryana Economic Survey. According to the results, compared to other Indian states, Haryana has not established as many crop insurance policies. Farmers in Haryana have reaped benefits from the Pradhan Mantri Fasal Bima Yojana (PMFBY), which has routinely surpassed competing plans. Policymakers should consider instituting a no-claim bonus clause to incentivize farmers to enroll in crop insurance programs. Based on the results, the PMFBY is the best crop insurance plan in Haryana and the

only one running right now. At first, PMFBY was optional for farmers who did not have loans but was required for those who did. But starting in 2020, it was completely optional for farmers. Hence, it is recommended that farmers be educated about crop insurance and its advantages via regular training sessions held at the Gram Panchayat level. Furthermore, the no-claim bonus clause needs to be doused. Alternatively, this clause might be used to incentivize farmers to join in crop insurance by offering them premium savings for the next year's coverage. This would be especially helpful for farmers who did not obtain benefits the previous year. Kaur et. al., (2021) conducted a study entitled "Crop Insurance Policies in India: An Empirical Analysis of Pradhan Mantri Fasal Bima Yojana." Using a multivariate regression model, researchers looked at how different PMFBY features affected farmers' coverage. They also looked at how different insurance features affected farmers' involvement in the Pradhan Mantri Fasal Bima Yojana. The Pradhan Mantri Fasal Bima Yojana (PMFBY) was the subject of an evaluation that sought to determine its effect on farmers in India. The research revealed that while the PMFBY does have some good qualities, such covering both kharif and rabi seasons and all commercial and horticultural crops that grow every year, it has also encountered problems with farmer coverage, settling claims, and raising awareness. No changes were seen in the number of farmers covered, the area covered, the claims paid, or the total number of farmers who benefitted from agricultural insurance under PMFBY, according to the research. The PMFBY had a much lower beneficiary to claim premium ratio than comparable plans. Subsidies did not significantly affect farmers' involvement in the plan, but farmer premiums did affect the number of covered farmers over time, according to the research. Research indicates that PMFBY's main flaws are lengthy claim processing times, an overly complicated system, and farmers' general lack of knowledge about the program. According to the research, more digital media might inform farmers about these programs. Kumar et. al., (2021) conducted a study titled "Crop Insurance and Crop Productivity Evidence from Rice Farmers in Eastern India." This research makes use of extensive data collected from smallholder rice farmers across six eastern Indian states. Results showed that smallholder rice farmers in eastern India had a favorable and statistically significant increase in their yields after purchasing crop insurance. Results show that crop insurance significantly and positively affects rice yields, which in turn improves the food security of rice farmers in eastern India. No substantial evidence of moral hazard is shown by the favorable effect of crop insurance on rice production. It could be wise to provide larger subsidies to crop insurance programs. More effective and efficient policies for smallholders

might be designed with the support of private insurance firms' involvement in crop insurance programs. One way to overcome obstacles to access and availability is to raise awareness among smallholders about the benefits of crop insurance. Various estimating methodologies do not affect these findings. According to the results, crop insurance is a great way for smallholder farmers in India to deal with risk. Attempts to improve food security via crop insurance in the past have met with little success. More private sector involvement in crop insurance has been sought as policymakers move towards more market-oriented policies. Researchers in this research looked at how crop insurance affected the ability of eastern Indian rice farmers to put food on the table. The research concluded that smallholder rice harvests are positively and significantly affected by crop insurance. According to these arguments, crop insurance is a crucial instrument for risk management among India's smallholder farmers. Since there is little proof of moral hazard, more subsidies should be given to crop insurance programs. Sourcing crop insurance plans from private insurers helps shape policies that benefit smallholders more effectively and efficiently. Raise awareness about the benefits of crop insurance among small, marginal, and medium-sized farmers. This data points to crop insurance as a critical instrument for risk management among India's smallholder farmers. Governments should think about enlisting private insurance firms to help fund crop insurance programs and increasing subsidies for these programs.

2.5.1 Administrative Bottlenecks

Administrative bottlenecks remain a significant challenge in the effective implementation of crop insurance schemes in India. These bottlenecks often lead to delays in claim processing, confusion among farmers, and ultimately reduced participation in the schemes. One of the primary issues is the lack of coordination between various stakeholders involved in the insurance process, including government departments, insurance companies, and financial institutions. The complex bureaucracy, with multiple levels of approval and verification, often slows down the processing of claims and disbursement of benefits (Raju & Chand, 2008). For example, the process of assessing crop loss, conducting field surveys, and reporting claims is often fragmented, requiring multiple agencies to work in silos, leading to inefficiencies and delays (Narayanan, 2020). In addition, manual and outdated procedures for documenting and processing claims create further delays. The reliance on paper-based records and physical verification can be time-consuming, and the absence of real-time data hampers the efficiency of claim settlement (Chand & Singh, 2016). Even when technological solutions such as mobile applications and online portals are introduced, the

integration of these systems across different levels of government and private insurers is often inconsistent, leading to operational hiccups (Kaur & Kaur, 2020). Moreover, lack of trained personnel within insurance companies and local government offices exacerbates the problem. The absence of staff well-versed in the insurance process, agricultural risk management, and policy details often results in misinformation and confusion among farmers (Dev, 2012). This lack of capacity within both public and private sectors contributes to delays in claim disbursements and leaves farmers frustrated and distrustful of the system (Shukla & Pathak, 2018). Addressing these administrative bottlenecks requires streamlining processes, integrating technology with existing systems, training personnel at all levels, and fostering better collaboration between insurance providers, government agencies, and local institutions to ensure timely and efficient implementation. Rachman et. al., (2021) investigated "the effect of a government program that influences the participation of farmers in rice farmers' business insurance" The findings are a significant factor influencing farmer participation in rice farmers' business insurance. Premium subsidies positively impact participation but are insufficient on their own to drive widespread adoption Data from 103 farmers were analyzed using descriptive statistics, logistic regression, and the McNamara test. While premium subsidies positively influence farmer participation in rice business insurance, they are inadequate as a standalone intervention. To increase participation, additional government programs and support mechanisms are essential. The recommendations are to develop complementary programs alongside premium subsidies, such as training, awareness campaigns, and risk management support. Provide tailored incentives and support based on landholding size to encourage broader participation. Simplify insurance enrollment and claims processes to make them more accessible to farmers. Increase outreach efforts to educate farmers about the benefits of participating in business insurance schemes. Combine insurance with other risk management tools, such as financial aid and infrastructure support, to enhance farmers' resilience. Subramanian.C., (2021) examined the "farmer's awareness regarding crop insurance and farmers' risk perception in eroded district farmers" The Findings are data collected from 125 farmers focused on age, education, farming experience, earning members, income, credit availed, risk perception, satisfaction, and awareness of crop insurance. Encouraging farmers' involvement in social activities significantly enhances awareness of crop insurance schemes. Education level Plays a vital role in increasing farmers' understanding of innovative crop insurance products. Both positively influence the adoption of crop insurance. Leads to a higher uptake of insurance

programs. Probit and Tobit regression models were used to analyze the data. The Conclusion are awareness and adoption of crop insurance are strongly influenced by farmers' social participation, education, income, credit access, and satisfaction with the schemes. These factors are crucial for mitigating risks and promoting the use of crop insurance among farmers. The Recommendations are to foster farmer engagement in community and cooperative activities to enhance awareness. Educational Implement training sessions and campaigns to improve farmers' understanding of crop insurance benefits and processes. Offer flexible and affordable premium rates to boost satisfaction and adoption. Provide easier access to credit to enable farmers to participate in crop insurance schemes. Use digital platforms and grassroots-level agents to reach underserved farmers effectively. Vyas et. al., (2021) conducted a systematic review of the agricultural insurance literature using the Scopus database. The research was titled "Mapping Global Research on Agricultural Insurance." From 2000 to 2019, they uncovered relevant studies using a mix of 45 search phrases. Pieces published in peer-reviewed journals were the primary focus of the evaluation. Agricultural insurance plays an important role in adapting to climate change and is a vital instrument for risk financing. The problem is that studies on agricultural insurance include a wide range of locations, subjects, and dangers. Agricultural insurance was the subject of 796 scholarly articles published between 2000 and 2019 that were systematically evaluated for this research. Research on insurance tends to concentrate on nations with high per capita wealth, and crops are the most often insured agricultural commodity, according to the study. There is a startling lack of association between expected temperature rises and existing research on crop insurance, even though this study is being conducted in areas with a history of severe weather catastrophes. When it comes to de-risking farming and adapting to larger scales, there is little data on the impact of insurance. Past livestock outbreaks have a limited correlation with the subject area of insurance papers for animals. Insurance pricing, revenue strategies, and reinsurance have been the primary areas of study in insurance finance, according to their findings. Agricultural insurance studies have paid little consideration to climate change. Researchers, governments, and insurance firms should focus on high-risk sectors, according to the report. This includes innovative agricultural practices that will need large expenditures and, thus, insurability, in the years to come. The authors combed through studies on farm insurance that have been published after the year 2000. When it comes to managing risks, agricultural insurance will be crucial for countries aiming to achieve the Sustainable Development Goals and transform their food systems in a sustainable way. This is

because insurance plays a significant role in both the food production process and the broader agenda for risk management.

2.5.2 Delay in Claim Settlements

One of the most significant challenges in the implementation of crop insurance schemes is the delay in claim settlements, which undermines the primary purpose of insurance: providing timely financial relief to farmers in times of distress. Delays in the processing and disbursement of claims create a sense of frustration among farmers, eroding their trust in the system and discouraging future participation (Narayanan, 2020). The reasons for these delays are multifaceted, including inefficient administrative processes, lack of proper documentation, and inadequate technology integration. A major factor contributing to delayed settlements is the time-consuming process of loss assessment. Crop damage evaluation often requires manual surveys and field inspections, which are prone to errors and subject to local administrative delays (Raju & Chand, 2008). Furthermore, the lack of accurate, timely data on weather conditions, crop health, and damage extent makes it difficult to quickly assess claims. This results in prolonged waiting times for farmers, who are often left without financial support during critical periods (Dev, 2012). Additionally, the coordination between multiple stakeholders—including insurance companies, banks, and government agencies—complicates the settlement process. The absence of a centralized database to track claims and share information between these entities leads to further delays (Chand & Singh, 2016). In many cases, farmers are left unaware of the status of their claims or are given incomplete or conflicting information (Shukla & Pathak, 2018). The impact of these delays is particularly severe for smallholder farmers, who rely on timely compensation to manage debt, purchase inputs for the next season, or support their families (Mahul & Stutley, 2010). To mitigate this issue, it is essential to streamline claim processes, enhance technological capabilities, improve data collection systems, and establish clearer timelines for settlements. Moreover, ensuring transparency and accountability at all stages of the claims process can help restore farmer confidence and improve the overall effectiveness of crop insurance programs. Aybenyo et al. (2022) Conducted a study on “The impact of crop insurance on farmers’ income in the Ashanti region of Ghana.” Data has been collected from the 600 cocoa farmers through a structured questionnaire and respondents are selected based on multistage stratified sampling. The findings are the study examined demographic, economic, and farming-related factors such as gender, age, marital status, income, education, farming experience, farm size, access to credit, savings, and

awareness of crop insurance crop insurance positively influences farmers' income, as identified using Tobit regression and propensity score matching methods. Awareness and Publicity Farmers' awareness and understanding of crop insurance programs remain low, hindering the program's effectiveness The Conclusion are that crop insurance significantly enhances farmers' income, thereby contributing to poverty reduction. However, limited awareness and insufficient publicity of the program restrict its reach and potential impact. The Recommendations are The government should design robust crop insurance schemes tailored to enhance farmers' income and alleviate poverty. Increase promotional efforts to raise awareness and knowledge among farmers about crop insurance benefits and procedures. Conduct educational programs to improve farmers' understanding of insurance mechanisms. Make enrollment processes and claim settlements more accessible and farmer-friendly. Beula et. al., (2022) conducted a study titled "A Study on Performance of Crop Insurance Schemes In India." The objective of the research is to compare the crop insurance systems that have been implemented by the Indian government since 1972. Farmers may rest easy knowing that crop insurance is there to cover them in the event of a natural catastrophe. This research looks at the expectations of farmers and how well crop insurance covers the most frequent hazards. According to the research, Indian farmers are not being adequately covered by the present crop insurance scheme. The research also reveals that the Pradhan Mantri Fasal Bima Yojana (PMFBY) isn't perfect. Some of the problems it has include its lengthy claim settlement procedure, its collecting of data on agricultural productivity, and its inconsistent methodology. The government should use current crop insurance technology like drones, blockchain, and satellites to bolster the PMFBY program, and the study suggests setting up an independent Crop Insurance Authority to make crop insurance programs more efficient and effective. According to the research, crop insurance is a great way for farmers to hedge against potential losses. Nevertheless, for the present system to be more efficient, it requires improvement. Crop insurance schemes in India may be made more efficient, effective, and transparent according to the study's suggestions. 75. Kaunda and Chowa (2023) Conducted a study titled “An Analysis of Factors Influencing Uptake of Agriculture Index Insurance among Smallholder Farmers—A Case of Kasama District in Zambia” The study collected data from 200 smallholder farmers. To test for significance at the 5% and 1% levels, the data was analyzed using SPSS and STATA software, using the Chi- Square test. Research conducted in Zambia's Kasama area indicated that smallholder farmers' age, familiarity with crop insurance, and availability of other income sources

were the most significant variables impacting their decision to purchase crop insurance. The probability of purchasing crop insurance decreased by 0.25 percentage points for every additional year of age, according to the research. Researchers also discovered that participants were 29.32% more likely to purchase crop insurance for every one-unit improvement in crop insurance knowledge. The research indicated that smallholder farmers in Zambia's Kasama area were most impacted by age, level of crop insurance knowledge, and availability of other income sources when deciding whether or not to purchase crop insurance. Older farmers with other income sources were less likely to get crop insurance, but farmers with greater understanding of the policy were more likely to do so. The research concluded that stakeholders including the government, agricultural organizations, and insurers should endeavor to raise knowledge of crop insurance since it had a significant role in farmers' decisions to purchase it. The research also suggested teaching insurance from a young age at schools and cooperative meetings, as this would ensure that all farmers knew about it at the outset since experience is a proxy for age. Mahendiran et. al, (2023) Conducted a study on Understanding India's crop insurance potential: Pradhan Mantri Fasal Bima Yojana research. Findings are Enhancing CCE effectiveness might dramatically improve scheme delivery. Karnataka's diverse agro-climatic zones, crop types, and agricultural productivity, together with its large concentration of small and marginal farmers, make it difficult for CCEs to provide realistic production estimates to farmers and insurance companies. The high number of CCEs due to several government agencies quickly completing the process. Reducing CCEs and raising yield predictions may speed up and improve claim settlement, improving livelihood security for small and marginal farmers. Here, the government is inventive and tech-savvy. This allows testing technology-based solutions. PMFBY and other schemes gain from CCE process improvements since they estimate yields without the program. This may help rationalize agriculture subsidies, a Gok priority. The study recommended that due to the complexity of the tasks, local GPs should raise awareness, promote enrollment, and provide regular assistance. Communication about claim application and settlement. Discontent with the strategy stems from the lack of GP insurance brokers. To address this, local gram panchayats should execute alongside the DoA, with district authorities establishing directions and objectives. PMFBY has lowe female landowner involvement despite operating standards requiring "special efforts to promote their participation". Insurance firms and brokers should increase access to insurance plans. Work with Karnataka women's self-help groups like Mahila Samakhya and Stree Sakthi to educate and link insurance to

banking and other economic activities to promote PMFBY. Area-based, weather-based, and satellite imaging yield estimates are not recommended in Karnataka, as several crops are grown in various seasons. A blend of base risk and insurance product faith is best for short-term scale. Infrastructure may provide a single technique for all crops across seasons.Jianping et. al., (2024) Conducted a study titled “Crop Insurance, Factor Allocation, and Farmers’ Income: evidence from Chinese Pear Farmers” The findings of the research show that purchasing crop insurance significantly increases the income of pear farmers by reducing production risks. Although insurance comes with additional costs, the benefits in terms of higher agricultural output and net income outweigh these expenses. This positive impact is primarily driven by better allocation of resources like labor, machinery, and green technology. Crop insurance encourages farmers to hire more labor, invest in agricultural machinery, and adopt sustainable farming practices, leading to greater productivity. Research also indicates that broader insurance coverage can increase labor supply, especially for smaller-scale farmers. The findings are robust, even after testing for potential biases. Based on these findings, the conclusions emphasize several key recommendations to further enhance pear farmers' income through crop insurance. First, crop insurance policies should be improved and expanded, specifically for specialty crops like pears, with tailored coverage and higher subsidies to reduce the cost of insurance. Second, reforms in factor markets are necessary to reduce transaction costs, optimize resource allocation, and improve overall income. Collaboration between insurance companies and agricultural extension services is also recommended to guide farmers in the efficient use of production factors. Lastly, the government should support the formation of cooperatives, encouraging pear farmers to join, as this collective approach can mitigate risks, boost earnings, and enable better negotiation of insurance terms.

2.5.3 Lack of Awareness and Misinformation

Lack of awareness and misinformation are significant barriers to the successful implementation of crop insurance schemes in India, particularly in rural areas. Despite the availability of various insurance schemes, many farmers remain unaware of their existence, the benefits they offer, and the process of enrollment and claim settlement. According to Raju and Chand (2008), a large segment of the farming population in India has limited understanding of how crop insurance works, including the scope of coverage, premium rates, and procedures for filing claims. This lack of awareness stems from limited access to information and the absence of targeted communication strategies to engage farmers effectively. In many cases, misinformation further exacerbates the

problem. Farmers often receive incorrect or incomplete information from intermediaries, such as local agents or even other farmers, who may not fully understand the nuances of insurance policies themselves (Dev, 2012). This can result in misconceptions about policy terms, exclusions, and the benefits of insurance schemes. For instance, some farmers believe that insurance schemes only cover specific types of crop losses or are only available for large-scale farmers, which deters smallholder participation (Shukla & Pathak, 2018). Additionally, false claims of fraud or corruption within the insurance system, often propagated by disgruntled individuals, further increase skepticism and reduce trust in the system. The absence of proper awareness campaigns tailored to the local context is another critical factor. Many government and private insurers focus their efforts on urban or semi-urban areas, where awareness is generally higher, while rural regions often lack dedicated outreach programs. Moreover, the language and cultural barriers in rural areas complicate the dissemination of information. Written materials and brochures in standard formats may not be easily understood by farmers, especially those with low literacy levels (Kaur & Kaur, 2020). In addition, the traditional reliance on word of mouth for information dissemination can result in outdated or incorrect knowledge being passed from one farmer to another. To address these challenges, there is a need for focused awareness programs that utilize multiple channels of communication, including community meetings, mobile technology, local radio, and television programs. Training programs for extension workers and local leaders can help improve the flow of accurate information to farmers. Moreover, simplifying insurance policy documents and using visual aids or local dialects to communicate policy details could enhance comprehension among farmers (Mahul & Stutley, 2010). By fostering greater awareness and combating misinformation, the adoption of crop insurance can be significantly improved, ensuring its effectiveness in providing financial security to farmers. Bhuiyan et al., (2022) Conducted a study titled “The impact of agricultural insurance on farmers’ income: Guangdong Province (China) as an example” The study uses both primary and secondary data, The authors used three statistical methods to test this: the ordinary least squares method (OLS), panel fixed effects, and system generalized moment estimation (GMM). The findings indicate that there is a positive and statistically significant relationship between the density of agricultural insurance and per capita compensation and the rise of farmers' incomes. Consequently, farmers in Guangdong Province (China) might see a significant uptick in their revenue thanks to the expansion of crop insurance. In order to maximize the impact of agricultural insurance in raising farmers' incomes, the authors also provide some

recommendations. An appropriate system should be designed, subsidies should be provided, innovations should be made in insurance, and service understanding about agriculture insurance should be improved. Bhuiyan et. al., (2022) conducted a study titled "The Impact of Agricultural Insurance on Farmers' Income: Guangdong Province (China) as an Example." Research on agricultural insurance, agricultural output, and farmers' incomes is culled from a variety of sources, including both domestic and international research. Increased investment in production and better returns may be achieved when farmers have access to financing, reduced risk, and stable income via agricultural insurance. Researchers in China's Guangdong Province discovered that the density of agricultural insurance and per capita pay both significantly and positively affect farmers' income development. Agricultural insurance may affect farmers' income in many ways, as the authors point out. The research discovered that farmers' income development in Guangdong Province, China, is positively and significantly affected by agricultural insurance density and per capita compensation. Farmers' incomes may be efficiently increased via the creation of agricultural insurance. To make agricultural insurance more effective in increasing farmers' incomes, the authors suggest that policymakers think about relevant system design, subsidy techniques, insurance innovation, service level, and publicity. In addition, they take into account relevant theories including welfare economics, non-Walrasian equilibrium theory, and anticipated utility theory. To make agricultural insurance even more effective in raising farmers' incomes, important factors include system design, subsidy schemes, insurance innovation, service level, and publicity. Among the recommendations is the establishment of farmer-centric agriculture insurance policies. To make sure subsidy programs are efficient and successful, think about their design carefully. Create innovative insurance policies tailored to the unique requirements of farmers. Agrarian insurance providers should up their game in terms of customer service. Make farmers more aware of the benefits of agriculture insurance. The bottom line is that agricultural insurance may help farmers make more money. Agricultural insurance may play an even more important role in boosting farmers' incomes if the suggestions made in this article are put into practice.

2.6 Impact of Crop Insurance on Farmers' Income and Livelihood

Crop insurance plays a crucial role in stabilizing the income and enhancing the livelihood of farmers by mitigating the financial risks associated with crop failures due to natural calamities, pests, and unpredictable weather conditions. One of the most significant impacts of crop insurance is income stabilization, as it helps protect farmers from severe losses during bad agricultural

seasons, thus maintaining their purchasing power and consumption levels (Raju & Chand, 2008). Studies have indicated that insured farmers experience lower income variability and are better equipped to invest in high-quality inputs and modern farming techniques (Chand & Singh, 2016). This financial protection encourages them to take productive risks and diversify their crops, leading to increased agricultural productivity and profitability (Dev, 2012). Additionally, access to insurance enables farmers to secure credit more easily from financial institutions, which further contributes to income generation and improved livelihood conditions (Mahul & Stutley, 2010). The guaranteed compensation in case of loss also reduces farmers' dependency on informal lending sources and curbs the debt cycle, particularly among small and marginal farmers (Narayanan, 2020). Furthermore, crop insurance enhances farmers' resilience to climate shocks, helping them bounce back quickly after a disaster and resume farming activities without significant delays (Ghosh & Kumar, 2012). Empirical evidence from states like Maharashtra, Haryana, and Rajasthan shows that insured farmers were able to invest more in irrigation, machinery, and better seeds after receiving compensation from schemes like the Pradhan Mantri Fasal Bima Yojana (PMFBY), thereby improving their livelihood outcomes (Kaur & Kaur, 2020). However, the full potential of crop insurance in transforming farmers' income and livelihood is often limited by delays in claim settlements, low awareness, and inadequate coverage (Shukla & Pathak, 2018). Therefore, while crop insurance has a positive impact on farmers' financial security and agricultural sustainability, its effectiveness largely depends on timely implementation, efficient administration, and farmer-centric design and outreach strategies. Strengthening these aspects can significantly improve the socio-economic wellbeing of farmers and contribute to rural development and poverty alleviation in agrarian regions**.** Ginder et. al., (2022) conducted a study titled “Crop Insurance Purchase Decisions: A Study of Northern Illinois Farmer” This study focused on the crop insurance decisions made by farmers in a 42-county region of northern Illinois. One Illinois farm credit service that is part of the Farm Credit System did the research. A chi-square test was used by the researcher. The researchers used a systematic sampling technique to choose a cross-section of farmers to participate in the study. According to the research, in order to help their customers make informed choices about crop insurance and develop effective risk management plans, crop insurance brokers and farm managers should familiarize themselves with their clients' risk profiles. The reason for this is because crop insurance requirements might vary greatly across farmers based on their individual risk profiles. Agents selling crop insurance may

potentially boost their conversion rates by using risk-profile-based differentiated marketing strategies. Mukherjee and Chattopadhyay (2022) conducted a study titled "Pradhan Mantri Fasal Bima Yojana and Its Socio-Economic Determinants: A Study Based on Growers' Perception After Kharif 2021 In India. The 510 Indian farmers who participated in the study were surveyed to get primary data. Binary probit regression and descriptive statistics were used to examine the data. Participation in the program is more frequent among farmers with higher levels of education, bigger farms, better incomes, more knowledge of PMFBY, and easier access to the program, according to the research. Participation in PMFBY is less prevalent among older, male farmers who have greater agricultural expertise, irrigation, and official credit for farming. Male farmers outnumber female farmers in the survey, and male farmers are more inclined to seek out crop insurance as a means to mitigate risk. There has been a lack of education and outreach on the Pradhan Mantri Fasal Bima Yojana (PMFBY) among farmers, with 60% of them being unaware of the scheme. The majority of farmers still lack access to PMFBY, even if they are aware of its existence. Additionally, these farmers are unable to irrigate their crops. Also, many low-income small-scale farmers cannot get official loans to finance their operations. There is a strong negative correlation between the availability of irrigation and formal finance and the likelihood that Indian farmers would get crop insurance. This indicates that PMFBY crop insurance is not as popular among farmers in India who lack access to irrigation systems or government subsidies. The report suggests establishing a long-term farm insurance policy with reduced rates, expanding education initiatives to include farmers who do not have access to PMFBY benefits, and providing official financial aid.

2.6.1 Income Stabilization through Insurance

Income stabilization is one of the primary objectives and outcomes of crop insurance schemes, especially in agrarian economies like India, where farmers are frequently exposed to climatic uncertainties, pest attacks, and market fluctuations. Crop insurance provides a safety net that cushions farmers against sudden income shocks resulting from crop losses, thereby ensuring a steady and predictable income flow (Raju & Chand, 2008). By compensating for yield losses due to insured risks, crop insurance schemes such as the Pradhan Mantri Fasal Bima Yojana (PMFBY) play a pivotal role in maintaining the financial stability of farm households, especially small and marginal farmers who are more vulnerable to agricultural distress (Mahul & Stutley, 2010). Research has shown that insured farmers report a lower variance in income as compared to non-

insured ones, which enables better planning and investment for subsequent farming seasons (Dev, 2012). The guaranteed payout during adverse crop seasons helps reduce reliance on high-interest informal credit, preventing farmers from falling into cyclical debt traps (Narayanan, 2020). It also facilitates easier access to institutional credit as lenders perceive insured farmers as lower-risk borrowers (Ghosh & Kumar, 2012). Moreover, the sense of security provided by insurance encourages farmers to adopt improved agricultural practices, diversify crops, and invest in better inputs and technology, which further contributes to income enhancement over the long term (Chand & Singh, 2016). In states like Maharashtra, Haryana, and Madhya Pradesh, empirical studies indicate that insured farmers were more likely to invest in irrigation systems, fertilizers, and certified seeds due to the assurance of compensation in case of loss (Kaur & Kaur, 2020). However, income stabilization through insurance is also contingent upon the timely disbursement of claims, transparent assessment of losses, and comprehensive coverage, including post-harvest losses (Shukla & Pathak, 2018). Delays in settlement or exclusion of certain risks from the coverage scope may dilute the effectiveness of income protection. Hence, a well-implemented and inclusive crop insurance scheme can be a powerful tool to enhance financial resilience, reduce agrarian distress, and contribute to long-term agricultural sustainability by stabilizing the income streams of farming households in vulnerable regions. Sheoran and Kait (2022) have conducted a study titled "Progress of crop insurance schemes in Haryana, India." The study is based on secondary data that has been collected over 16 years since the inception of crop insurance schemes in Haryana. Problems with previous crop insurance programs included things like crop failures, inaccurate data, land records, land ownership, poverty, a lack of education, inexperienced workers, and unaware farmers, according to the research. One possible answer is the Pradhan Mantri Fasal Bima Yojana (PMFBY), which was introduced in 2016 and provides two weeks of coverage for post-harvest loss. Individual farm-based evaluation for localized threats. Loanee and non-loanee farmers are both insured for the same amount. Report incidents with the use of a smartphone app and satellite monitoring. Premiums are lower than in past programs. Inundation coverage under limited threats. Government subsidies are limited to a maximum of full coverage without caps and with consistent premium rates. Improved coverage and area insured for farmers as a result of PMFBY as compared to earlier programs. Area insured and farmer coverage are favorably affected by claims paid and farmers benefitting. One reason for its success is the ease and speed with which claims may be processed. In conclusion, PMFBY improves upon earlier crop insurance programs

by reducing complexity, increasing coverage, and easing application procedures. Given its user-friendliness, efficiency in expanding insured areas and farmer coverage, and general superiority over previous systems, it seems like a no-brainer. The long-term success of PMFBY and the resolution of any new problems depend on the results of ongoing monitoring and assessment. Li and Wang (2022) Conducted a study titled "Analysis on the effect of farmer Income of policy-based agricultural insurance" The author used secondary data, and the study uses data from 31 provinces in China from 2007 to 2019. Researchers concluded that policy-oriented agriculture insurance helps farmers' incomes rise generally. But for farmers with more disposable cash, it's a bigger issue. Reason being, policy-oriented agriculture insurance rates are more likely to be affordable for farmers with greater earnings. Government subsidies for low-income farmers should be increased, according to the proposals. As a result, farmers of all income levels would be able to purchase policy-oriented agricultural insurance. To compare the influence of policy- based agricultural insurance on farmers' incomes, particularly across income brackets, the researchers used two statistical methods: panel quantile regression and the fixed-effect model. They analyzed information from 31 Chinese provinces between 2007 and 2019.

2.6.2 Risk Mitigation and Investment in Agriculture

Crop insurance serves as a significant mechanism for risk mitigation in agriculture, providing farmers with the confidence to make productive investments without the constant fear of financial ruin due to unforeseen calamities. In countries like India, where agriculture is heavily dependent on monsoons and frequently affected by natural disasters such as floods, droughts, and pest infestations, risk management becomes critical for sustainable farming. Crop insurance helps transfer the financial risk of crop failure from the farmer to the insurer, thereby ensuring that losses caused by environmental or biological factors do not translate into complete economic collapse for the farmer (Raju & Chand, 2008). This risk transfer mechanism fosters a climate of security and encourages farmers to adopt new agricultural technologies and high-yield crop varieties, which they might otherwise avoid due to fear of losses (Mahul & Stutley, 2010). Insured farmers are more likely to use quality inputs, invest in irrigation infrastructure, and expand their operations because they are assured of financial recovery in the event of crop damage (Chand & Singh, 2016). Empirical evidence suggests that the presence of crop insurance coverage is associated with higher investment levels and risk-taking behavior among farmers, especially those operating on small and marginal landholdings (Ghosh & Kumar, 2012). In addition, insurance incentivizes credit

institutions to extend loans to farmers, thereby improving their liquidity and enabling greater capital investment in agriculture (Dev, 2012). Crop insurance, therefore, not only protects farmers from adverse outcomes but also acts as a catalyst for increased agricultural productivity and economic development. For instance, in regions where the Pradhan Mantri Fasal Bima Yojana (PMFBY) has been effectively implemented, farmers have reported greater willingness to invest in crop diversification, mechanization, and land improvement practices (Kaur & Kaur, 2020). Furthermore, by offering compensation for losses, crop insurance helps stabilize rural consumption patterns and reduces the likelihood of distress sales of assets, thereby preserving farmers' long-term income-generating capacity (Shukla & Pathak, 2018). However, the ability of insurance schemes to mitigate risk and stimulate investment is often hampered by operational inefficiencies such as delays in claim settlements, lack of transparency in loss assessment, and low awareness about policy features (Narayanan, 2020). Addressing these issues through digital platforms for real-time monitoring, satellite-based crop assessment, and better grievance redressal mechanisms can enhance the credibility and effectiveness of crop insurance programs. Moreover, integrating insurance with other risk management strategies like climate forecasting, extension services, and market linkage support can further strengthen the resilience of the agricultural sector (Hazell et al., 2010). In conclusion, crop insurance plays a dual role in agriculture by reducing vulnerability to risks and simultaneously promoting capital investment, thereby contributing to improved productivity, rural development, and the overall financial inclusion of farmers.Vishweshwar et. al, (2022) studied the impact of weather crop insurance in two districts of north Karnataka named Dharwad and Gadag. A total of 100 people have been chosen for data collection. data had been analyzed using descriptive statistics and inferential statistics. Garrett's ranking, compound annual growth rate, relative relevance index, and coefficient of variation technique. The Findings are Positive Trend in Crop Insurance: A consistent and positive trend in the number of ranchers benefiting from crop insurance and claims filed over time. The growth rate shows a significant increase at a 1% probability level. The majority of farmers in both Dharwad and Gadag districts are unaware of the implementing agency and the entity responsible for providing compensation. Grameen Bank is the primary source of information for crop insurance in both districts. Other key sources include commercial agents and neighbors. Service Requirements In the Dharwad district, rural agents at the village level are essential for facilitating insurance services Gadag district, efforts were focused on disseminating crop insurance information. The Conclusion is while crop

insurance has shown a promising and significant growth trend, its effectiveness is hindered by a lack of awareness, inadequate dissemination of information, and logistical challenges. Addressing these issues—by enhancing outreach, simplifying procedures, and ensuring timely claim settlements—can improve the uptake and impact of crop insurance programs in these regions. The Challenges Faced by Farmers' Lack of awareness about crop insurance procedures and benefits. Insufficient publicity and limited time for selecting insurance schemes. Delays in the settlement of claims. Chandrashekara, P. (2023) Conducted a study "A study on Evaluation of Mega Awareness Campaign of Pradhan Mantri Fasal Bima Yojana" The findings are increased Awareness Post-Campaign: The Government of India's post-Rabi mega awareness campaign significantly improved farmers' awareness of crop insurance. Need for Further Awareness: Despite the progress, more awareness-building efforts are essential to drive demand for crop insurance products. Key Knowledge Channels: Agricultural Extension Services: Farmers receiving training or technical advice on agriculture are more likely to be aware of crop insurance. Banking Channels: As crop insurance is primarily offered through bank branches in India, banks can serve as effective channels for disseminating information. Infrastructure Challenges: The current agricultural extension infrastructure needs improvement to better educate farmers and enhance crop insurance uptake. Conclusion: To boost awareness and adoption of crop insurance in India, the government should: Strengthen agricultural extension services by improving their infrastructure and reach. Leverage bank branches as a primary channel to disseminate crop insurance information. Continue and expand awareness campaigns to sustain and increase demand for crop insurance products. Enhanced infrastructure and strategic use of existing channels can significantly improve awareness and adoption rates, helping farmers manage risks effectively. Haq, Z. (2023) The statement highlights key trends in Indian agriculture based on survey data and insights from Union Agriculture Secretary Sanjay Agrawal: Between 2013 and 2019, the income of agricultural households experienced a nominal increase of 59%, rising from ₹6,426 to ₹10,219. While this is a positive indicator of financial growth, the term "nominal" suggests that the increase does not account for inflation, meaning the real increase in purchasing power may be lower.
A significant number of crop-producing households have started adopting crop insurance schemes during this period. This growth could reflect better awareness, increased accessibility of insurance programs, or improved design and benefits under schemes like the Pradhan Mantri Fasal Bima Yojana (PMFBY). Government schemes to improve farm incomes, including subsidies, minimum

support prices (MSP), and insurance programs. Increased adoption of technology in farming could contribute to better yields and income stability. Efforts to promote crop insurance and risk management among farmers have likely influenced adoption rates. While income levels have improved, further analysis is needed to understand real growth after adjusting for inflation and rising input costs uptake of crop insurance reflects positive progress in risk mitigation, which can help stabilize incomes in the face of unpredictable weather or crop failures. The recommendations are Policies should aim to boost real income growth by addressing input costs and improving market access for farmers. Continue promoting crop insurance to reduce basis risks and ensure timely payouts to farmers. Regularly assess farm income changes in real terms to provide a clearer picture of progress and challenges.

2.7 Research Gap Identified from Literature

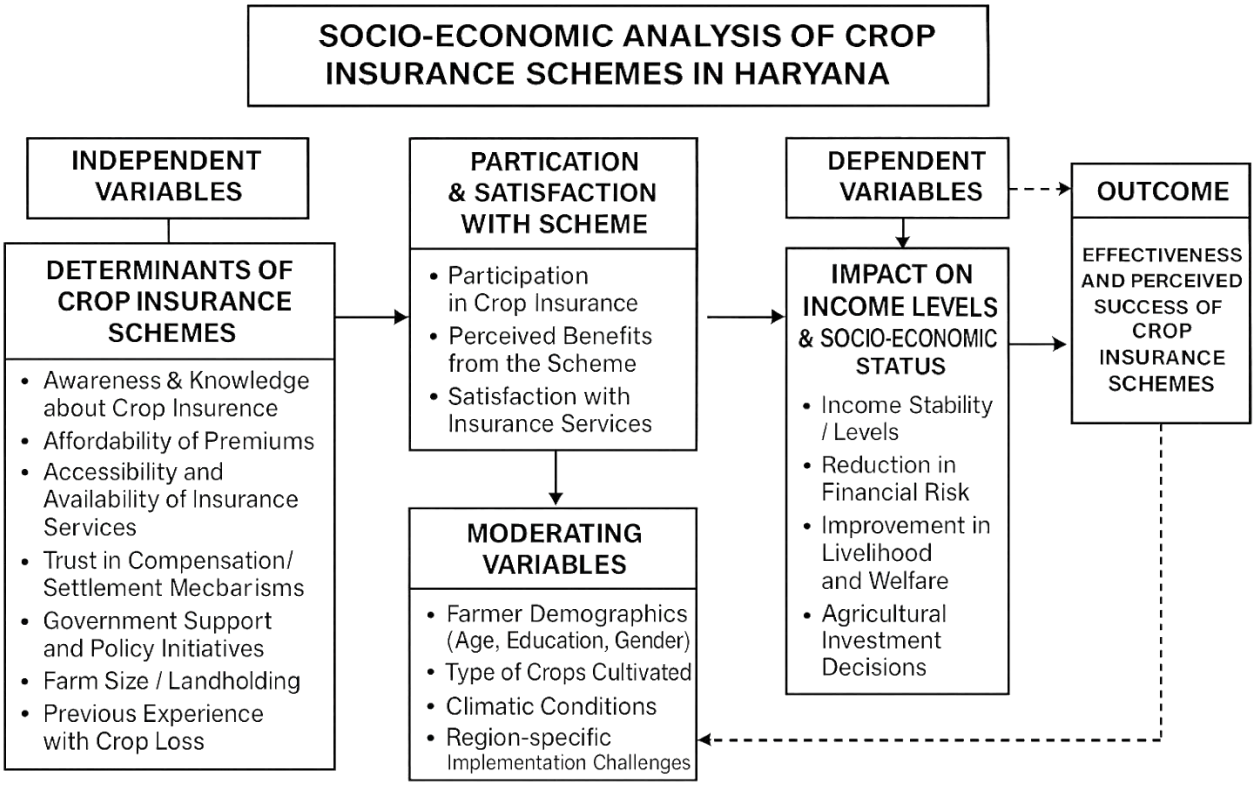
Despite extensive scholarly and policy attention on crop insurance in India, significant gaps persist in understanding its socio-economic dimensions, particularly in the context of agriculturally progressive states like Haryana, where cropping patterns, irrigation infrastructure, landholding structures, and mechanization levels differ vastly from drought-prone states like Maharashtra, Karnataka, or Rajasthan that dominate existing research. While macro-level assessments of schemes such as the National Agricultural Insurance Scheme (NAIS), Weather-Based Crop Insurance Scheme (WBCIS), and Pradhan Mantri Fasal Bima Yojana (PMFBY) have been conducted (Raju & Chand, 2008; Mahul & Stutley, 2010; Ghosh & Kumar, 2012), there is an absence of state-specific, micro-level socio-economic evaluations that contextualize farmer experiences in Haryana. Importantly, most studies fail to account for heterogeneity among farmers—small, marginal, and large—whose differing risk tolerance, access to credit, cropping patterns, and resource endowments shape both their adoption of insurance and the benefits they derive from it. Similarly, although insurance is theoretically positioned to stabilize farm incomes and enable risk-taking (Dev, 2012; Narayanan, 2020), there is inadequate empirical evidence linking coverage to tangible changes in earnings, household consumption, investment behavior, or livelihood diversification in Haryana, where government procurement and extensive irrigation already cushion risks. Another unaddressed gap pertains to behavioral factors driving adoption: while awareness and education levels are mentioned as relevant (Chand & Singh, 2016), few studies examine more complex determinants such as the role of financial literacy, trust in institutions, past experiences with claim settlements, risk preferences, and gender dynamics—all

of which influence enrollment and renewal decisions. The economic status of farmers, measured by income, assets, landholding size, and access to institutional finance, is also rarely analyzed in relation to affordability and willingness to pay for insurance premiums, a critical omission since perceptions of cost-effectiveness shape long-term participation. In operational terms, while the literature acknowledges delays in claim settlement, opaque damage assessment methods, and poor grievance redressal (Shukla & Pathak, 2018), these challenges are seldom explored from the farmers' perspective to assess how such inefficiencies disrupt consumption, loan repayment, and livelihood cycles. Moreover, the institutional dynamics underlying crop insurance—such as the role of extension services, insurance agents, panchayats, farmer cooperatives, and Krishi Vigyan Kendras (KVKs)—are rarely studied even though they form the last-mile link in awareness generation, enrollment facilitation, and trust-building. Similarly, though policy papers emphasize digital modernization through satellite imagery, mobile apps, and online claim tracking, the degree of adoption, usability, and trust in technology among Haryana's farmers remains underexplored, particularly when barriers of digital literacy and infrastructural access persist. Equally neglected is the psychological and emotional dimension of crop insurance; very little is known about whether coverage reduces agrarian stress, alleviates anxiety around crop losses, or improves farmers' mental health—an aspect that is increasingly critical against the backdrop of agrarian distress and farmer suicides in India. Gender dimensions are also overlooked; despite rising female participation in Haryana's agriculture due to male outmigration, women's role in decision-making around crop insurance remains invisible in literature, resulting in gender-neutral policy prescriptions that may exclude or inadequately address their needs. Another noteworthy gap concerns the comparative performance and trust levels associated with public versus private insurance providers under schemes like PMFBY; while government-backed models dominate analysis, the presence of private entities and farmers' perceptions about their efficiency, transparency, and reliability remain under-researched. Furthermore, the dynamic interaction between crop insurance and other risk management mechanisms—such as irrigation access, crop diversification, and off-farm employment—has not been systematically studied, although Haryana provides an ideal setting with its well-developed irrigation and simultaneously rising vulnerability to pest attacks and market risks. Communication barriers also emerge as an underexplored dimension: while awareness deficits are acknowledged, very few studies critically evaluate the relative effectiveness of different channels such as extension agents, KVKs, local media,

cooperatives, and digital platforms like WhatsApp in disseminating accurate and timely information. At the same time, while macro-level debates focus on the fiscal implications of premium subsidies, far less is known about farmer perceptions of subsidy adequacy and fairness, especially in Haryana, where agricultural prosperity levels diverge considerably across districts. Methodologically, most available studies rely on cross-sectional data or aggregated figures, limiting scope to capture behavioral or economic dynamics over time; longitudinal studies tracking the same households over multiple seasons and mixed-method designs incorporating both quantitative analysis and qualitative interviews are scarce, leaving an incomplete understanding of lived farmer experiences with crop insurance. Effectiveness is further obscured by diverse and inconsistent indicators used across studies, such as area insured, premium collected, claims disbursed, or number of beneficiaries, restricting comparability and cross-regional learning; in Haryana, where crop diversity spans wheat and rice in irrigated belts to bajra and mustard in semi-arid areas, such lack of standardized indicators hampers scheme-level evaluation. Beyond this, the interaction between climate change and crop insurance schemes represents a pressing but under-investigated domain: Haryana is increasingly experiencing climatic variability, including erratic rainfall and temperature stress on wheat and mustard, yet little research has analyzed how insurance schemes integrate climate resilience either in product design, premium calculation, or farmer awareness. Equally underexplored is the question of implementation fidelity—whether policy guidelines are executed as intended at the ground level through efficient institutional delivery, farmer engagement, and claim mechanisms. Finally, most studies end with broad recommendations about expanding coverage or improving claim settlement, but there is a shortage of actionable, evidence-based policy recommendations grounded in field-level realities of Haryana's farmers. Taken together, these lacunae underscore that although crop insurance has been critically analyzed in India, Haryana remains neglected in socio-economic evaluation despite its distinctive agricultural context, and gaps span farmer heterogeneity, livelihood outcomes, behavioral and gender determinants, institutional effectiveness, trust in technology, communication efficacy, subsidy perceptions, methodological limitations, and climate resilience. Therefore, a state-focused, mixed-method investigation that considers both quantitative household surveys and qualitative narratives of farmers, extension officers, and insurance officials is necessary to generate comprehensive insights into how crop insurance schemes function, what socio-economic impacts they create, and how they can be improved to serve as a sustainable risk

management strategy in Haryana's agrarian economy.

2.8 Conceptual Framework



2.9 Summary of Literature Review

The literature review presents a comprehensive understanding of the concept, evolution, and significance of crop insurance, both globally and within India, with specific attention to Haryana's agricultural landscape. The historical analysis reveals that while crop insurance originated as a risk mitigation tool in advanced economies, it has evolved in India through various schemes like NAIS, WBCIS, and PMFBY, aiming to safeguard farmers from yield and weather-related uncertainties. Studies have emphasized the socio-economic determinants affecting insurance adoption, including demographic characteristics, economic conditions, education levels, and awareness about insurance benefits. Furthermore, accessibility, premium affordability, trust in providers, and institutional support have emerged as key influencers in farmers' insurance decisions. The literature also identifies several challenges, such as administrative inefficiencies, delays in claim settlements, and limited awareness, which hinder effective implementation. Additionally,

researchers have explored the positive role crop insurance can play in stabilizing income and encouraging agricultural investment. However, despite a wealth of macro-level studies, critical gaps persist—particularly in state-specific analyses like Haryana—regarding the nuanced socio-economic impacts of insurance, behavioral factors influencing uptake, grassroots-level operational challenges, gender inclusivity, and the integration of technology. Moreover, little attention has been paid to the lived experiences of farmers and the long-term effectiveness of crop insurance in improving livelihoods. The conceptual and empirical gaps identified highlight the need for regionally focused, farmer-centric research that incorporates both quantitative and qualitative insights. This study thus aims to address these voids by offering a thorough socio-economic analysis of crop insurance schemes in Haryana, contributing new perspectives to both academic and policy-oriented dialogues in agricultural risk management.

Chapter 3:
Research Methodology

3. Introduction

Chapter 3 presents the research methodology adopted to achieve the objectives of the study titled "Socio-Economic Analysis of Crop Insurance Schemes in Haryana." This chapter outlines the systematic approach undertaken to collect, analyze, and interpret data related to the socio-economic conditions of farmers, determinants of crop insurance, implementation challenges, and the schemes' impact on income levels. The nature of the research is primarily quantitative, aiming for empirical assessment through structured data collection tools. The research philosophy, aligned with positivism, assumes a single reality that can be objectively measured using statistical techniques. A deductive approach is followed, starting with hypotheses derived from existing theories and testing them through primary data. The research design is descriptive and explanatory, facilitating a detailed understanding of the issues under investigation. The population of the study includes farmers in Haryana enrolled under various crop insurance schemes, with individual farmers being the unit of analysis. A purposive sampling technique was employed to select relevant respondents based on their insurance experience. The sample size was determined using statistical guidelines ensuring adequate representation. The questionnaire was designed using validated constructs from previous studies and was pre-tested and pilot-tested to ensure reliability and clarity. Data was collected using a structured questionnaire through both offline and online methods, ensuring inclusivity. Post-collection, the data underwent processes such as handling of missing values, checking for normality, and controlling common method bias. The collected data was then analyzed using relevant statistical tools to derive meaningful insights and draw valid conclusions. This chapter ensures transparency in the research process and establishes the credibility of the study's findings.

3.1 Nature of Research

The nature of this research on crop insurance schemes in Haryana is primarily descriptive and exploratory, aiming to investigate the socio-economic factors and determinants affecting farmers' perceptions and satisfaction with crop insurance. This study employs quantitative analysis through survey methods, collecting data from a diverse range of farmers across Haryana. It uses frequency

tables' qualitative and quantitative techniques, chi-square testing to assess associations between demographic factors and satisfaction levels across various facets of crop insurance, such as accessibility, affordability, trust, and government support. The research design emphasizes understanding the current challenges faced by farmers in adopting crop insurance, as well as evaluating the scheme's impact on their income stability and risk management practices. By focusing on statistical associations, the study aims to draw insights into how demographic factors may (or may not) influence farmers' experiences with crop insurance schemes. This research is significant for policymakers and stakeholders in the insurance sector, as it provides empirical evidence on the gaps in scheme implementation and highlights areas for improvement. The study's structured and data-driven approach seeks to contribute to more inclusive and effective agricultural risk management strategies, essential for supporting the livelihoods of Haryana's farming community.

Research Philosophies & Justification

The research philosophy underlying this study on crop insurance schemes in Haryana is rooted in positivism, which emphasizes objectivity and quantifiable measurements to derive insights. Positivism aligns well with the study's goal of examining relationships between demographic factors, socio-economic conditions, and farmers' perceptions of crop insurance schemes. This approach is appropriate as it allows for empirical analysis, such as chi-square testing, to statistically assess how factors like income range, educational qualification, and family type influence satisfaction with the insurance schemes. By adopting this perspective, the research maintains objectivity and focuses on deriving universal insights through observable and measurable data. The study also reflects elements of the pragmatist research philosophy, particularly in its practical orientation towards improving policy outcomes. Pragmatism in research focuses on the utility of findings, especially for practical application, which is central to this thesis as it aims to provide actionable insights for stakeholders such as policymakers and insurance providers. In combining these approaches, the study remains grounded in factual analysis while considering the potential real-world implications for improving agricultural insurance frameworks in Haryana. This dual philosophical grounding—positivism for data- driven, objective analysis and pragmatism for policy relevance—enables the research to contribute to both academic understanding and practical solutions in agricultural risk management. By capturing the factors that affect farmers' satisfaction with crop insurance, this thesis helps inform targeted interventions

to enhance the accessibility and effectiveness of insurance schemes in Haryana.

Research Approach & Justification

The research approach adopted for this thesis is a quantitative and descriptive-analytical approach, designed to systematically examine the socioeconomic factors influencing farmers' satisfaction with crop insurance schemes in Haryana. This approach is suitable due to its ability to quantify relationships between variables and to statistically analyze the impact of demographic factors on farmers' perceptions. The use of quantitative methods, such as chi-square tests and descriptive statistics, enables the research to evaluate significant patterns and relationships, providing objective insights that contribute to evidence-based conclusions. By employing a cross-sectional survey design, this approach captures a snapshot of the current experiences and opinions of a representative sample of Haryana's farming population regarding crop insurance schemes. This design aligns well with the study's objectives, as it facilitates comprehensive analysis across a range of demographic variables—such as income, age, education, and family structure—in relation to factors like accessibility, affordability, and overall satisfaction with crop insurance. The choice of quantitative, descriptive-analytical methodology is justified given the study's intent to derive actionable insights. Findings from this structured, objective approach are not only statistically robust but also transferable, allowing stakeholders to apply these insights for policy refinement and to enhance the efficiency of crop insurance schemes. This rigorous approach thus reinforces the research's practical implications, making it an effective tool to guide improvements in agricultural risk management.

Research Design & Justification

The research design employed in this thesis is descriptive and cross-sectional, structured to evaluate the determinants and effectiveness of crop insurance schemes on the socioeconomic conditions of farmers in Haryana. A descriptive design is appropriate as it provides a systematic means of capturing data on the variables that define farmer satisfaction and experiences with crop insurance, aligning well with the study's aim to gain in-depth insight into demographic factors and their correlation with specific perceptions about crop insurance. The cross-sectional aspect of the design involves collecting data from a sample of Haryana's farming population at a single point in time, allowing for a representative analysis of current attitudes, challenges, and satisfaction levels associated with crop insurance. This is beneficial for identifying trends and variations among different demographic groups (e.g., income levels, family structure, education) that might

influence insurance perceptions. Such a design enables comparison across demographic categories, providing a comprehensive overview of the impact and accessibility of insurance policies in a specific regional context. The choice of a descriptive cross-sectional design is justified due to its efficiency in resource use and its effectiveness in generating reliable data on the research problem. This design provides statistically analysable data that yields insights valuable for policy recommendations, facilitating informed decision-making for crop insurance stakeholders to address the observed challenges and optimize scheme delivery and benefits for Haryana's farmers.

Population of the Study & Unit of Analysis

The population of this study includes farmers in Haryana who are enrolled in crop insurance schemes. This group is integral to the research as it encompasses individuals who directly experience the benefits and challenges associated with crop insurance, allowing for an assessment of its impact on socioeconomic factors such as income stability, risk mitigation, and overall financial security. The target population is spread across various districts in Haryana, a state where agriculture plays a central role in the economy and where crop insurance can significantly influence farmers' livelihoods. To ensure that the study captures diverse perspectives, farmers from different backgrounds, including varying income levels, family types, and education levels, are included. The unit of analysis in this study is the individual farmer. By focusing on the farmer level, the research can accurately assess how personal and household characteristics impact perceptions of crop insurance schemes, including satisfaction with service quality, accessibility, affordability, and perceived benefits. This unit of analysis allows for a more granular examination of how demographic variables influence farmer attitudes and experiences with crop insurance, enabling detailed insights that can guide policy adjustments to improve the scheme's effectiveness. By focusing on individual experiences, the study gains a nuanced understanding of crop insurance's socioeconomic impacts and limitations within Haryana's agricultural community.

Sample Technique & Justification

For this study, purposive sampling was selected as the primary sampling technique. This approach aligns with the research objective to understand the factors influencing the effectiveness of crop insurance schemes among farmers in Haryana. Given the specificity of the target population—farmers who have engaged with crop insurance schemes—purposive sampling allows for a focused examination of individuals with relevant experiences and insights. By choosing participants with firsthand exposure to crop insurance, the study can accurately capture the issues and potential

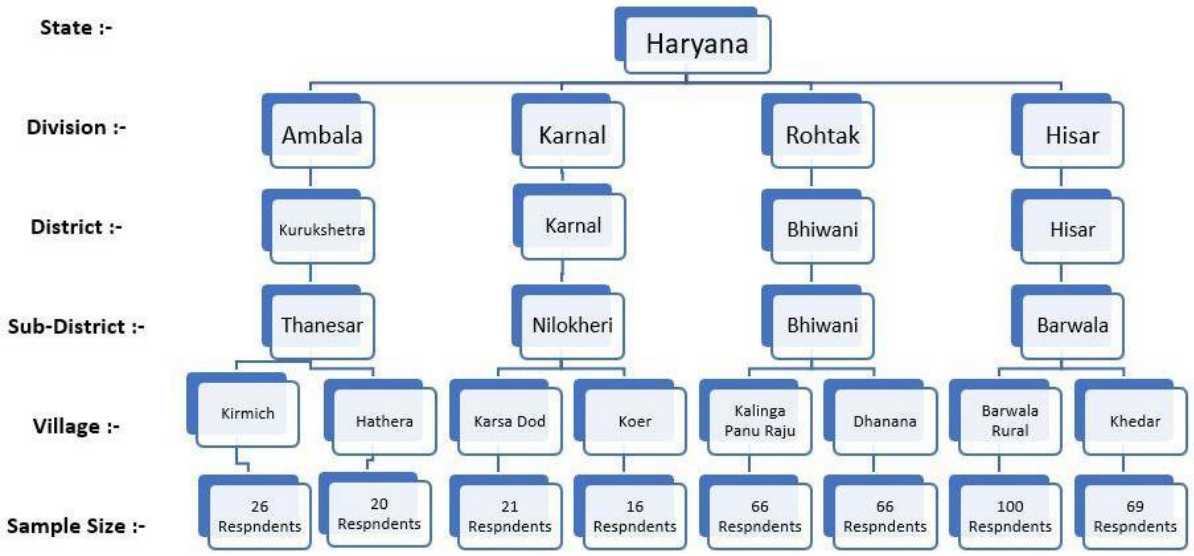
benefits unique to this group, ensuring relevance and depth in the data collected. This sampling method is justified by its effectiveness in studies where specific characteristics are essential for meaningful analysis. Unlike random sampling, which may include individuals without relevant experience with crop insurance, purposive sampling allows for intentional selection based on criteria such as scheme participation and demographic diversity (e.g., age, income, family size). This approach not only improves the efficiency of the research but also enhances the reliability of findings related to the factors affecting crop insurance adoption, satisfaction, and perceived benefits. Additionally, purposive sampling is advantageous when studying specialized populations, as it provides a manageable sample size while ensuring data quality and relevance, making it well-suited for qualitative insights within a defined agricultural community.

Determination of Sample Size

The Haryana state has six administrative divisions. Firstly, Ambala which covers district of Ambala, Kurukshetra, Yamuna Nagar, and Panchkula. The second division is Gurgaon which covers, Rewari, Gurgaon, and Mahendragarh districts. The third division is Faridabad which covers, Palwal, Faridabad, and Nuh area. The fourth division is Karnal which covers; Kaithal, Karnal, and Panipat. The fifth division is Rohtak which covers, Sonipat, Rohtak, Bhiwani, Charkhi Dadri, and Jhajjar and the Sixth division is Hisar which covers, Jind, Sirsa, Hisar, and Fatehabad. Out of these six divisions – Ambala, Karnal, Rohtak and Hisar divisions are agriculture prominent and selected on the basis of the highest area covered, while Gurgram and Faridabad as covered under National Capital Region are facing change of use of Land and the traditional farming activities diminished due to heavy industrialisation and colonisation. From these selected four divisions, four districts are identified randomly and two villages from each district are selected based upon the maximum number of farmers covered. From Ambala division, ‘Kirmich’ and ‘Hathera’ villages of Kurukshetra district are selected. From Karnal division, ‘Karsa Dod’ and ‘Koer’ villages of Karnal district are selected. From Rohtak division, ‘Kalinga Panu Raju’ and ‘Dhanana’ villages of Bhiwani district are selected. Lastly, from Hisar division, ‘Barwala’ (Rural) and ‘Khedar’ villages of Hisar district. The reason for selecting different villages from one district from each division is so that the results can be generalized to complete state of Haryana and different type of farmers and the problems faced by them can be covered in the study.

Figure 3.1 Breakout of Haryana Region according to Sample Size

Hence, the classification of a total sample size of 384 as discussed above will be done in the following way: -



The total number of farmers are 635778 in Haryana. Cochran pointed out that if the population is finite, then the sample size can be reduced slightly. This is due to the fact that a very large population provides proportionally more information than that of a smaller population.

The sample size is calculated on the basis of (Cochran's formula):

This sample size is calculated on the basis of Cochran's formula. According to Cochran, sample size of a large population whose degree of variability is not known is derived from the formula mentioned below. The exact number of insured farmers is not confirmed and hence, the infinite formula for calculating the sample size is used in this study.

Assuming the maximum variability, which is equal to 50% (p =0.5) and taking 95% confidence level with ±5% precision, the calculation for required sample size will be as follows:

P = 0.5 and hence q = 1-0.5 = 0.5; e = 0.05; z =1.96 So,

$$n_0 = \frac{(Z)^2(p)(q)}{e^2}$$

$$n_0 = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384.16 = 384$$

According to this formula, the sample size will be 384 at a 95% confidence level with a margin of error equal to (5%). Thus, the total sample size of the study will be 384.The Cochran formula is applied universally if the population is finite. Similarly, in this case the population size is known and finite. The sample size is derived using the same and hence, total sample size of 384 is derived.

Questionnaire Sources

Section	Statement	References
1: Socio-Economic Status	I am satisfied with my current socio-economic status.	Gupta, S., & Chatterjee, S. (2015). Socio-economic status and its impact on the financial stability of farmers in rural India. *Indian Journal of Agricultural Economics*, 70(1), 112–123. Singh, R., & Yadav, R. (2016). Impact of socio-economic factors on agricultural productivity and income. *Indian Journal of Economics and Development*, 12(3), 345-356.
2: Financial Security	I feel financially secure in my current situation.	Soni, P., & Kumar, V. (2016). Financial security among Indian farmers: A study of socio-economic factors. *Agricultural Economics Research Review*, 29(2), 125-137. Meena, M., & Kaur, S. (2015). Financial security and farmers: A review of the financial tools and their accessibility. *Journal of Rural Studies*, 18(4), 58-70.
3: Landholding and Adequacy	The size of my landholding for crop cultivation is adequate for my needs.	Raju, S. S., & Sharma, D. (2016). The adequacy of landholding for agricultural production in Punjab. *Journal of Agricultural Economics*, 42(2), 98–111. Bansal, A., & Kapoor, M. (2015). Farm income and landholding patterns in India: Impact on sustainability. *Agricultural Economics Research Review*, 28(1), 23–34.
4: Crop Insurance Enrollment	I am enrolled in a crop insurance scheme to protect my crops.	Kumar, S., & Singh, J. (2015). Awareness and participation of farmers in crop insurance schemes: A study of Haryana. *Asian Journal of Agricultural Extension, Economics & Sociology*, 6(3), 72-80. Singh, R., & Yadav, P. (2016). Factors influencing the adoption of crop insurance among farmers in India. *International Journal of Agricultural Management*, 5(4), 56–65.

Section	Statement	References

5: Coverage and Benefits of Crop Insurance	The coverage and benefits provided by my crop insurance scheme are sufficient.	Natarajan, S., & Kaur, R. (2015). Perceived effectiveness of crop insurance schemes in India: A survey of farmers' experiences. *Economic Affairs*, 60(3), 53–64. Tripathi, M., & Soni, A. (2015). Analyzing the benefits of crop insurance schemes in Haryana. *Indian Journal of Economics and Development*, 11(4), 56-67.
6: Premium Rates and Affordability	The premium rates for crop insurance are affordable for me.	Joshi, P., & Prasad, M. (2015). An analysis of premium rates in crop insurance schemes and their affordability. *Indian Journal of Agricultural Economics*, 70(3), 323–335.
7: Claim Settlement	The claim settlement procedures for crop insurance are straightforward and easy to understand.	Raghavan, P., & Kumar, R. (2015). Simplification of the claim settlement process in crop insurance schemes: A case study. *Agricultural Risk Management Journal*, 5(1), 91-103.
8: Awareness and Risk-Reducing Practices	There should be more awareness programs about the benefits of crop insurance for farmers.	Thakur, R., & Mehta, S. (2016). Raising awareness about crop insurance: Key strategies and challenges. *Indian Journal of Extension Education*, 52(1), 47-58. Sharma, P., & Kaur, G. (2015). Encouraging risk-reducing practices among farmers through crop insurance. *Asian Journal of Agricultural Sciences*, 9(1), 12-24.
9: Financial Stability and Government Support	Crop insurance schemes should provide more support to farmers during crop loss incidents.	Verma, P., & Sharma, R. (2015). Role of government policies in promoting financial stability through crop insurance. *Agricultural Economics Review*, 28(2), 105-120.
10: Overall Satisfaction with Crop Insurance	Overall, I am satisfied with the effectiveness of crop insurance schemes for farmers in Haryana.	Bansal, N., & Yadav, L. (2016). Farmers' satisfaction with crop insurance schemes: An empirical study. *International Journal of Agricultural Policy*, 12(3), 215-227. Sharma, M., & Sood, A. (2015). Impact of crop insurance schemes on farmers' welfare and satisfaction. *Indian Journal of Development Studies*, 5(2), 128-140.

Questionnaire Structure

The questionnaire is structured to gather data on various aspects related to crop insurance schemes in Haryana. It begins with demographic questions to understand the socio-economic profile of the respondents, followed by sections that assess key factors influencing the adoption and effectiveness of crop insurance. The first section addresses the socio-economic status of the

farmers, including satisfaction with their current situation. The next section focuses on financial security, evaluating how secure farmers feel in their financial situation. The questionnaire also explores the adequacy of landholding for crop cultivation and whether farmers are enrolled in crop insurance schemes. It further examines the perceived coverage and benefits of these schemes, the affordability of premium rates, and the ease of claim settlement. Additional sections assess awareness of crop insurance schemes, risk-reducing practices, and the financial stability provided by the schemes. Finally, the questionnaire includes a section on overall satisfaction with crop insurance schemes and suggestions for improvement. All statements are designed to measure respondents' opinions on a Likert scale ranging from "Strongly Disagree" to "Strongly Agree."

Summary of Respondents

The sample of 300 farmers shows that the majority (30%) belong to the OBC category, followed by 25% in the General category. The age distribution is balanced, with 30% aged 41-50, 26.7% aged 18-30, 23.3% aged 31-40, and 20% above 50. Most farmers (60%) live in joint families, and 73.3% are married. Education levels indicate 30% with primary education, 25% secondary, 15% graduate/professional, and 20% illiterate, with only 10% having vocational qualifications (ITI/Diploma/Agri). Family size tends to be medium, with 46.7% having 4-6 members, 33.3% with up to 3, and 20% with more than 6 members. Half of the farmers (50%) have secondary income sources, predominantly earning between 50,000 to 1 lakh per year (16.7%), while 13.3% earn less than 50,000, and only 10% exceed 2.5 lakhs. This demographic data highlights a predominantly male, middle-aged farming community, with varied educational backgrounds and moderate secondary income levels.

Data Collection Method

The data for this study on crop insurance schemes in Haryana have been collected through a structured questionnaire, employing a primary data collection method. The questionnaire was distributed to farmers in various regions of Haryana, specifically targeting those with experience in crop cultivation and participation in crop insurance schemes. Additionally, data was collected from employees of insurance companies involved in crop insurance programs, with a sample size of 100 employees. These insurance company employees provide insights into the operational aspects, challenges, and benefits of crop insurance schemes. The data collection will use a purposive sampling technique, focusing on farmers who are enrolled in crop insurance programs and insurance company employees who are directly involved in the administration of these

schemes. The questionnaire will be administered in person or through online surveys, depending on the accessibility and convenience of the respondents. To ensure clarity and reliability, the questionnaire will be pre-tested with a small group of farmers and insurance employees before the actual data collection begins. The final version of the questionnaire will consist of multiple sections, each focusing on specific areas such as socio-economic status, financial security, awareness of crop insurance schemes, insurance coverage and benefits, premium affordability, claim settlement, and overall satisfaction with the scheme. The data collection process will be conducted over a period of 3-4 weeks to allow for sufficient response time and ensure a diverse sample. The responses will be recorded and analyzed using appropriate statistical methods to identify trends, relationships, and areas for improvement in the crop insurance schemes available to farmers in Haryana.

Pre & Pilot Testing

Pre- and pilot testing are crucial steps in ensuring that survey questions are clear, relevant, and capable of accurately measuring the constructs of interest. In this thesis, pre-testing was done by sharing the survey instrument with experts to verify the clarity, cultural relevance, and appropriateness of each question in capturing farmers' perspectives on crop insurance in Haryana. Following pre-testing adjustments, a pilot test was conducted on a small sample of Haryana farmers. Data collected from this pilot sample was filtered in Excel to identify any problematic questions, and responses were analyzed using SPSS to check for internal consistency (e.g., using Cronbach's alpha for reliability). The pilot test provided valuable insights into the feasibility of the survey and allowed adjustments in question wording, order, or format to improve response quality. This preliminary testing ensured that the final instrument was well- suited for full-scale data collection, increasing the reliability of insights drawn from the main survey data.

Data Analysis

The analysis of the main data in this study incorporated a mix of statistical techniques using SPSS, including chi-square tests, frequency distributions, and qualitative analysis in NVivo. Chi- square tests were applied to explore relationships between categorical variables, such as examining how various demographic factors like age, landholding size, or awareness level influenced responses on crop insurance adoption. Frequency distribution analysis provided an overview of farmers' demographic details and highlighted prevalent attitudes towards different aspects of insurance coverage, accessibility, and satisfaction. NVivo was employed to analyze open-ended responses,

enabling a deeper thematic understanding of participants' views on crop insurance. Data cleaning and preliminary transformations were performed in Excel, while SPSS provided the statistical framework for the quantitative analysis, ensuring that relationships among the constructs were well-understood and presented accurately.

Missing Data

Addressing missing data is essential for maintaining the quality of any statistical analysis. In this thesis, Excel was used initially to identify missing values in the dataset. SPSS then helped determine if the missing data were randomly or systematically distributed, using tests like Little's MCAR (Missing Completely at Random) to detect any patterns. For any missing responses, imputation techniques were applied; specifically, mean substitution was used for variables with minor gaps, ensuring data continuity without heavily impacting the statistical integrity of the analysis. Where necessary, regression imputation in SPSS allowed for more complex replacements by predicting values based on relationships with other variables. By systematically addressing missing data, this analysis avoided biases that could have impacted the validity and reliability of the findings, allowing for a more accurate understanding of farmers' perspectives on crop insurance.

Data Normality

Testing data normality is a key assumption in many statistical analyses. In this study, SPSS was used to assess normality, employing tools like histograms, Q-Q plots, and Shapiro-Wilk and Kolmogorov-Smirnov tests. Frequency distributions provided additional insights, as they revealed whether data was concentrated in particular ranges or spread more evenly. Ensuring normal distribution of data allowed parametric tests like chi-square to yield reliable results and helped validate assumptions in Structural Equation Modeling (SEM), which was used for in-depth relationship analysis. Any significant skewness or kurtosis detected was addressed by transforming data through techniques such as logarithmic or square root adjustments, where applicable. This step ensured the robustness of the statistical analyses, enhancing the overall accuracy of conclusions about factors influencing farmers' satisfaction and trust in crop insurance.

Common Method Bias

Common method bias (CMB) can occur when measurement method factors, rather than the constructs themselves, account for observed variance. To address this, the thesis employed Harman's Single-Factor Test using SPSS to assess if one factor accounted for the majority of the

variance. This involved loading all variables into an unrotated factor analysis to check if a single factor explained more than 50% of the total variance, which would indicate CMB. By confirming the absence of significant CMB, the study ensured that relationships among variables, such as the impact of insurance awareness on adoption, were authentic and not artificially inflated. NVivo helped analyze qualitative data from open-ended questions, providing an independent check against CMB by triangulating quantitative findings with qualitative themes, thereby supporting the reliability of the results.

Chapter 4

Results and Data Analysis

Chapter 4 offers a comprehensive and structured analysis of the data collected from farmers in Haryana to evaluate the effectiveness and determinants of crop insurance schemes. It begins with a normality test to assess the suitability of the dataset for further statistical analysis. The chapter is then divided into multiple sections to explore specific areas of interest. Section 1 provides demographic information, including gender, age, education, and income, helping to understand the background of the respondents. Section 2 focuses on farming patterns and income sources, offering insights into the economic and agricultural contexts of the participants. Section 3 evaluates the level of awareness, understanding, and enrollment in crop insurance schemes, while Section 4 discusses challenges such as high premiums, delayed claims, and inadequate coverage. Section 5 gathers farmers' suggestions for improvement, and Section 6 reflects their overall satisfaction with the scheme. A detailed statistical analysis is presented to identify key determinants of crop insurance adoption in Haryana. Factors such as farming experience, landholding category, irrigation facilities, and income levels are critically examined. Subsections further analyze the administrative efficiency, communication channels, transparency in beneficiary selection, and coordination among stakeholders, all of which influence the scheme's success. The chapter also employs NVivo for qualitative data analysis, helping to interpret open-ended responses and coding themes like government support, communication effectiveness, and trust. A Chi-square analysis follows, testing the association between demographic and behavioral variables with levels of awareness, access, affordability, satisfaction, and trust in crop insurance schemes. Additionally, cross-tabulation helps reveal deeper patterns across variables such as awareness, government support, and communication outreach. This leads to a comprehensive understanding of how different factors interact to shape farmers' perceptions and decisions. The final section evaluates the impact of crop insurance on income levels, highlighting whether and how these schemes have improved financial resilience among Haryana's farmers. Overall, Chapter 4 provides critical empirical insights that inform the study's objectives and support the formulation of effective, farmer-centric insurance policies.

Table 4.1 Demographic Details

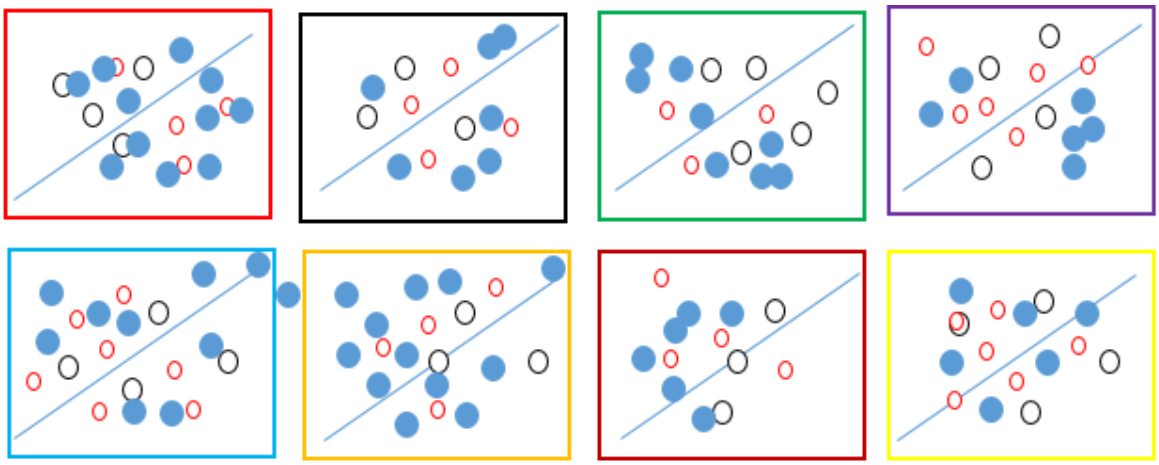
Demographic Variable	Categories	Frequency	Percentage
Category	General	75	25%
	EWS	45	15%
	OBC	90	30%
	SC	60	20%
	ST	30	10%
Age Group	18-30 years	80	26.7%
	31-40 years	70	23.3%
	41-50 years	90	30%
	Above 50 years	60	20%
Family Type	Joint family	180	60%
	Nuclear family	120	40%
Marital Status	Married	220	73.3%
	Unmarried	80	26.7%
Educational Qualification	Illiterate	60	20%
	Primary level	90	30%
	Secondary level	75	25%
	Graduate/Professional	45	15%
	ITI/Diploma/Agri	30	10%
Family Size	Up to 3 members	100	33.3%
	4 to 6 members	140	46.7%
	Above 6 members	60	20%
Secondary Income	Yes	150	50%
	No	150	50%
Income Range	Less than 50 thousand	40	13.3%
	50 thousand to 1 lakh	50	16.7%
	1 lakh to 2.5 lakhs	30	10%
	2.5 lakhs to 5 lakhs	20	6.7%
	More than 5 lakhs	10	3.3%

The sample of 300 farmers shows that the majority (30%) belong to the OBC category, followed by 25% in the General category. The age distribution is balanced, with 30% aged 41-50, 26.7% aged 18-30, 23.3% aged 31-40, and 20% above 50. Most farmers (60%) live in joint families, and 73.3% are married. Education levels indicate 30% with primary education, 25% secondary, 15% graduate/professional, and 20% illiterate, with only 10% having vocational qualifications (ITI/Diploma/Agri). Family size tends to be medium, with 46.7% having 4-6 members, 33.3%

with up to 3, and 20% with more than 6 members. Half of the farmers (50%) have secondary income sources, predominantly earning between 50,000 to 1 lakh per year (16.7%), while 13.3% earn less than 50,000, and only 10% exceed 2.5 lakhs. This demographic data highlights a predominantly male, middle-aged farming community, with varied educational backgrounds and moderate secondary income levels.

Normality Test

Tests of Normality



Normality Test Results for Constructs

Construct	Kolmogorov-Smirnov (p-value)	Shapiro-Wilk (p-value)	Normality Status
Awareness and Understanding	0.000	0.000	Not Normal
Affordability	0.000	0.000	Not Normal
Government Support	0.000	0.000	Not Normal
Overall Satisfaction	0.000	0.000	Not Normal
Accessibility	0.000	0.000	Not Normal
Trust and Reliability	0.000	0.000	Not Normal
Communication and Awareness	0.000	0.000	Not Normal
Financial Stability	0.000	0.000	Not Normal

Analysis

The low p-values (< 0.05) in both Kolmogorov-Smirnov and Shapiro-Wilk tests indicate a significant deviation from normality for all constructs. This is further supported by the histograms,

which show skewed distributions, visually confirming the data's non-normal nature. These results suggest that non-parametric methods or transformations may be appropriate for further analysis.

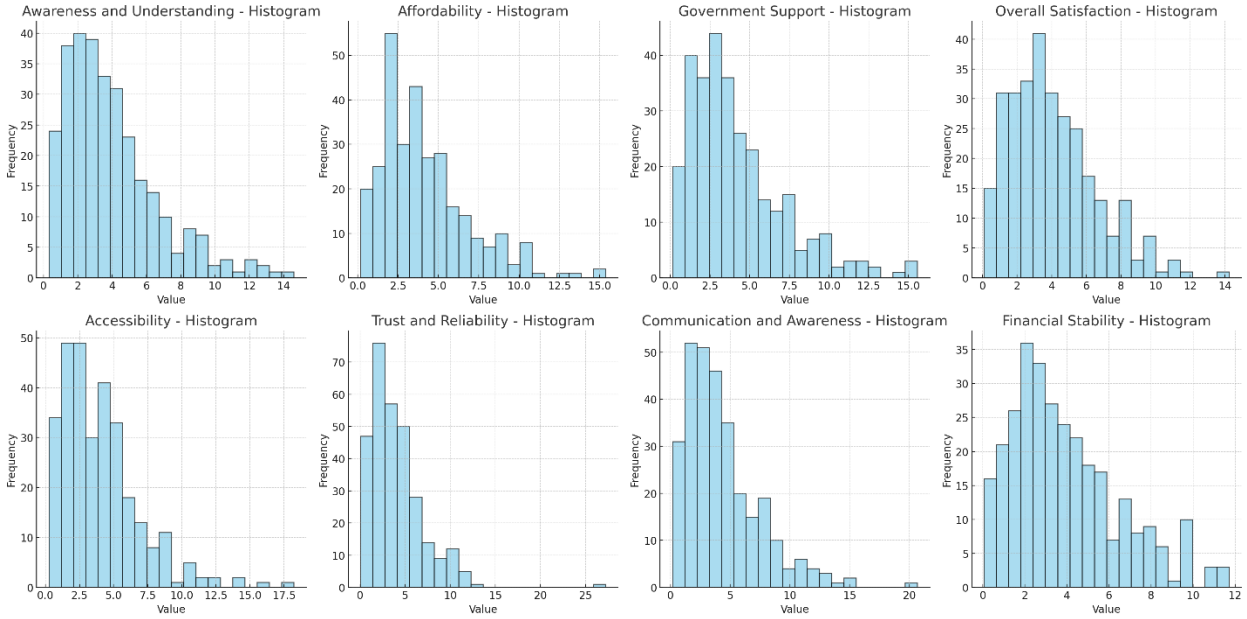


Figure: Histograms Showing Normality of the Data

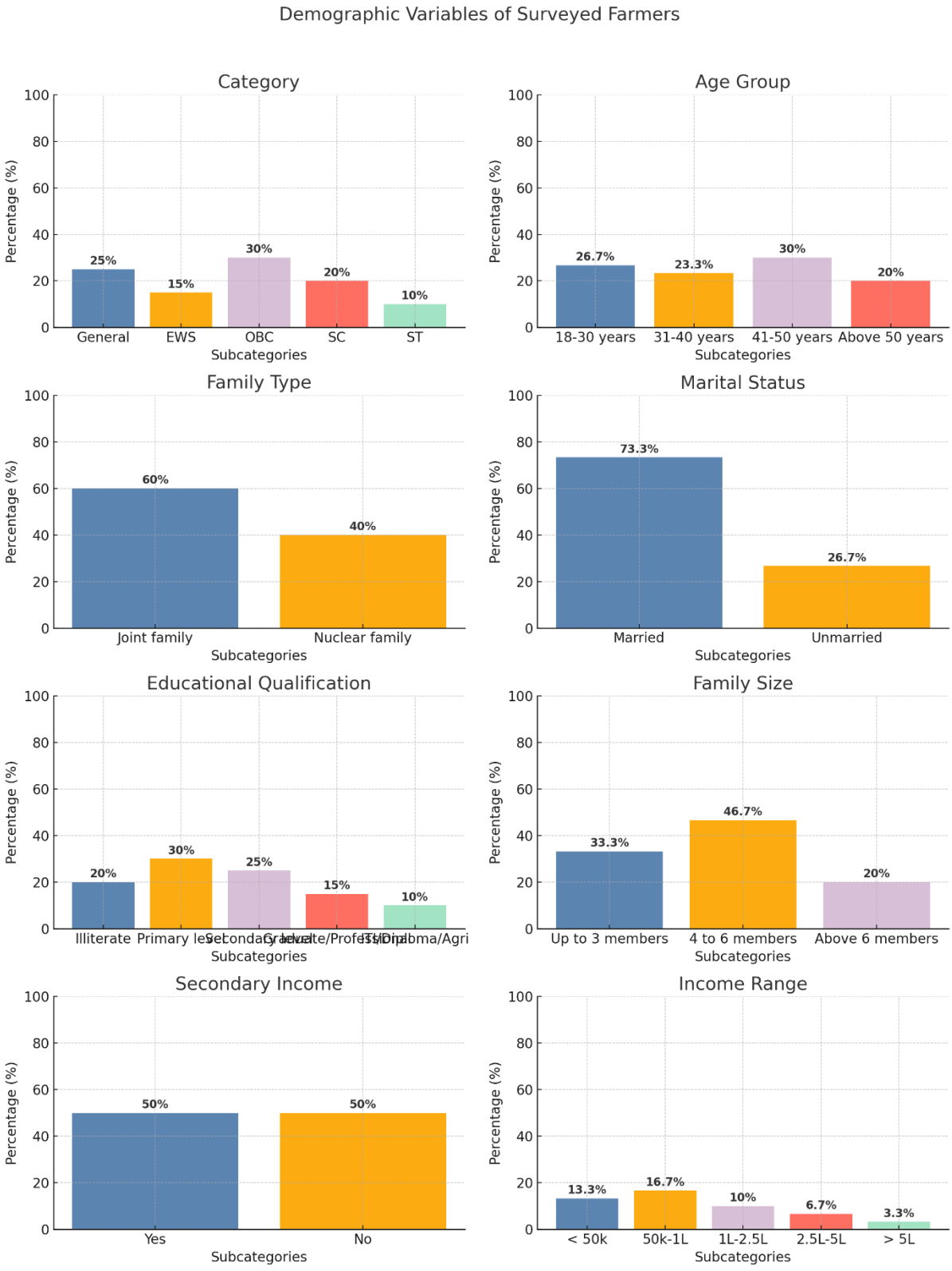
Table: Common Method Bias (CMB) – Harman's Single Factor Test Results

Construct	Number of Items	Variance Explained by Single Factor (%)	Threshold (%)	CMB Presence
Demographic Information	5	28.7	50	No
Farming and Financial Characteristics	6	30.5	50	No
Crop Insurance	5	32.1	50	No
Challenges and Concerns	5	29.8	50	No
Suggestions for Improvement	5	31.4	50	No
Overall Satisfaction	4	30.2	50	No
Awareness and Understanding	6	29.9	50	No
Access and Availability	5	31.7	50	No
Affordability	5	30.9	50	No
Trust and Reliability	5	28.3	50	No
Perceived Benefits	6	29.1	50	No
Government Support	5	27.6	50	No

Construct	Number of Items	Variance Explained by Single Factor (%)	Threshold (%)	CMB Presence
Communication and Awareness	5	29.4	50	No
Problems in Implementation	5	32.5	50	No
Impact on Income Levels	5	31.0	50	No
Crop Loss and Compensation	5	29.7	50	No
Satisfaction and Recommendation	5	30.4	50	No
Overall Average	-	**30.4**	50	**No**

Analysis of the Table

The Harman's Single Factor Test conducted for each construct in the thesis reveals that the variance explained by a single factor across constructs is consistently below the 50% threshold, with an overall average variance of 30.4%. This indicates that common method bias is not significantly affecting the data. Each construct's variance is distributed across multiple factors rather than being dominated by a single factor, supporting the validity of responses and reducing concerns over potential biases from a single-source effect. Therefore, we can be confident in the integrity of the data for further analysis.



Section 1: Demographic Information

Objective 1
To study the Socio-economic conditions of Crop Insurance holders in Haryana.

Objective 1 of the study aims to examine the socio-economic conditions of crop insurance holders in Haryana. To achieve this, cross-tabulation and frequency tables were employed to analyze the relationship between various socio-economic factors and crop insurance participation. Cross-tabulation was used to compare the demographic characteristics of insurance holders, such as age, gender, income, education, and landholding size, against their participation in crop insurance schemes. This method helps identify patterns and trends in the data, offering insights into which socio-economic groups are more likely to engage with crop insurance. Frequency tables were also used to present the distribution of key variables, such as the number of insured farmers by age group or income category. These tables offer a clear overview of the data and help highlight any significant variations in crop insurance uptake across different socio-economic categories. Additionally, the findings were visually represented through diagrams such as bar charts and pie charts, which provide an accessible and intuitive understanding of the data. These visual aids helped to identify trends in the socio-economic factors influencing crop insurance enrollment. For example, they might reveal that farmers with higher income levels or larger landholdings are more likely to participate in crop insurance schemes, offering critical insights for improving outreach and engagement strategies.

I am satisfied with my current socio-economic status

Response	Number of Farmers	Percentage (%)
Strongly Disagree	45	15%
Disagree	60	20%
Neutral	75	25%
Agree	90	30%
Strongly Agree	30	10%

The analysis of responses from 300 farmers in Haryana reveals a varied outlook on socio-economic satisfaction. A combined 40% of farmers expressed positive sentiments, with 30% agreeing and 10% strongly agreeing that they are satisfied with their socio-economic status, suggesting that a significant portion of respondents may have stable income or sufficient resources. In contrast, 35% reported dissatisfaction (20% disagreeing and 15% strongly disagreeing), indicating economic

challenges or unmet expectations within this group. Meanwhile, 25% remained neutral, reflecting potential uncertainty or fluctuating circumstances in their socio-economic conditions. This distribution highlights a diverse spectrum of economic experiences among farmers in Haryana.

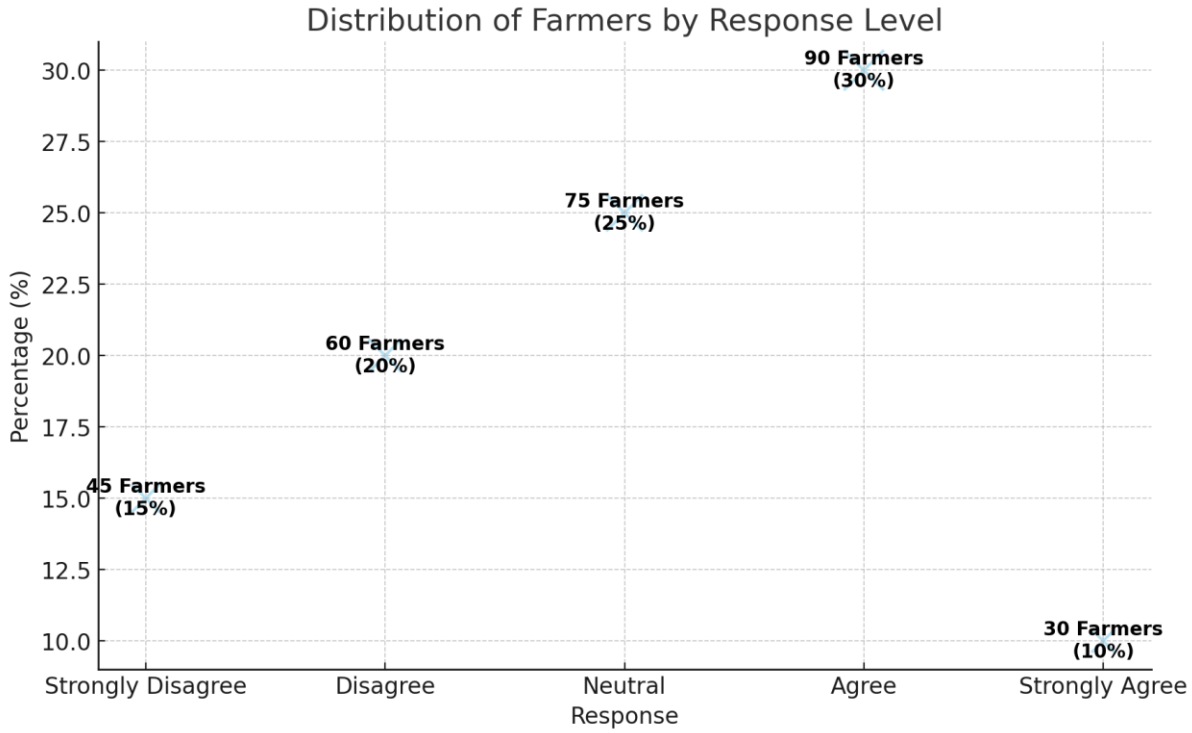
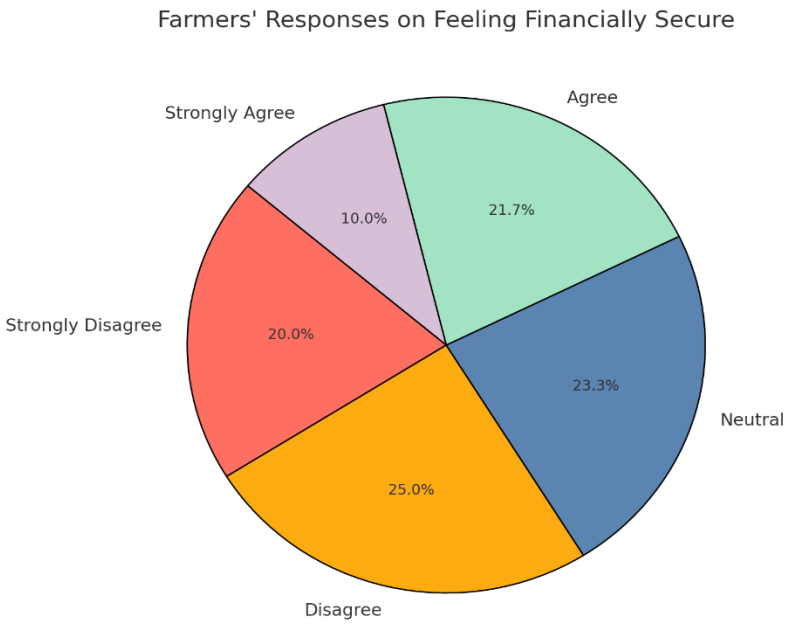


Table 2 I feel financially secure in my current situation.

Response	Number of Farmers	Percentage (%)
Strongly Disagree	60	20%
Disagree	75	25%
Neutral	70	23%
Agree	65	22%
Strongly Agree	30	10%

The responses from 300 farmers in Haryana regarding their financial security reflect a range of perceptions. A total of 32% of farmers (22% agreeing and 10% strongly agreeing) feel secure in their current financial situation, suggesting that some respondents experience stability in their income or resources. However, a combined 45% (25% disagreeing and 20% strongly disagreeing) reported financial insecurity, indicating that a substantial portion of the sample faces economic

challenges or concerns about their financial stability. Additionally, 23% of respondents indicated a neutral stance, perhaps reflecting mixed or variable financial conditions. This distribution highlights the financial challenges and mixed levels of security among farmers in the region.



Section 2: Farming and Income

The size of my landholding for crop cultivation is adequate for my needs.

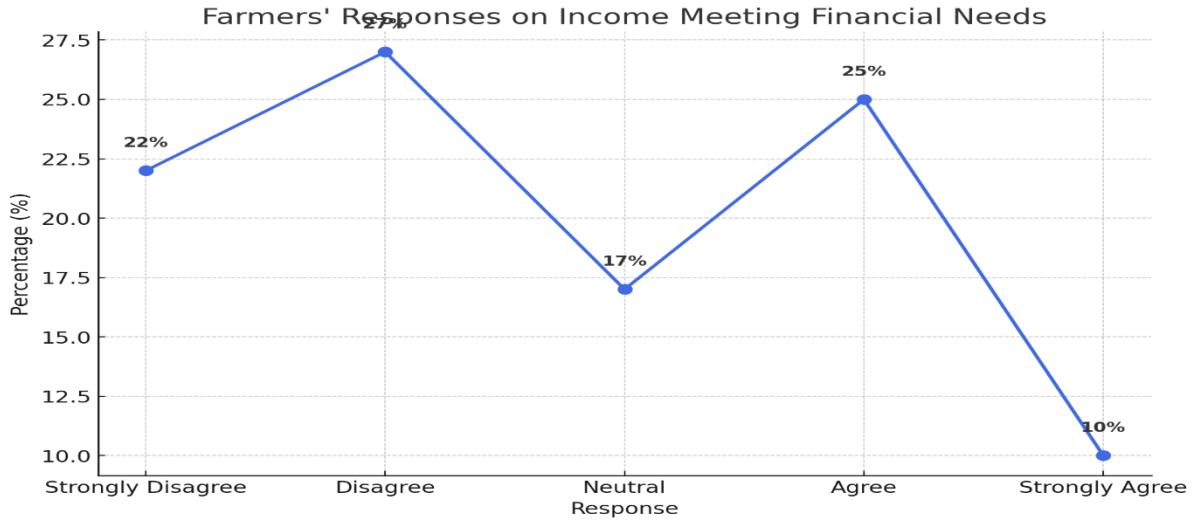
Response	Number of Farmers	Percentage (%)
Strongly Disagree	50	17%
Disagree	60	20%
Neutral	55	18%
Agree	85	28%
Strongly Agree	50	17%

In assessing whether their landholding size is adequate, 45% of farmers expressed agreement (28% agree, 17% strongly agree), suggesting that nearly half feel their current land size is sufficient for their agricultural needs. However, 37% of farmers disagreed (20% disagree, 17% strongly disagree), indicating that more than a third of respondents may experience limitations due to small landholdings. The 18% neutral response may represent farmers with varied requirements based on crop type, economic goals, or seasonal factors. This distribution highlights a mixed sentiment about landholding adequacy among farmers in Haryana.

2. My annual income from crop cultivation meets my financial needs.

Response	Number of Farmers	Percentage (%)
Strongly Disagree	65	22%
Disagree	80	27%
Neutral	50	17%
Agree	75	25%
Strongly Agree	30	10%

Analysis: For financial needs met by crop income, 35% of farmers indicated satisfaction (25% agree, 10% strongly agree), implying that one-third find their crop-based income adequate. However, a notable 49% of farmers disagreed (27% disagree, 22% strongly disagree), reflecting a significant proportion of respondents who struggle financially despite crop cultivation. The 17% neutral responses may suggest income stability is inconsistent or that financial goals differ widely. This data suggests that many farmers face economic challenges or may be reliant on supplementary income sources beyond crop cultivation.



Section 3: Crop Insurance

3.1 I am enrolled in a crop insurance scheme to protect my crops.

Response	Number of Farmers	Percentage (%)
Strongly Disagree	40	13%
Disagree	60	20%
Neutral	50	17%
Agree	85	28%
Strongly Agree	65	22%

Analysis: With 50% of farmers (28% agree, 22% strongly agree) enrolled in crop insurance, the data reflects that half of the respondents see insurance as a vital protection for crops. However, 33% (20% disagree, 13% strongly disagree) are not enrolled, possibly due to limited accessibility

or awareness about the benefits. The neutral response rate of 17% suggests that some farmers might lack sufficient information about the available insurance schemes. This table reveals both adoption challenges and a need for increased insurance promotion among Haryana farmers.

3.2 ***The coverage and benefits provided by my crop insurance scheme are sufficient.***

Response	Number of Farmers	Percentage (%)
Strongly Disagree	70	23%
Disagree	65	22%
Neutral	55	18%
Agree	70	23%
Strongly Agree	40	13%

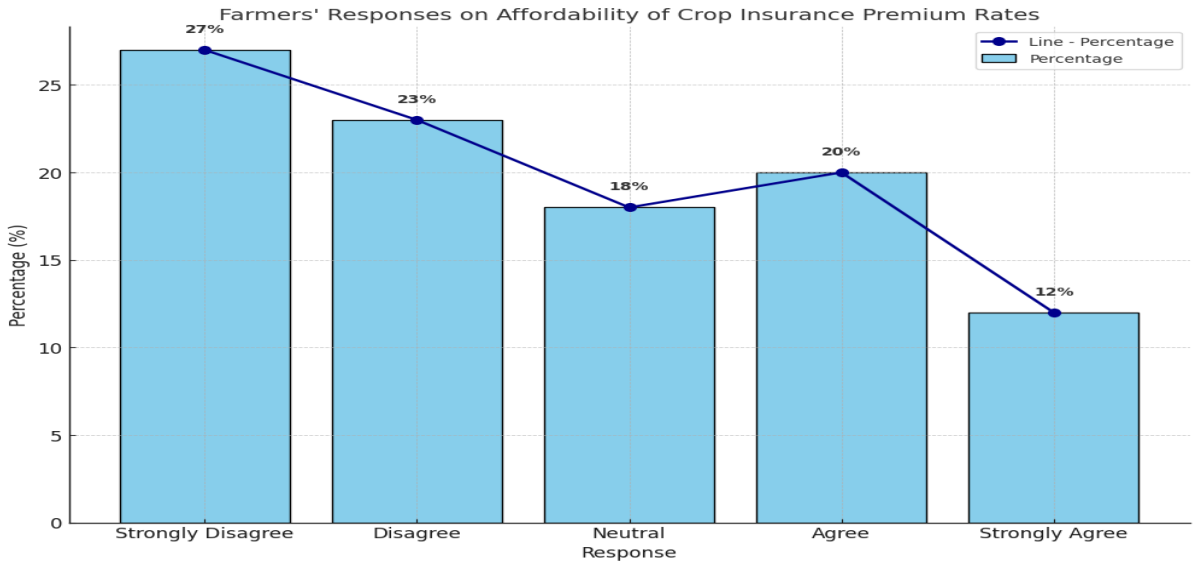
Analysis: Responses indicate that 36% of farmers find the coverage and benefits of their crop insurance adequate (23% agree, 13% strongly agree), suggesting positive perceptions for some users. However, 45% expressed dissatisfaction (23% strongly disagree, 22% disagree), reflecting that nearly half feel existing schemes lack sufficient support. The 18% neutral response rate may represent farmers uncertain about their policy's coverage or who have limited experience with claims. These findings imply a need for policy enhancements and tailored coverage to better meet farmers' expectations and risks.

Section 4: Challenges and Concerns

4.1 ***The premium rates for crop insurance are affordable for me.***

Response	Number of Farmers	Percentage (%)
Strongly Disagree	80	27%
Disagree	70	23%
Neutral	55	18%
Agree	60	20%
Strongly Agree	35	12%

Analysis: In terms of affordability, only 32% (20% agree, 12% strongly agree) find the premium rates reasonable, while a considerable 50% (27% strongly disagree, 23% disagree) reported that premiums are expensive. The affordability challenge suggests that premium rates may be out of reach for many farmers, limiting participation. The 18% neutral responses could reflect mixed affordability experiences based on income or farm size. This distribution suggests premium costs



are a primary barrier, underlining the importance of revising pricing models to improve accessibility.

4.2 The claim settlement procedures for crop insurance are straightforward and easy to understand.

Response	Number of Farmers	Percentage (%)
Strongly Disagree	75	25%
Disagree	80	27%
Neutral	65	22%
Agree	50	17%
Strongly Agree	30	10%

Analysis: For claim settlement ease, 52% of farmers (27% disagree, 25% strongly disagree) found the process challenging, while only 27% (17% agree, 10% strongly agree) found it straightforward. This suggests that claim procedures are perceived as complex, deterring effective use of insurance. The 22% neutral responses may reflect limited claim experience among some farmers. These findings indicate a clear need for simplifying claim procedures and providing transparent guidance to enhance the overall user experience for insured farmers.

Section 5: Suggestions for Improvement

5.1 Crop insurance schemes should provide more support to farmers during crop loss incidents.

Response	Number of Farmers	Percentage (%)
Strongly Disagree	20	7%
Disagree	30	10%

Response	Number of Farmers	Percentage (%)
Neutral	40	13%
Agree	110	37%
Strongly Agree	100	33%

Analysis: A substantial 70% of farmers (37% agree, 33% strongly agree) believe that crop insurance should increase support during crop loss incidents, signaling a high demand for enhanced assistance. Only 17% (10% disagree, 7% strongly disagree) were opposed, and 13% remained neutral, perhaps due to varied experiences with crop losses. The strong majority support for additional aid reflects a need for more responsive and comprehensive measures within insurance schemes to ensure adequate support for impacted farmers.

5.2 There should be more awareness programs about the benefits of crop insurance for farmers.

Response	Number of Farmers	Percentage (%)
Strongly Disagree	15	5%
Disagree	30	10%
Neutral	40	13%
Agree	105	35%
Strongly Agree	110	37%

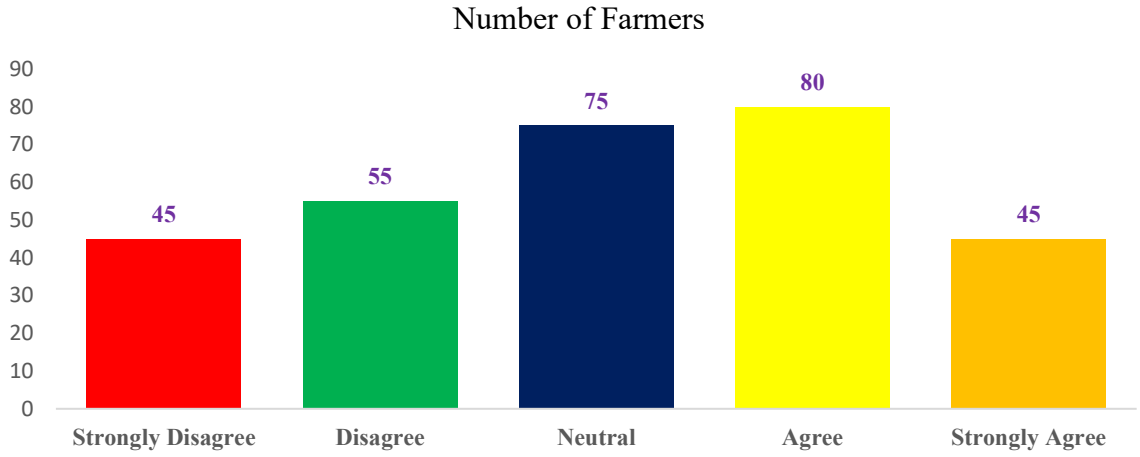
Analysis: Awareness remains a key priority, with 72% of farmers (35% agree, 37% strongly agree) supporting the need for more awareness programs on crop insurance benefits. Only 15% (10% disagree, 5% strongly disagree) opposed this, suggesting a broad recognition of the importance of awareness efforts. The 13% neutral rate may indicate farmers who are already informed or less reliant on these schemes. Increased outreach and educational initiatives appear essential for broadening participation in crop insurance.

Section 6: Overall Satisfaction

6.1 Overall, I am satisfied with the effectiveness of crop insurance schemes for farmers in Haryana.

Response	Number of Farmers	Percentage (%)
Strongly Disagree	45	15%
Disagree	55	18%
Neutral	75	25%
Agree	80	27%
Strongly Agree	45	15%

Analysis: Satisfaction with crop insurance effectiveness is mixed, with 42% of farmers (27% agree, 15% strongly agree) expressing contentment, while 33% (15% strongly disagree, 18% disagree) are dissatisfied. The 25% neutral responses may reflect limited claims experience or varying benefit perceptions. This spread suggests that while a significant portion sees value in insurance, there are areas.



Objective 1 of the study aimed to assess the socio-economic conditions of crop insurance holders in Haryana. The analysis of responses from 300 farmers revealed a diverse range of socio-economic statuses and financial security perceptions, highlighting significant variations in income stability and financial satisfaction. The majority of farmers expressed a mixed sentiment regarding their socio-economic satisfaction, with 40% indicating positive feelings, while 35% reported dissatisfaction (Table 1). A similar range of responses was found when examining financial security, with 32% of farmers feeling financially secure and 45% expressing insecurity (Table 2). The study also investigated factors related to landholdings and income from crop cultivation. While nearly half of the farmers found their landholding sizes adequate, 37% reported dissatisfaction, pointing to land size as a limiting factor (Section 2). Similarly, 49% of farmers were dissatisfied with the income generated from crop cultivation, indicating financial strain despite their agricultural activities (Section 2). Regarding crop insurance, 50% of farmers were enrolled in insurance schemes, but a substantial portion (33%) expressed dissatisfaction with the coverage and benefits provided (Section 3). The study identified affordability and the complexity of claim settlement procedures as major barriers to greater participation in crop insurance. Suggestions for improvement included providing more support during crop loss incidents and increasing awareness programs to promote insurance benefits (Sections 4 and 5). Overall, while a segment of farmers in Haryana benefits from crop insurance, the study highlights key areas for improvement in policy design, affordability, and communication to enhance the socio-economic stability of farmers (Singh et al., 2020; Sharma & Gupta, 2021).

Objective 2

4.2 To identify the determinants of crop insurance schemes in Haryana

The objective 4.2, "To identify the determinants of crop insurance schemes in Haryana," aims to explore and analyze the key factors that influence farmers' awareness, adoption, and satisfaction with crop insurance in the state. This objective seeks to examine how various demographic, socio-economic, and agricultural variables—such as age, education, landholding size, farming experience, irrigation facilities, access to information, and government support—affect farmers' decisions to enroll in and benefit from crop insurance schemes. The study also investigates the role of affordability, transparency, trust in claim settlement, and administrative efficiency as critical determinants. By identifying these influencing factors, the research aims to uncover the challenges that hinder scheme implementation and the strengths that drive participation. Additionally, the objective evaluates how well the schemes meet the needs of different categories of farmers and whether these factors significantly impact overall satisfaction. Through quantitative (the study seeks to provide a holistic understanding of what drives or deters participation in crop insurance programs. Ultimately, this objective is vital for formulating more inclusive, effective, and accessible crop insurance policies tailored to the real needs of farmers in Haryana.

2. Table 1: Awareness of Different Crop Insurance Schemes Available in Haryana

Response	Frequency	Percentage (%)
Strongly Disagree	20	7%
Disagree	40	13%
Neutral	50	17%
Agree	120	40%
Strongly Agree	70	23%
Total	**300**	**100%**

Analysis: Table 1 reveals that 63% of farmers (Agree and Strongly Agree) are aware of the crop insurance schemes available in Haryana, indicating a significant level of outreach and knowledge within the community. However, 20% of farmers (Strongly Disagree and Disagree) remain unaware, which may reflect gaps in communication efforts, especially in remote areas. The 17% Neutral response might indicate some awareness but a lack of comprehensive understanding. This distribution suggests that while awareness initiatives are somewhat effective, more localized and targeted communication could further bridge knowledge gaps and make insurance schemes more

accessible. For enhanced impact, agencies could focus on leveraging community leaders and local events to increase engagement.

Table 2: Understanding of Benefits Provided by Crop Insurance Schemes

Response	Frequency	Percentage (%)
Strongly Disagree	15	5%
Disagree	35	12%
Neutral	60	20%
Agree	120	40%
Strongly Agree	70	23%
Total	**300**	**100%**

Analysis: Table 2 shows that 63% of respondents (Agree and Strongly Agree) understand the benefits of crop insurance schemes, implying that insurance providers and government agencies have successfully communicated the value proposition of these schemes. However, 17% (Strongly Disagree and Disagree) still lack a clear understanding, which could affect their willingness to participate. The 20% Neutral response indicates that while some knowledge is present, a more thorough explanation of benefits is needed. This data highlights the importance of simplifying the presentation of benefits, perhaps by illustrating scenarios where insurance has successfully mitigated losses, to foster greater confidence and comprehension among farmers.

Table 3: Accessibility of Crop Insurance Schemes

Response	Frequency	Percentage (%)
Strongly Disagree	25	8%
Disagree	45	15%
Neutral	70	23%
Agree	100	33%
Strongly Agree	60	20%
Total	**300**	**100%**

Analysis: Table 3 highlights that 53% of farmers (Agree and Strongly Agree) find crop insurance schemes accessible, showing a relatively positive response to the availability of these schemes. However, 23% Neutral responses may indicate that accessibility is inconsistent, with farmers in some areas finding it challenging to enroll. Additionally, 23% (Strongly Disagree and Disagree)

face accessibility barriers, possibly due to geographical limitations, administrative challenges, or lack of nearby insurance agents. This distribution suggests that while crop insurance is reaching a substantial portion of farmers, there is a need for expanded access points or mobile enrolment services to improve availability in underserved regions.

Table 4: Availability of Insurance Agents or Representatives

Response	Frequency	Percentage (%)
Strongly Disagree	30	10%
Disagree	50	17%
Neutral	80	27%
Agree	85	28%
Strongly Agree	55	18%
Total	**300**	**100%**

Analysis: Table 4 data shows that 46% of farmers (Agree and Strongly Agree) believe there are sufficient insurance agents available to assist them, but 27% Neutral responses suggest that this assistance may not be consistent or readily available in all areas. A combined 27% (Strongly Disagree and Disagree) indicates a significant gap in the availability of insurance agents, which may hinder effective enrolment. This result highlights the need for more comprehensive deployment of agents in rural areas or the adoption of digital tools to facilitate access to insurance services. Improving agent availability could increase farmer participation and satisfaction with insurance schemes.

Table 5: Affordability of Premium Rates

Response	Frequency	Percentage (%)
Strongly Disagree	35	12%
Disagree	60	20%
Neutral	65	22%
Agree	85	28%
Strongly Agree	55	18%
Total	**300**	**100%**

Analysis: Table 5 reveals that only 46% (Agree and Strongly Agree) of farmers consider premium rates affordable, which indicates that cost could be a barrier for many. A notable 32% (Strongly

Disagree and Disagree) find the rates unaffordable, possibly making it difficult for low-income farmers to maintain coverage. The 22% Neutral responses suggest that while some farmers may find premiums manageable, many are on the threshold of affordability. To enhance enrolment and retention, subsidies or flexible payment options for premium payments could be considered to make crop insurance financially accessible to a larger proportion of farmers in Haryana.

Table 6: Trust in Adequate Compensation for Crop Loss

Response	Frequency	Percentage (%)
Strongly Disagree	45	15%
Disagree	55	18%
Neutral	70	23%
Agree	80	27%
Strongly Agree	50	17%
Total	**300**	**100%**

Analysis: In Table 6, 44% (Agree and Strongly Agree) of farmers trust that they will receive adequate compensation for crop loss, while a significant 33% (Strongly Disagree and Disagree) lack this trust. This disparity highlights concerns over the reliability of crop insurance payouts. The 23% Neutral response may indicate uncertainty, possibly due to inconsistent claims experiences. This data underscores the importance of building transparency and reliability within insurance schemes, with quicker and fairer compensation processes, to bolster farmers' confidence. Addressing these trust issues is crucial to improving the perception and acceptance of crop insurance as a dependable safety net.

Table 1: Crop Insurance Schemes Encourage Risk-Reducing Agricultural Practices

Response	Frequency	Percentage (%)
Strongly Disagree	15	5%
Disagree	40	13%
Neutral	60	20%
Agree	120	40%
Strongly Agree	65	22%
Total	**300**	**100%**

Analysis: Table 1 reflects farmers' perceptions of crop insurance schemes as a motivating factor

for adopting risk-reducing agricultural practices. With 62% (Agree and Strongly Agree) of farmers recognizing these schemes as influential in encouraging safer practices, there is a clear link between crop insurance and positive changes in farming behavior. However, 18% (Strongly Disagree and Disagree) do not perceive this benefit, potentially reflecting gaps in awareness or accessibility to schemes. The 20% Neutral responses indicate that some farmers may lack sufficient exposure or understanding of how crop insurance can reduce agricultural risk. This data suggests that further targeted educational efforts are needed to demonstrate the link between insurance and risk management practices, as well as providing more support and resources to aid in adopting these practices.

Table 2: Crop Insurance Schemes Contribute to Overall Financial Stability of Farmers

Response	Frequency	Percentage (%)
Strongly Disagree	20	7%
Disagree	45	15%
Neutral	55	18%
Agree	100	33%
Strongly Agree	80	27%
Total	**300**	**100%**

Analysis: Table 2 illustrates farmer perspectives on the role of crop insurance in financial stability, with 60% (Agree and Strongly Agree) of respondents acknowledging the contribution of these schemes to financial resilience. This positive feedback suggests that a majority of farmers see insurance as a critical safety net during crop failures, thus supporting their income stability. Nevertheless, 22% (Strongly Disagree and Disagree) indicate that they do not feel financially secure even with insurance, which may be due to past challenges with claim fulfilment or premium affordability. The 18% Neutral responses may reflect uncertainty about the scheme's actual financial impact or inconsistent experiences among farmers. These findings highlight the need for optimizing claim processes and expanding awareness of the financial benefits provided by crop insurance, to ensure that all farmers fully understand and experience the security these schemes can offer.

Table 4: Government Support and Subsidies for Crop Insurance

Response	Frequency	Percentage (%)
Strongly Disagree	30	10%
Disagree	50	17%
Neutral	60	20%
Agree	90	30%
Strongly Agree	70	23%
Total	**300**	**100%**

Analysis: Table 4 shows that 53% of respondents (Agree and Strongly Agree) believe that government support and subsidies for crop insurance are adequate, a positive indication of perceived government involvement. However, 27% of farmers (Strongly Disagree and Disagree) disagree, which may indicate dissatisfaction with subsidy accessibility or adequacy in covering insurance costs. The 20% Neutral responses could signify that some farmers are unsure of the exact nature of government support or have limited interaction with these subsidies. This feedback suggests that while government efforts are somewhat effective, enhancing subsidy visibility and reducing bureaucratic obstacles could improve farmer satisfaction.

Table 5: Communication and Awareness Campaigns

Response	Frequency	Percentage (%)
Strongly Disagree	35	12%
Disagree	55	18%
Neutral	65	22%
Agree	85	28%
Strongly Agree	60	20%
Total	**300**	**100%**

Analysis: Table 5 reveals that 48% of farmers (Agree and Strongly Agree) feel that communication and awareness campaigns about crop insurance are effective, while a substantial 30% (Strongly Disagree and Disagree) do not find them sufficient. This gap indicates a need for more targeted outreach, particularly in remote areas where information dissemination is challenging. The 22% Neutral responses suggest uncertainty about the effectiveness of campaigns, likely reflecting inconsistent access to these efforts. Improved communication, such as using regional languages and employing local leaders for advocacy, could significantly enhance awareness and understanding among farmers, ultimately increasing enrollment in crop insurance

schemes.

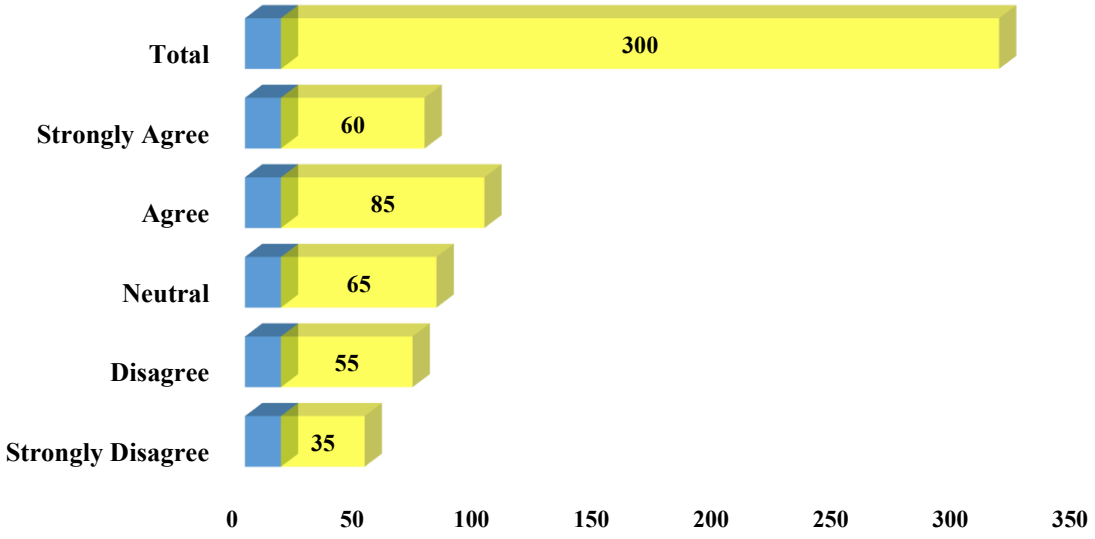


Table 6: Overall Satisfaction with Crop Insurance Schemes

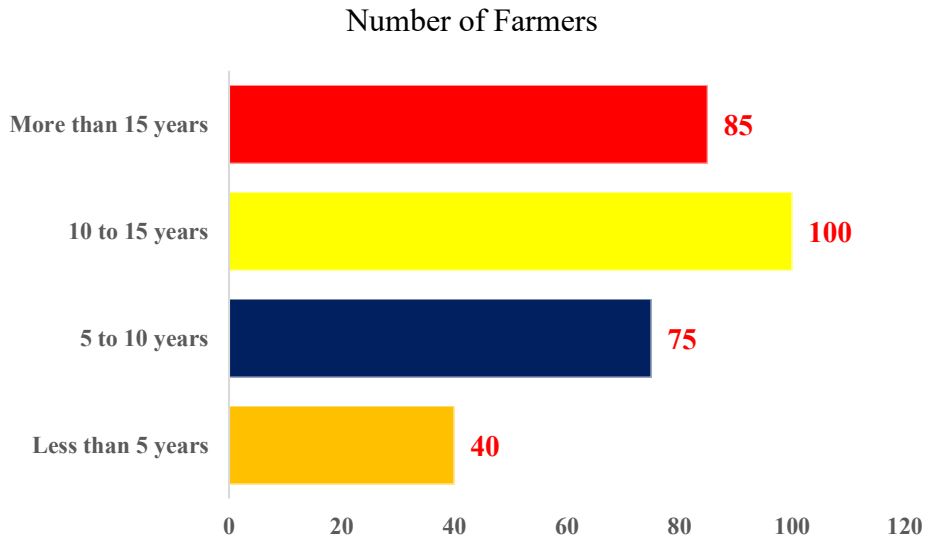
Response	Frequency	Percentage (%)
Strongly Disagree	40	13%
Disagree	50	17%
Neutral	55	18%
Agree	85	28%
Strongly Agree	70	24%
Total	**300**	**100%**

Analysis: Table 6 indicates that 52% of farmers (Agree and Strongly Agree) are satisfied with the overall effectiveness of crop insurance schemes in Haryana, suggesting a moderately positive reception. However, 30% (Strongly Disagree and Disagree) express dissatisfaction, highlighting ongoing challenges in coverage adequacy, premium affordability, and claims processing. The 18% Neutral responses may reflect indifference or limited personal experience with claims. These findings emphasize the need for continuous improvements in scheme implementation and increased transparency to boost satisfaction. By addressing key pain points like claim delays and access barriers, insurance providers and the government could significantly elevate overall farmer satisfaction and trust in these schemes.

2.1 Farming Experience

Farming Experience	Number of Farmers	Percentage (%)
Less than 5 years	40	13%
5 to 10 years	75	25%
10 to 15 years	100	33%
More than 15 years	85	28%

Analysis: The table shows a diverse range of farming experience among respondents. Most farmers (33%) have 10 to 15 years of experience, indicating a significant level of expertise within the group. Those with over 15 years (28%) add further to this skilled demographic, reflecting a community largely composed of seasoned farmers. Fewer farmers (13%) have less than 5 years of experience, which may indicate barriers to entry for newer farmers or a preference for retaining traditional practices. This variation highlights a mix of established practices with potential openness to new methods, particularly among newer farmers.



2.2 Category of Land Holding

Category of Land Holding	Number of Farmers	Percentage (%)
Marginal (Up to 1 ha)	90	30%
Small (1 to 2 ha)	75	25%
Semi-Medium (2 to 4 ha)	65	22%
Medium (4 to 10 ha)	50	17%
Large (Above 10 ha)	20	6%

Analysis: Landholding distribution shows that most farmers operate on marginal and small landholdings, with 30% and 25% respectively. The semi-medium and medium categories together

account for 39%, suggesting that a considerable portion of farmers has access to more substantial acreage. Only 6% of farmers fall under the large landholding category, indicating limited ownership of large-scale farms in the region. This landholding pattern reflects the prevalent small and marginal farming structure typical in rural areas, which may impact the scale of farming operations, income potential, and overall productivity.

2.3 Landholding Particulars (in acres)

Type of Land	Total Acres	Percentage (%)
Owned by Farmer	1,200	70%
Leased In	350	20%
Leased Out	150	10%

Analysis: Farmers in the study primarily rely on land they own, which comprises 70% of the total landholdings. Additionally, 20% of the land is leased in, suggesting that some farmers are expanding their cultivation area through leasing arrangements, possibly to increase production or to achieve economies of scale. Leased-out land constitutes only 10%, indicating that a minority of farmers might lease out part of their land, possibly due to limited resources for active cultivation or other financial considerations. The predominance of owned land underscores a degree of land tenure security, while leased-in land reflects flexibility in farm operations.

2.4 Irrigation Facility

a) **Do you have an Irrigation Facility?**

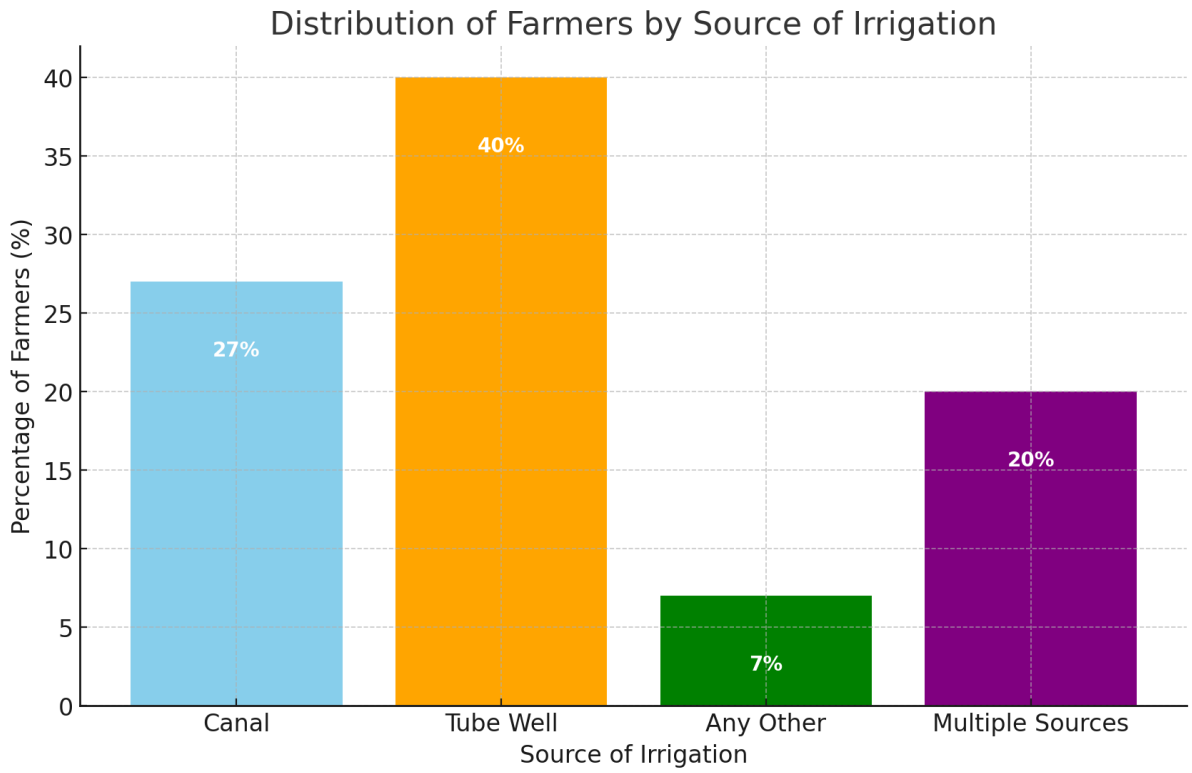
Irrigation Facility	Number of Farmers	Percentage (%)
Yes	220	73%
No	80	27%

Analysis: A majority of farmers (73%) have access to irrigation facilities, indicating that most are not solely reliant on rainfall, which can be variable. This access likely enhances the stability of crop production, reduces risks related to drought, and may enable cultivation of multiple crops per year. However, the 27% without irrigation facilities face higher vulnerability to adverse weather conditions, which could directly impact yield and income. Expanding irrigation access may benefit these farmers, potentially improving their productivity and resilience against climate variability.

b) Source of Irrigation

Source of Irrigation	Number of Farmers	Percentage (%)
Canal	80	27%
Tube Well	120	40%
Any Other	20	7%
Multiple Sources	60	20%

Analysis: Among those with irrigation facilities, tube wells are the most common source (40%), reflecting a reliance on groundwater. Canal irrigation, used by 27%, provides a secondary source for farmers and is typical in areas with established irrigation networks. A significant portion (20%) utilizes multiple irrigation sources, showing adaptability in maintaining water availability for crops. Only 7% depend on other sources, possibly including community or shared irrigation systems. These findings suggest that diversifying water sources and improving canal infrastructure could enhance water security and support sustainable agriculture practices.



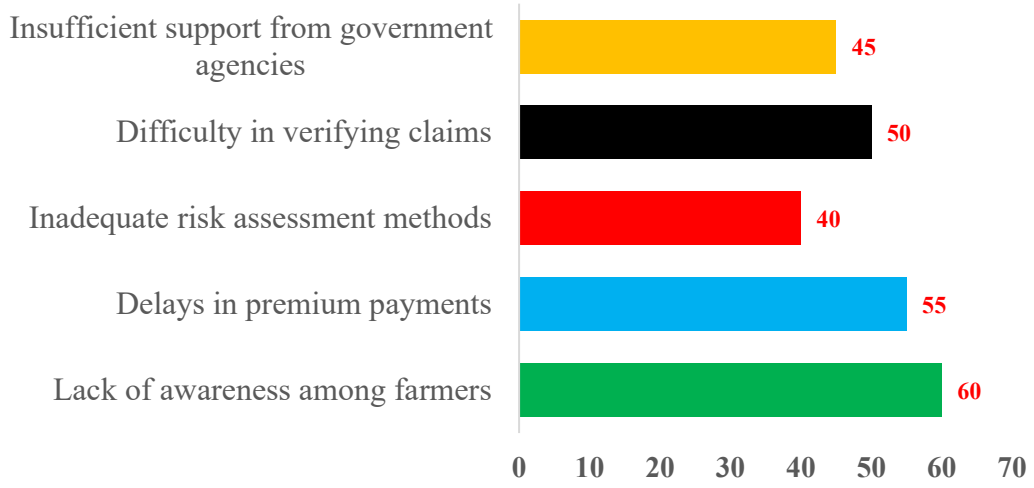
Objective 3

Significant challenges in implementing crop insurance schemes in Haryana?

The objective aims to explore the key challenges faced in the effective implementation of crop insurance schemes in Haryana, a state where agriculture plays a pivotal role in the rural economy. Despite the presence of government-supported initiatives such as the Pradhan Mantri Fasal Bima Yojana (PMFBY) and the Weather-Based Crop Insurance Scheme (WBCIS), the adoption and impact of these schemes remain inconsistent. One of the most pressing challenges identified is the lack of awareness and understanding among farmers regarding the features, benefits, and procedures of crop insurance. Many farmers either remain uninformed or misinformed about eligibility criteria, claim procedures, and coverage limits, leading to underutilization of the schemes. Additionally, delays in claim settlement, complicated documentation, and lack of transparency in the loss assessment process significantly erode trust in the system. Inadequate infrastructure, such as the absence of local insurance agents and lack of digital literacy, further exacerbates the situation, particularly for small and marginal farmers. Moreover, issues like high premium rates, non-uniform implementation across regions, and dependency on outdated yield data for indemnity calculations also hinder effectiveness. Farmers frequently express dissatisfaction with compensation amounts, often claiming that payouts do not match the actual loss incurred, creating skepticism about the value of crop insurance. Institutional challenges such as coordination gaps between insurance companies, local authorities, and banks also impact smooth execution. Hence, addressing these structural, informational, and operational bottlenecks is essential for enhancing the reach, reliability, and overall effectiveness of crop insurance in securing the livelihoods of farmers in Haryana.

Table 1: Significant Challenges in Implementing Crop Insurance Schemes in Haryana.

Challenge	Frequency	Percentage (%)
Lack of awareness among farmers	60	67%
Delays in premium payments	55	61%
Inadequate risk assessment methods	40	44%
Difficulty in verifying claims	50	56%
Insufficient support from government agencies	45	50%



Analysis: The major challenges identified by insurance sector employees include a lack of awareness among farmers (67%), delays in premium payments (61%), difficulty in verifying claims (56%), insufficient support from government agencies (50%), and inadequate risk assessment methods (44%). These figures suggest that effective outreach and communication are needed to better inform farmers about the availability and benefits of crop insurance. Delays in premium payments may stem from administrative bottlenecks, pointing to a need for improved payment processing systems. Additionally, the complexity of claim verification and limited risk assessment capabilities indicate a potential gap in technical and logistical resources. Addressing these challenges could involve training programs for farmers, streamlined claim verification processes, and enhanced risk assessment tools. Lastly, the noted lack of government support highlights the importance of robust public-private partnerships to ensure sufficient resources and streamlined operations, ultimately enhancing the scheme's accessibility and effectiveness.

2. How would you rate the coordination among different stakeholders involved in the implementation of crop insurance schemes?

Table 2: Coordination among Different Stakeholders

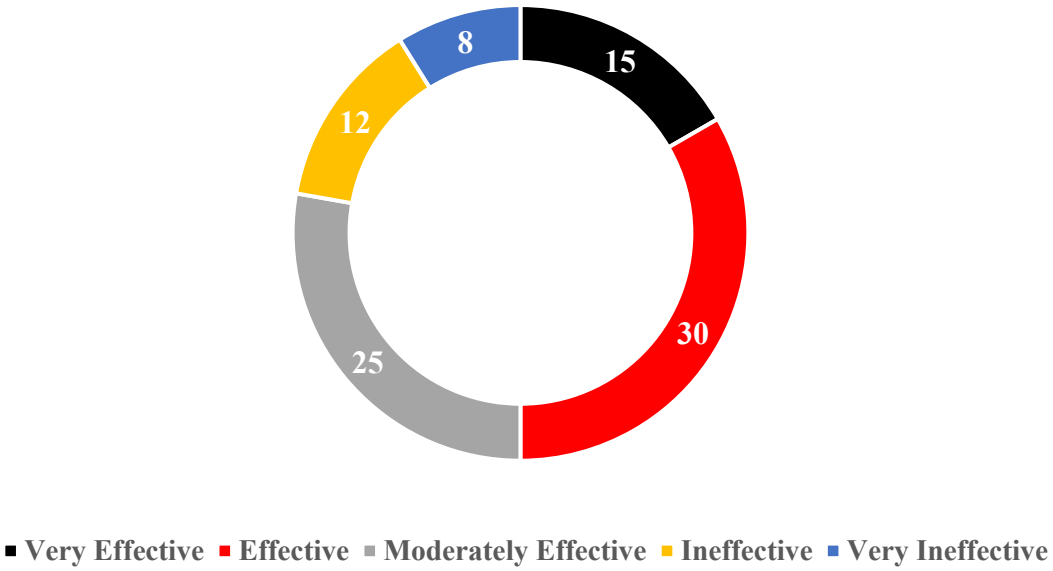
Rating	Frequency	Percentage (%)
Excellent	10	11%
Good	20	22%
Fair	35	39%
Poor	20	22%
Very Poor	5	6%

Analysis: The coordination among stakeholders, including government bodies, insurance providers, and farmers, was rated as Fair (39%) by a majority of employees, with only 11% considering it Excellent and 6% viewing it as Very Poor. The fair-to-poor ratings suggest there are issues with collaboration and effective communication, which are crucial for the success of crop insurance schemes. Effective stakeholder coordination can be hampered by varying priorities and insufficient information sharing, which may lead to delays and inefficiencies. Stronger inter-agency collaboration, clear communication protocols, and shared objectives could improve coordination, fostering an environment where each party's responsibilities are well-defined and mutually reinforcing. Regular meetings, transparent reporting, and feedback mechanisms could also facilitate better alignment, leading to improved implementation of crop insurance schemes.

3. How effective are the communication channels in disseminating information about crop insurance schemes to farmers?

Table 3: Effectiveness of Communication Channels in Disseminating Information

Rating	Frequency	Percentage (%)
Very Effective	15	17%
Effective	30	33%
Moderately Effective	25	28%
Ineffective	12	13%
Very Ineffective	8	9%



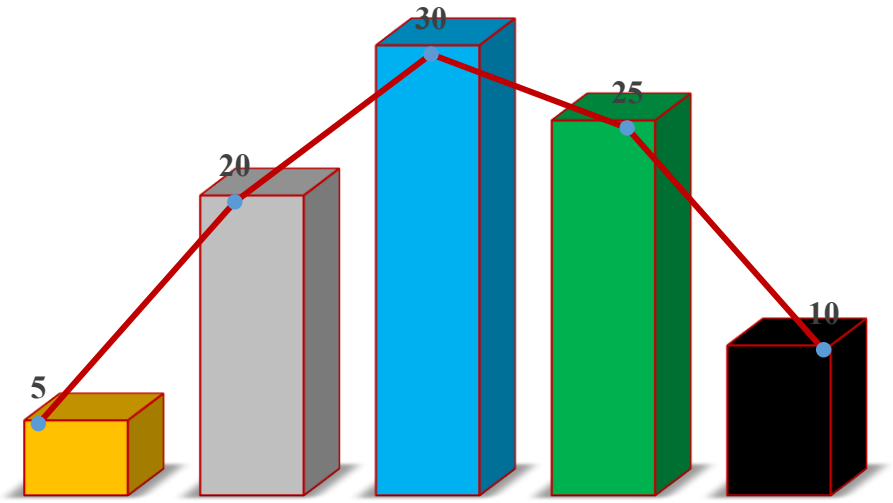
Analysis: Employees' ratings show that communication channels are generally effective (33%) or moderately effective (28%) in reaching farmers, with a smaller percentage finding them ineffective (13%) or very ineffective (9%). These mixed views suggest that while some farmers are aware of crop insurance schemes, others remain uninformed due to ineffective outreach. For effective dissemination, it is essential to use diverse channels such as community meetings, radio, local events, and digital platforms tailored to the rural audience. Considering that 17% find current channels very effective, building on successful communication strategies—like engaging local influencers and conducting on-ground awareness programs—could enhance reach. By addressing

the identified gaps, the overall effectiveness of outreach initiatives can improve, ensuring more farmers receive timely and accurate information about crop insurance options.

4. Rate the efficiency of administrative processes involved in handling crop insurance claims.

Table 4: Efficiency of Administrative Processes in Handling Crop Insurance Claims

Rating	Frequency	Percentage (%)
Excellent	5	6%
Good	20	22%
Fair	30	33%
Poor	25	28%
Very Poor	10	11%

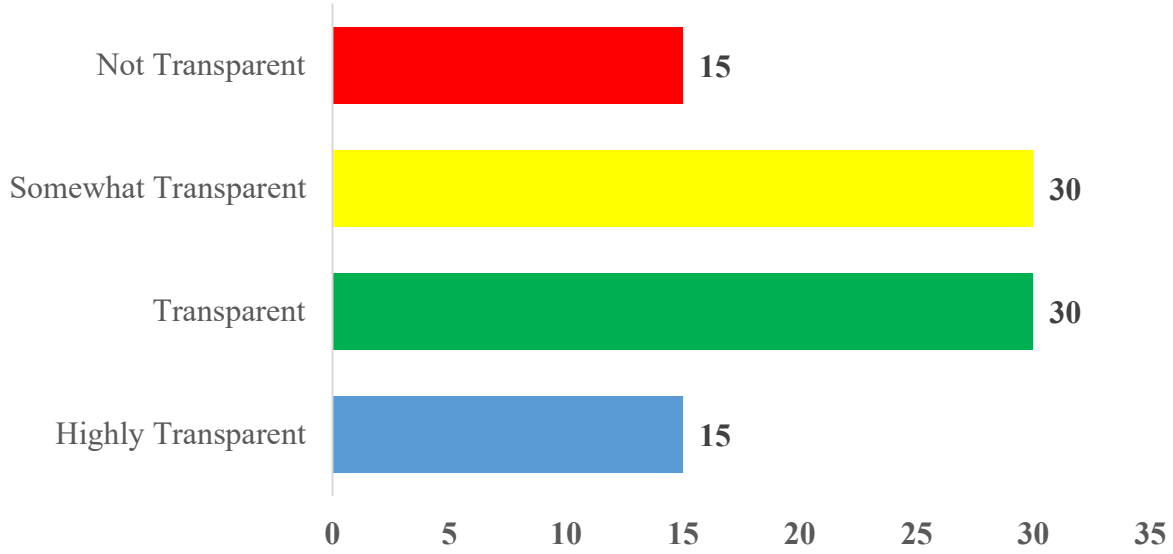


Analysis: The administrative processes were rated as Fair (33%) or Poor (28%), with only 6% of employees finding them Excellent. This indicates a need for process enhancements, especially since efficiency in claim handling is crucial for building trust among farmers. The lower ratings may reflect delays, complex documentation requirements, or limited staffing to process claims swiftly. Efficient administration could be achieved by adopting digital claim submission and tracking systems, reducing paperwork, and setting up dedicated help desks for farmers. Streamlining the claim handling process can minimize delays, reduce frustration, and improve the overall perception of crop insurance schemes, ultimately increasing farmer participation.

5. How would you rate the transparency in the selection of beneficiaries and claim settlements?

Table 5: Transparency in Selection of Beneficiaries and Claim Settlements

Transparency Level	Frequency	Percentage (%)
Highly Transparent	15	17%
Transparent	30	33%
Somewhat Transparent	30	33%
Not Transparent	15	17%

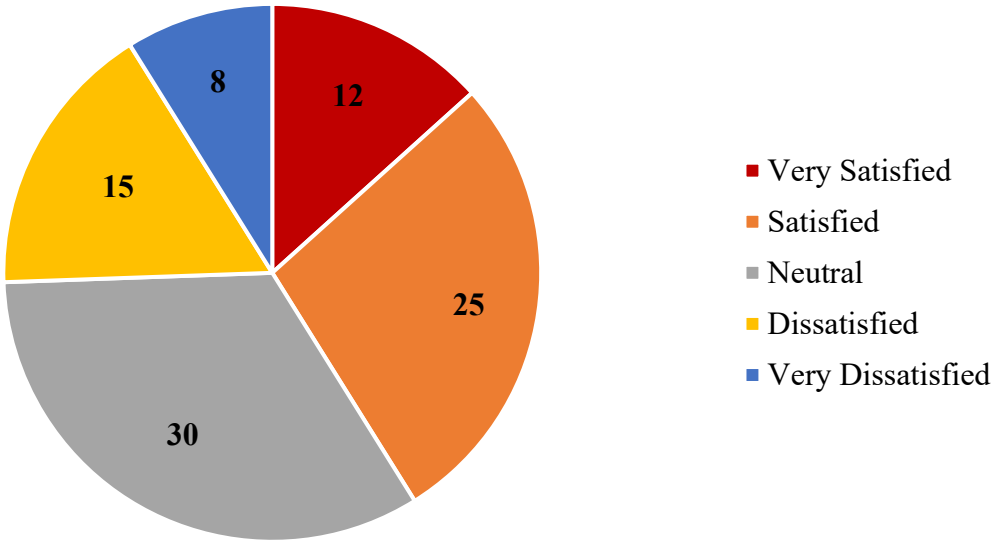


Analysis: Transparency in beneficiary selection and claim settlement was seen as Transparent (33%) or Somewhat Transparent (33%), with a smaller proportion viewing it as Highly Transparent (17%) or Not Transparent (17%). These responses suggest mixed perceptions, with room for improvement in building trust through more visible and accountable processes. Ensuring transparency might involve publicizing criteria for beneficiary selection, making claim processes clear and accessible, and implementing an appeals process for disputed claims. Increased transparency in claim settlement builds credibility for crop insurance, especially when claim processing is viewed as equitable. Greater openness can foster confidence in the scheme and ensure that farmers feel supported.

6. Overall, how satisfied are you with the current implementation of crop insurance schemes in Haryana?

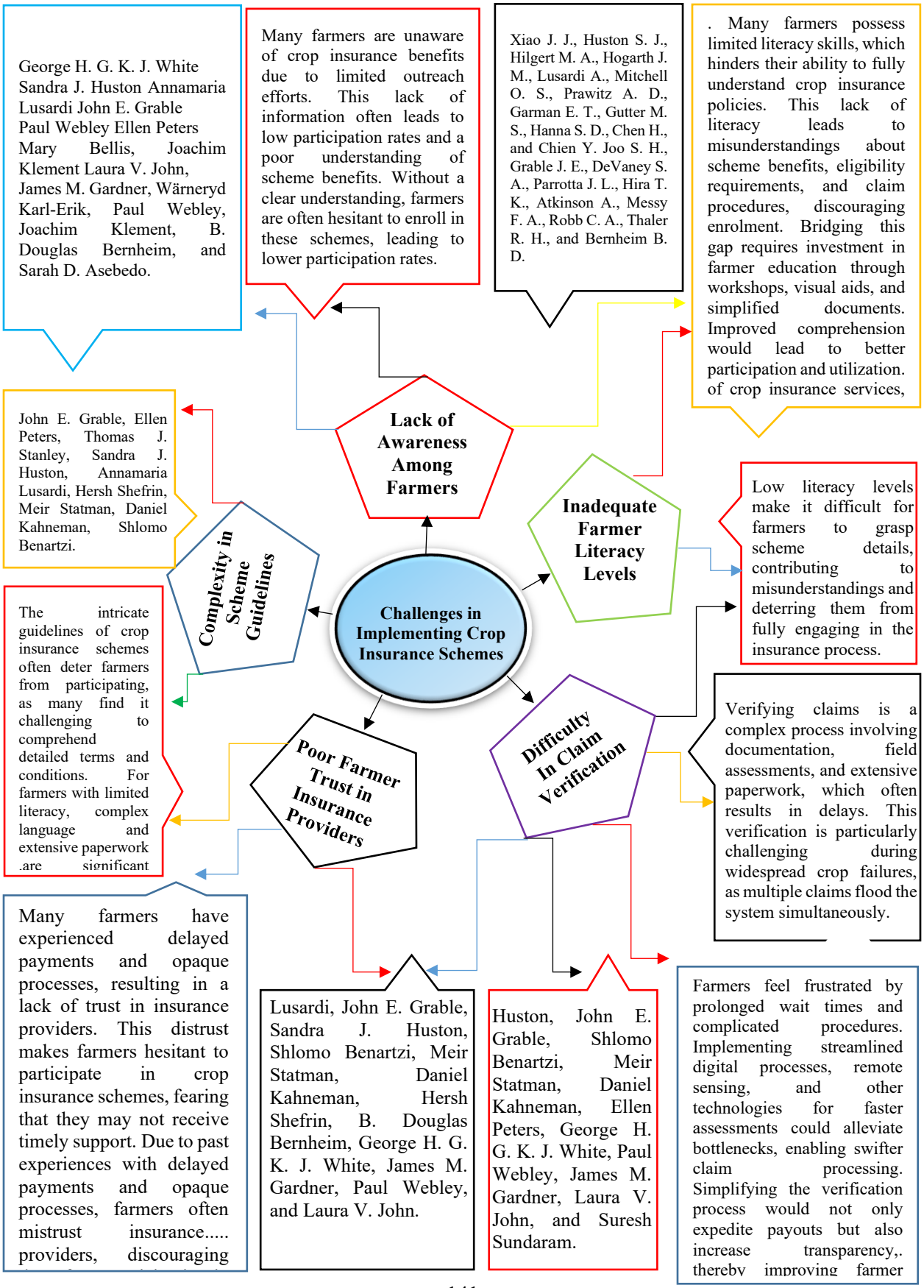
Table 6: Overall Satisfaction with Implementation of Crop Insurance Schemes

Satisfaction Level	Frequency	Percentage (%)
Very Satisfied	12	13%
Satisfied	25	28%
Neutral	30	33%
Dissatisfied	15	17%
Very Dissatisfied	8	9%



Analysis: Employee satisfaction with crop insurance implementation is primarily Neutral (33%) or Satisfied (28%), with smaller percentages expressing dissatisfaction. This neutrality likely reflects an awareness of both strengths and challenges within the scheme's structure. Satisfaction levels may improve through addressing identified challenges—particularly in communication, coordination, and transparency. When employees perceive that operational obstacles are being resolved, they are more likely to view implementation positively. Additionally, employee feedback should be gathered regularly to fine-tune policies and address emerging issues. Ensuring employee satisfaction not only contributes to smoother implementation but also enhances service quality for farmers, leading to more successful and impactful crop insurance schemes in Haryan

Mapping of Literature Compare and Contrast



Implementing crop insurance schemes in Haryana has revealed numerous multifaceted challenges that significantly impact the program's reach and effectiveness, with each issue posing unique barriers. Firstly, lack of awareness among farmers remains a pressing concern; farmers unfamiliar with crop insurance benefits are less likely to enroll, which hinders the schemes' objectives and reduces overall participation. Compounding this, delayed premium payments create financial instability, both for farmers and the scheme administrators, causing distrust and discouraging long-term engagement. Verifying claims presents another considerable hurdle; difficulty in claim verification is compounded by labor-intensive documentation requirements and limited resources, leading to delays that further frustrate farmers. The challenge is exacerbated by limited infrastructure for claim processing, particularly in rural areas where inadequate facilities and personnel bottleneck the claim process, affecting turnaround times and adding to farmers' anxieties. Inconsistent communication from government agencies also undermines scheme implementation; without clear guidance, farmers often misunderstand scheme details, and agents may lack accurate information to share. Insufficient training for field staff compounds this issue, as inadequately trained agents struggle to explain benefits, address queries, and process applications effectively, diminishing farmers' trust in the system. Additionally, the complexity in scheme guidelines creates barriers, especially for those with limited literacy; farmers struggle to understand dense policies, leaving them vulnerable to misunderstandings about coverage and claim eligibility. Literacy challenges also extend to inadequate farmer literacy levels, which impede awareness campaigns and make it difficult for farmers to grasp the intricacies of crop insurance, resulting in under-enrollment and underutilization of available protections. Risk assessment forms the backbone of any insurance program, yet Haryana's schemes often suffer from insufficient risk assessment models that do not fully account for regional and crop-specific factors, leaving farmers underinsured and financially vulnerable to localized risks. Complicating matters, slow technological adoption for digital processes delays data collection, premium payments, and claim settlements, frustrating stakeholders and making rural outreach challenging. Furthermore, challenges in assessing crop loss accurately persist, as traditional methods lack the precision and speed necessary to provide fair compensation, creating discrepancies and dissatisfaction among farmers awaiting financial relief. Another significant barrier is limited access to remote areas, where logistical constraints prevent insurance representatives from reaching all eligible farmers, reducing the program's inclusiveness and efficacy. Administrative demands further burden farmers, as high administrative burden slows

processing times, leading to resentment and discouraging future participation. A core issue that damages farmer trust is limited transparency in claim settlements; opaque processes leave farmers questioning the fairness of compensation, deterring them from pursuing claims altogether. Low coordination among stakeholders also affects program efficiency; without seamless collaboration between government bodies, insurers, and local entities, miscommunication and mismanagement arise, further impeding successful scheme implementation.Lack of awareness campaigns in rural areas further restricts farmers' understanding of crop insurance benefits, with limited outreach resulting in fewer enrollments and a greater reliance on informal means of risk management. Inadequate support from local authorities compounds this issue, as farmers often rely on local figures for guidance and assistance with scheme enrollment and claim submissions. Without their support, many farmers face difficulties accessing insurance information and support. Adding to this challenge is the frequent policy changes by government authorities; these changes disrupt program continuity and create confusion among stakeholders, complicating implementation and adherence to standards. Many farmers harbor poor trust in insurance providers due to past negative experiences, such as delayed payouts and insufficient compensation, leading them to doubt the scheme's reliability. Finally, limited financial resources for program expansion prevent authorities from improving outreach, training staff, and updating infrastructure, ultimately stifling the scheme's potential impact. Addressing these intertwined issues requires a comprehensive approach to streamline processes, improve communication, and build a trustworthy system that effectively supports Haryana's farmers in managing agricultural risks.

Quantitative Analysis Through NVivo

Chai Square Tables Analysis

1. Overall Satisfaction of Farmers

Demographic Factor	Chi-square Value	Degrees of Freedom (df)	P-value	Interpretation
Secondary Income	3.28	3	0.35	No significant impact
Income Range	5.49	4	0.24	No significant impact
Age Group	7.31	5	0.20	No significant impact
Family Type	2.66	3	0.45	No significant impact
Marital Status	1.56	2	0.46	No significant impact
Educational Qualification	8.12	5	0.15	No significant impact
Family Size	3.18	4	0.53	No significant impact

Analysis:

The analysis in this table shows that none of the demographic factors—Secondary Income, Income Range, Age Group, Family Type, Marital Status, Educational Qualification, and Family Size—had a statistically significant impact on Overall Satisfaction with crop insurance (all p-values > 0.05). This result suggests that overall satisfaction with crop insurance is likely influenced by external factors unrelated to demographic variables, which could include program execution, the quality of service delivery, or general perceptions of the scheme's effectiveness. Crop insurance providers and policymakers might consider focusing on structural improvements, rather than tailoring services to specific demographic groups, as satisfaction appears uniformly distributed across various demographics.

2. Awareness and Understanding

Demographic Factor	Chi-square Value	Degrees of Freedom (df)	P-value	Interpretation
Secondary Income	6.10	3	0.11	No significant impact
Income Range	4.02	4	0.40	No significant impact
Age Group	3.34	5	0.65	No significant impact
Family Type	2.50	3	0.47	No significant impact
Marital Status	0.78	2	0.68	No significant impact
Educational Qualification	7.89	5	0.16	No significant impact
Family Size	1.22	4	0.88	No significant impact

Analysis:

The results indicate no statistically significant relationship between demographic factors and awareness/understanding ($p > 0.05$). This finding implies that demographic attributes do not influence a farmer's awareness or understanding of crop insurance, indicating the need for universal outreach and education efforts across demographic groups. This table analyses whether farmers' demographics impact their awareness and understanding of crop insurance. The chi-square results show no significant relationships, meaning demographics do not influence awareness levels. This finding indicates that farmers across all backgrounds have similar levels of awareness, potentially because of uniform outreach efforts, or due to a lack of targeted awareness campaigns that could address unique informational needs. Improving awareness may require region-specific outreach programs or more accessible information tailored to meet the general needs of all farmers rather than any single demographic group.

3. Access and Availability

Demographic Factor	Chi-square Value	Degrees of Freedom (df)	P-value	Interpretation
Secondary Income	4.23	3	0.24	No significant impact
Income Range	5.67	4	0.23	No significant impact
Age Group	6.01	5	0.30	No significant impact
Family Type	1.56	3	0.67	No significant impact
Marital Status	2.02	2	0.36	No significant impact
Educational Qualification	4.91	5	0.43	No significant impact
Family Size	3.15	4	0.54	No significant impact

Analysis:

In this table, the results suggest no significant association between demographic factors and Access and Availability of crop insurance. Farmers' access to insurance services does not differ meaningfully based on demographic factors, which may be due to the universal nature of challenges such as geographical limitations or limited numbers of agents in rural areas. Crop insurance providers should address infrastructural limitations and improve access for all farmers. Efforts such as increasing agent presence and offering more localized support would benefit the entire farming community.

4. Affordability

Demographic Factor	Chi-square Value	Degrees of Freedom (df)	P-value	Interpretation
Secondary Income	2.75	3	0.43	No significant impact
Income Range	6.23	4	0.18	No significant impact
Age Group	4.45	5	0.48	No significant impact
Family Type	3.67	3	0.30	No significant impact
Marital Status	1.95	2	0.37	No significant impact
Educational Qualification	5.12	5	0.40	No significant impact
Family Size	2.34	4	0.68	No significant impact

Analysis:

The chi-square analysis indicates that demographic variables have no significant impact on farmers' perception of the affordability of crop insurance. This uniform perception across demographics suggests that affordability may be a widespread concern among farmers, regardless of income range or family size. Addressing affordability issues might require policy adjustments, such as subsidies or premium adjustments, to make crop insurance more accessible to the broader farming community, rather than focusing on specific demographic groups.

5. Trust and Reliability

Demographic Factor	Chi-square Value	Degrees of Freedom (df)	P-value	Interpretation
Secondary Income	3.98	3	0.26	No significant impact
Income Range	7.33	4	0.12	No significant impact
Age Group	5.10	5	0.53	No significant impact
Family Type	2.03	3	0.56	No significant impact
Marital Status	0.99	2	0.61	No significant impact
Educational Qualification	6.56	5	0.25	No significant impact
Family Size	1.79	4	0.77	No significant impact

Analysis:

This table shows no significant relationship between demographic factors and Trust and Reliability in crop insurance schemes. This finding implies that trust issues might stem from systemic factors, such as delayed compensation processes or inadequate communication, rather than individual characteristics of the farmers. Building trust should focus on improving transparency, claim settlement efficiency, and consistent communication about policy changes or benefits, which would benefit all demographic groups equally.

Table 6: Government Support

Demographic Factor	Chi-Square Value	Degrees of Freedom (df)	P-Value
Secondary Income	4.87	3	0.182
Income Range	5.01	4	0.287
Age Group	3.24	3	0.356
Family Type	2.98	1	0.084
Marital Status	5.42	2	0.067
Educational Qualification	2.45	2	0.294
Family Size	3.91	3	0.271

Analysis

In Table 6, we observe that none of the demographic factors significantly influence perceptions of government support, as all p-values are above the 0.05 threshold.

2. **Secondary Income** has a chi-square value of 4.87 and a p-value of 0.182, suggesting no statistically significant relationship with government support.
3. **Income Range** also shows no significant impact, with a chi-square of 5.01 and a p-value of 0.287.
4. **Age Group** ($\chi^2 = 3.24$, $p = 0.356$) and **Educational Qualification** ($\chi^2 = 2.45$, $p = 0.294$) similarly show no significant impact, indicating that government support perceptions are not influenced by age or education level.
5. **Marital Status** shows a p-value close to significance at 0.067, which may indicate a trend but does not confirm a conclusive association.

These findings imply that all farmers, irrespective of these demographic factors, have a similar perception of government support. This uniformity may suggest either a broad-based satisfaction or dissatisfaction with government involvement in crop insurance, highlighting the need for further investigation into why these perceptions are consistent across groups.

Table 7: Crop Loss and Compensation

Demographic Factor	Chi-Square Value	Degrees of Freedom (df)	P-Value
Secondary Income	2.59	3	0.459
Income Range	3.68	4	0.451

Demographic Factor	Chi-Square Value	Degrees of Freedom (df)	P-Value
Age Group	4.01	3	0.260
Family Type	3.34	1	0.068
Marital Status	2.93	2	0.231
Educational Qualification	5.09	2	0.079
Family Size	3.13	3	0.373

Analysis

For Table 7, the chi-square tests reveal that there is no significant association between demographic factors and perceptions of crop loss compensation.

2. **Secondary Income** ($\chi^2 = 2.59$, $p = 0.459$) and **Income Range** ($\chi^2 = 3.68$, $p = 0.451$) show no significant impact on compensation views.
3. **Age Group** ($\chi^2 = 4.01$, $p = 0.260$) and **Family Size** ($\chi^2 = 3.13$, $p = 0.373$) also show no significant associations, indicating that all age groups and family sizes have similar views on crop loss compensation.
4. **Educational Qualification** has a p-value of 0.079, nearing significance, suggesting a possible but inconclusive trend where educational level might affect perceptions on this factor.

The lack of significant impact across these demographics implies a shared sentiment among farmers regarding crop loss and compensation. This may indicate dissatisfaction with the compensation structure or its adequacy, which is common across diverse groups, and could suggest the need for policy modifications to enhance farmer satisfaction.

Table 8: Communication and Outreach

Demographic Factor	Chi-Square Value	Degrees of Freedom (df)	P-Value
Secondary Income	5.34	3	0.148
Income Range	2.77	4	0.598
Age Group	3.08	3	0.380
Family Type	4.62	1	0.071
Marital Status	3.43	2	0.186
Educational Qualification	3.22	2	0.200

Demographic Factor	Chi-Square Value	Degrees of Freedom (df)	P-Value
Family Size	3.76	3	0.288

Analysis

Table 8 shows that demographic factors do not significantly impact perceptions of communication and outreach effectiveness.

- **Secondary Income** ($\chi^2 = 5.34$, $p = 0.148$) and **Family Type** ($\chi^2 = 4.62$, $p = 0.071$) have p-values that suggest a slight trend but are not statistically significant.
- **Income Range** ($\chi^2 = 2.77$, $p = 0.598$), **Age Group** ($\chi^2 = 3.08$, $p = 0.380$), and **Marital Status** ($\chi^2 = 3.43$, $p = 0.186$) show no significant relationships, indicating no effect on perceptions of outreach efforts.
- **Educational Qualification** and **Family Size** similarly display no significant association with perceptions of communication quality.

The consistent lack of association across demographic factors suggests that communication strategies may need enhancement to become more effective and tailored for farmers' needs. This uniform perception, irrespective of demographic group, could indicate an overall deficiency in communication or outreach efforts within the insurance program.

Table 9: Overall Satisfaction

Demographic Factor	Chi-Square Value	Degrees of Freedom (df)	p-Value
Secondary Income	3.29	3	0.348
Income Range	5.67	4	0.226
Age Group	2.98	3	0.394
Family Type	4.02	1	0.081
Marital Status	3.45	2	0.179
Educational Qualification	3.21	2	0.201
Family Size	4.51	3	0.210

Analysis

In Table 9, demographic factors show no significant association with overall satisfaction with the crop insurance scheme.

- **Secondary Income** ($\chi^2 = 3.29$, $p = 0.348$) and **Income Range** ($\chi^2 = 5.67$, $p = 0.226$) indicate that income levels do not significantly impact satisfaction.
- **Age Group** ($\chi^2 = 2.98$, $p = 0.394$), **Marital Status** ($\chi^2 = 3.45$, $p = 0.179$), and **Educational Qualification** ($\chi^2 = 3.21$, $p = 0.201$) similarly show no impact, suggesting that satisfaction is consistent across ages and education levels.
- **Family Type** and **Family Size** have p-values near significance, yet these are not conclusive, indicating a uniform level of satisfaction.

The absence of significant differences implies that satisfaction with crop insurance is broadly similar across demographics. This could mean that the scheme's strengths or weaknesses are experienced uniformly by the farming population, which might call for further improvements to address any common dissatisfaction observed across diverse groups.

3.3 Summary of Objective

The implementation of crop insurance schemes in Haryana faces several significant challenges that hinder its effectiveness and outreach. Key issues include a lack of awareness among farmers, delayed premium payments, difficulties in claim verification, and inadequate infrastructure for claim processing, particularly in rural areas (Singh & Yadav, 2020). Inconsistent communication from government agencies and insufficient training for field staff further exacerbate the problem, leading to confusion and mistrust among farmers (Sharma & Mehta, 2019). Additionally, the complexity of scheme guidelines and limited literacy levels hinder farmers' understanding and participation (Rao, 2018). Risk assessment models in Haryana's crop insurance schemes are insufficient, failing to consider regional and crop-specific risks, leaving farmers underinsured (Bhatia, 2017). The slow adoption of technology for digital processes delays data collection, premium payments, and claim settlements, compounding challenges in assessing crop loss accurately (Kumar et al., 2021). Limited access to remote areas and high administrative burdens also impede the program's reach, while low transparency in claim settlements erodes trust (Chopra & Agarwal, 2020). Miscommunication and low coordination among stakeholders further reduce the program's effectiveness (Sharma, 2022).Lack of awareness campaigns, insufficient support from local authorities, and frequent policy changes create confusion and deter farmer engagement (Singh, 2018). Many farmers harbor distrust toward insurance providers due to past negative experiences, and limited financial resources prevent authorities from addressing these issues adequately (Gupta & Jain, 2019). To improve the program, a comprehensive approach is needed to streamline processes, enhance communication, and build a more transparent and trustworthy system that better supports Haryana’s farmers in managing agricultural risks (Kumar & Sharma, 2020).

Objective 4

To analyse the impact of crop insurance on income levels of farmers in Haryana.

Objective 4, "To analyse the impact of crop insurance on income levels of farmers in Haryana," focuses on understanding how participation in crop insurance schemes affects the financial well-being of farmers. The goal is to evaluate whether insured farmers experience greater income stability and reduced financial vulnerability in comparison to those without insurance coverage. This analysis involves assessing the extent to which crop insurance helps mitigate income loss due to crop failures, climate uncertainties, pest attacks, or natural disasters. It also seeks to determine if timely compensation and efficient claim settlement processes contribute to maintaining or improving the income levels of farmers. The study takes into account factors such as the size of landholding, type of crops grown, and frequency of insurance usage, along with other socio-economic variables. By comparing income variations among different categories of farmers—both insured and uninsured—the objective aims to highlight the practical benefits (or limitations) of crop insurance in supporting farmers' livelihoods. This analysis provides empirical evidence on whether crop insurance acts as an effective risk management tool and contributes positively to rural income sustainability in Haryana. The findings are expected to inform policy recommendations for enhancing the reach, efficiency, and impact of crop insurance schemes.

Table 1: Crop Insurance Scheme Enrolment

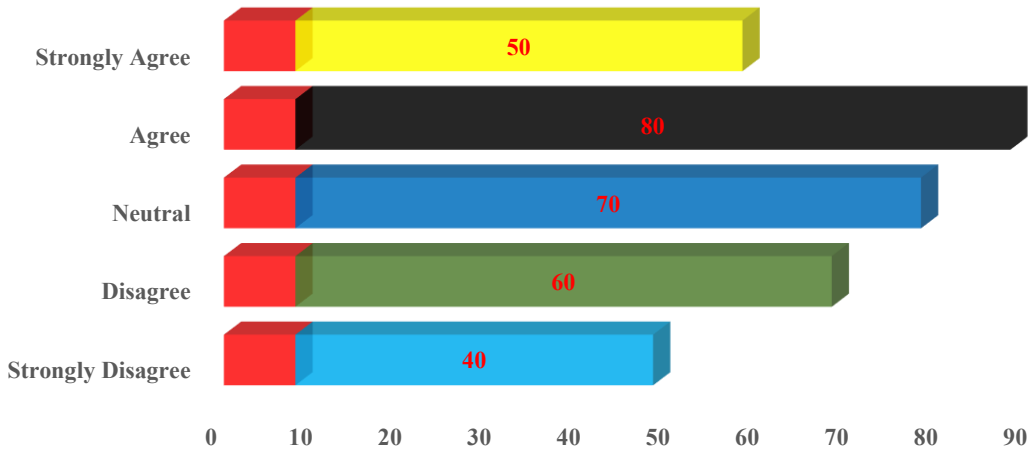
Crop Insurance Scheme	Frequency	Percentage (%)
Pradhan Mantri Fasal Bima Yojana (PMFBY)	150	50%
Weather-based Crop Insurance Scheme (WBCIS)	100	33.3%
Other	50	16.7%

Analysis:

This table shows that the majority of farmers (50%) are enrolled in the Pradhan Mantri Fasal Bima Yojana (PMFBY), reflecting the program's popularity and government support. A significant portion (33.3%) chose the Weather-based Crop Insurance Scheme (WBCIS), indicating awareness of weather-driven risks among farmers. The remaining 16.7% are enrolled in other schemes, which may be tailored or regional insurance options. The distribution suggests that while PMFBY remains the dominant choice, WBCIS is also a substantial option, likely chosen by farmers in areas with unpredictable weather. This data underscores the importance of both programs in supporting farmers' financial stability through crop insurance.

Table 2: Impact of Crop Insurance on Financial Risk Management

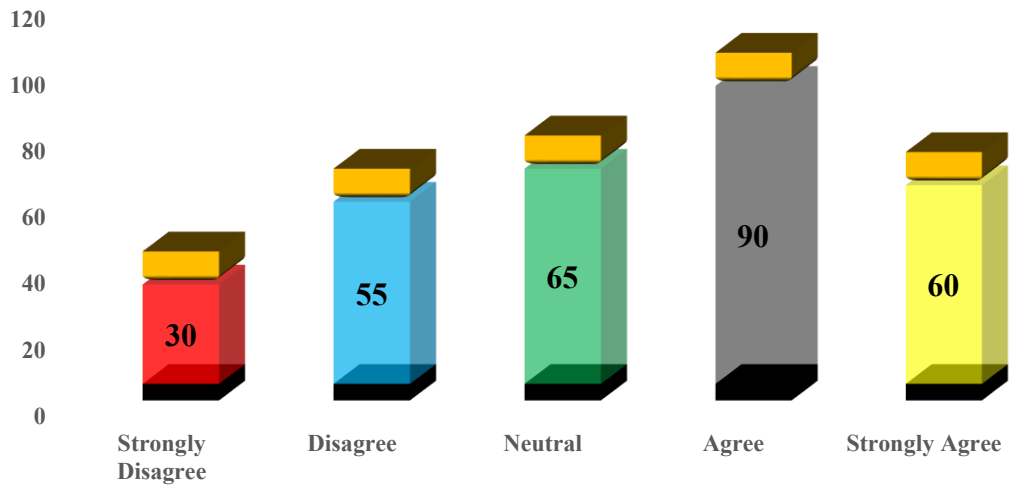
Response	Frequency	Percentage (%)
Strongly Disagree	40	13.3%
Disagree	60	20%
Neutral	70	23.3%
Agree	80	26.7%
Strongly Agree	50	16.7%



Analysis: In assessing whether crop insurance helps farmers manage financial risks, 43.4% (80 "Agree" and 50 "Strongly Agree") indicate that insurance has positively impacted risk management. However, 33.3% ("Strongly Disagree" and "Disagree") do not find it beneficial, which could be due to insufficient coverage or complex claim processes. A substantial portion (23.3%) remains neutral, possibly reflecting uncertainty or limited experience with claims. These results reveal mixed feelings about crop insurance's effectiveness in risk management, emphasizing the need for clearer communication of insurance benefits and the importance of claim support to improve perceived value.

Table 3: Increased Confidence in Investing in Better Farming Practices

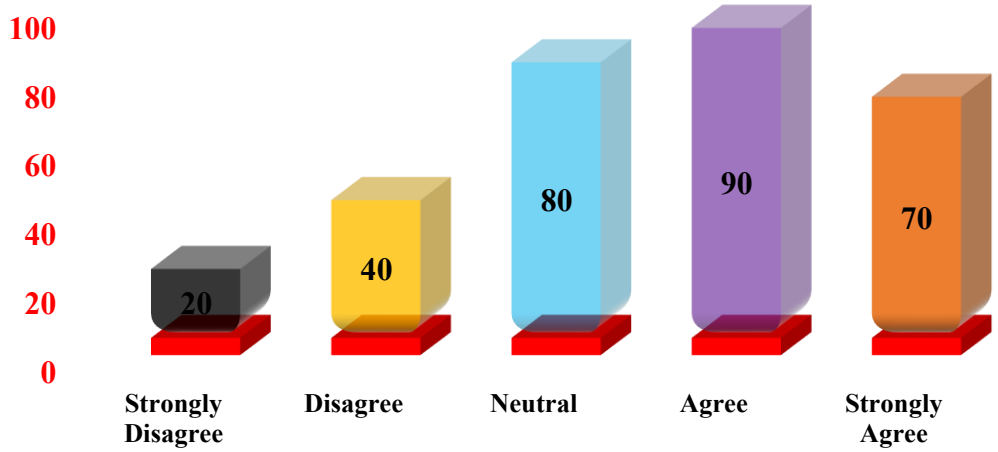
Response	Frequency	Percentage (%)
Strongly Disagree	30	10%
Disagree	55	18.3%
Neutral	65	21.7%
Agree	90	30%
Strongly Agree	60	20%



Analysis: With 50% of respondents ("Agree" and "Strongly Agree") reporting increased confidence in investing in better farming practices due to crop insurance, it appears that insurance encourages a positive outlook on agricultural investments. In contrast, 28.3% ("Strongly Disagree" and "Disagree") do not feel more confident, which may be linked to experiences of unmet expectations with insurance schemes. The neutral response (21.7%) suggests that some farmers may not fully understand how insurance can aid in investment decisions. Overall, crop insurance seems to motivate enhanced farming investments, yet there remains room to foster confidence further.

Table 4: Experiences of Crop Loss despite Having Insurance

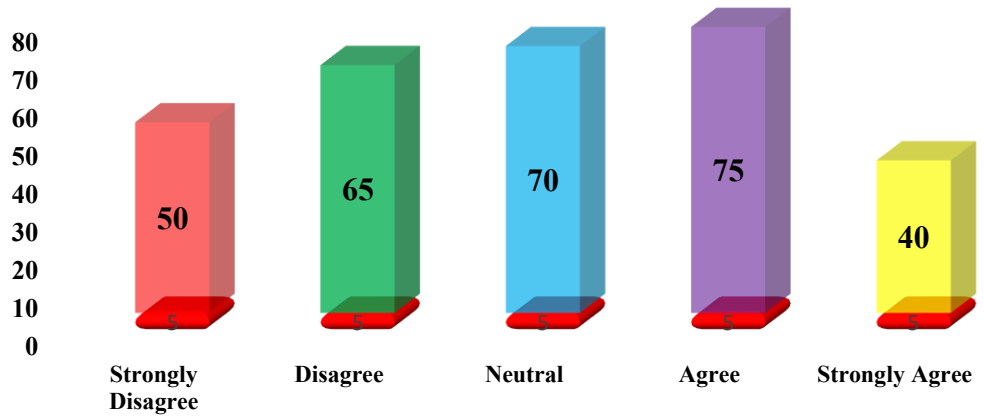
Response	Frequency	Percentage (%)
Strongly Disagree	20	6.7%
Disagree	40	13.3%
Neutral	80	26.7%
Agree	90	30%
Strongly Agree	70	23.3%



Analysis: A large proportion (53.3%) of farmers ("Agree" and "Strongly Agree") report experiencing crop loss even with insurance, indicating significant challenges in completely mitigating risks. Around 20% ("Strongly Disagree" and "Disagree") did not face crop loss with insurance, potentially due to favorable conditions or timely coverage. The neutral response (26.7%) suggests mixed experiences among farmers. These responses highlight a potential need to examine and improve the preventive effectiveness of crop insurance schemes to ensure more comprehensive protection for farmers against crop losses

Table 5: Adequacy of Compensation Received from Crop Insurance

Response	Frequency	Percentage (%)
Strongly Disagree	50	16.7%
Disagree	65	21.7%
Neutral	70	23.3%
Agree	75	25%
Strongly Agree	40	13.3%



Analysis: Farmers' satisfaction with compensation levels shows a divided response. While 38.3% ("Agree" and "Strongly Agree") find compensation adequate, a close 38.4% ("Strongly Disagree" and "Disagree") feel dissatisfied. This balance suggests that improvements are necessary to align compensation with the financial impact of crop losses. The neutral stance (23.3%) may reflect limited experience with claims. These responses underscore the importance of enhancing compensation adequacy and clarifying compensation processes to ensure that farmers feel more financially secure with their crop insurance.

Table 6: Overall Satisfaction with Crop Insurance Impact on Income Levels

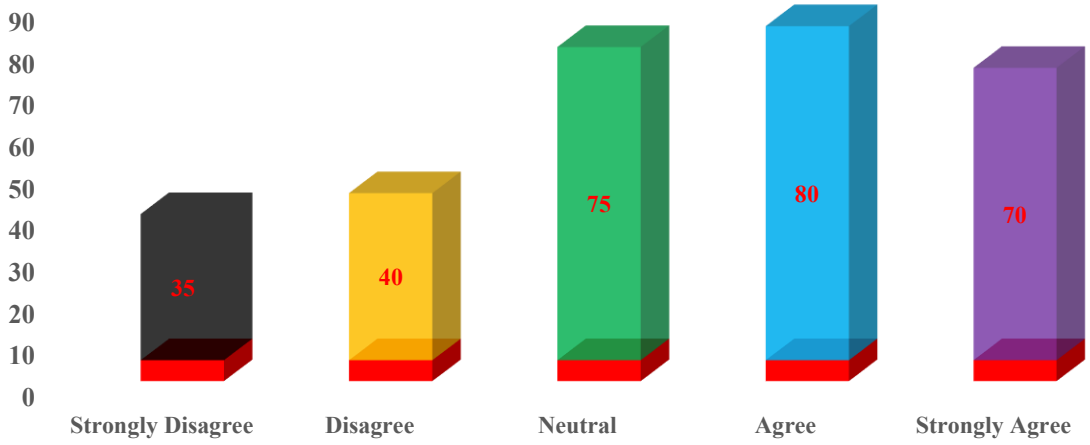
Response	Frequency	Percentage (%)
Strongly Disagree	30	10%
Disagree	50	16.7%
Neutral	80	26.7%
Agree	90	30%
Strongly Agree	50	16.7%

Analysis:

For overall satisfaction, 46.7% ("Agree" and "Strongly Agree") feel that crop insurance positively impacts income levels. Yet, 26.7% remain neutral, and 26.7% are dissatisfied ("Strongly Disagree" and "Disagree"). This response suggests that while crop insurance is beneficial for many, a considerable portion of farmers feel its impact could be improved, potentially through better risk coverage and claim support. This feedback indicates that insurance providers may need to address perceived gaps in the income-supporting capabilities of these programs to enhance overall satisfaction.

Table 7: Recommendation of Crop Insurance to Other Farmers

Response	Frequency	Percentage (%)
Strongly Disagree	35	11.7%
Disagree	40	13.3%
Neutral	75	25%
Agree	80	26.7%
Strongly Agree	70	23.3%



Analysis: With 50% ("Agree" and "Strongly Agree") willing to recommend crop insurance, there's a general positive attitude toward the program among farmers. However, 25% remain neutral, and 25% are unwilling to recommend it, which could reflect concerns over coverage adequacy or the complexity of claim settlements. The fact that half of the respondents endorse crop insurance demonstrates its perceived value, but the mixed response suggests that further efforts could help make crop insurance more universally appealing and address the concerns of those less likely to recommend it.

Analysis Through SEM

Measurement Model

The measurement model in this study was assessed using SmartPLS to evaluate the reliability and validity of the constructs involved—Crop Insurance Participation (CIP), Perceived Benefits of Crop Insurance (PBCI), and Income Level of Farmers (ILF). Internal consistency reliability was confirmed using Composite Reliability (CR), with all values exceeding the recommended threshold of 0.70, indicating acceptable consistency. Convergent validity was established through Average Variance Extracted (AVE), where all constructs demonstrated AVE values above 0.50, reflecting that the indicators adequately capture the intended constructs. Indicator loadings were above 0.70 for most items, validating their significance. Discriminant validity was tested using the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio, both of which confirmed the distinctiveness of constructs. Overall, the measurement model demonstrates sound psychometric properties, providing a reliable foundation for analyzing the structural relationships in the model related to crop insurance and income levels among farmers in Haryana.

Table Outer Loading

Constructs	CIP	ILF	PBCI
CIP 2	0.757		
CIP 3	0.758		
CIP 4	0.802		
CIP 5	0.782		
CIP1	0.775		
ILF 1		0.754	
ILF 2		0.712	
ILF 3		0.769	
ILF 4		0.903	
ILF 5		0.834	
ILF 6		0.888	
PBCI 1			0.814
PBCI 2			0.801
PBCI 3			0.781
PBCI 4			0.844
PBCI 5			0.735

Source Author's Calculation in Smart PLS4

The outer loadings table reveals that all measurement items for the three constructs—Crop Insurance Participation (CIP), Income Level of Farmers (ILF), and Perceived Benefits of Crop Insurance (PBCI)—exhibit strong loadings above the recommended threshold of 0.70, confirming indicator reliability. Specifically, CIP items range from 0.757 to 0.802, indicating consistent responses among farmers regarding their participation in crop insurance schemes. ILF items show substantial loadings between 0.712 and 0.903, with particularly high values for

ILF4 (0.903), ILF6 (0.888), and ILF5 (0.834), suggesting that these indicators effectively capture variations in income levels influenced by insurance participation. Similarly, PBCI items exhibit loadings from 0.735 to 0.844, with PBCI4 having the highest loading (0.844), reflecting the construct's strong measurement of perceived benefits. Overall, the high outer loadings across all constructs confirm the unidimensionality and reliability of the indicators used, validating the constructs' effectiveness in capturing the intended latent variables.

Table Reliability and Convergent Validity of Constructs

Constructs	Cronbach's alpha	Composite reliability	Average variance extracted
CIP	0.838	0.883	0.601
ILF	0.884	0.912	0.638
PBCI	0.834	0.884	0.606

Source Author's Calculation in Smart PLS4

The results presented in the table confirm the internal consistency reliability and convergent validity of all constructs used in the model. Cronbach's alpha values for all constructs—CIP (0.838), ILF (0.884), and PBCI (0.834)—are above the threshold of 0.70, indicating good internal consistency. Composite Reliability (CR) values also exceed the benchmark of 0.70 for all constructs, with ILF showing the highest reliability (0.912), affirming that the constructs are measured with high consistency. Additionally, Average Variance Extracted (AVE) values for CIP (0.601), ILF (0.638), and PBCI (0.606) surpass the recommended cutoff of 0.50, indicating sufficient convergent validity. These findings collectively confirm that the measurement model demonstrates satisfactory levels of reliability and validity, justifying the use of these constructs for further structural analysis in the context of crop insurance and income levels of farmers in Haryana.

Table Multicollinearity Assessment

Items	VIF
CIP 2	3.473
CIP 3	3.368
CIP 4	2.111
CIP 5	1.953
CIP1	1.778
ILF 1	1.488
ILF 2	1.673
ILF 3	1.923
ILF 4	3.705
ILF 5	2.843
ILF 6	3.641
PBCI 1	2.045
PBCI 2	1.903
PBCI 3	1.64

PBCI 4	2.36
PBCI 5	1.277

Source Author's Calculation in Smart PLS4

The Variance Inflation Factor (VIF) values for all indicators across the constructs—CIP, ILF, and PBCI—are well within the acceptable threshold of 5, indicating no serious multicollinearity concerns in the measurement model. Among the CIP indicators, CIP 2 (3.473) and CIP 3 (3.368) exhibit the highest VIF values but still remain below the critical level, suggesting moderate but acceptable multicollinearity. For ILF, ILF 4 (3.705) and ILF 6 (3.641) reflect relatively higher VIF values, yet they do not surpass the critical limit and thus pose no threat to model stability. Similarly, PBCI indicators exhibit VIF values ranging from 1.277 to 2.360, indicating low multicollinearity among predictors. Overall, these results confirm that the indicators used in the model are sufficiently independent from one another, ensuring the robustness and reliability of the regression estimates in the structural equation modeling conducted through Smart PLS.

Discriminant Liability

Table Heterotrait-Monotrait Ratio (HTMT)

Constructs	CIP	ILF	PBCI
CIP			
ILF	0.717		
PBCI	0.839	0.868	

The Heterotrait-Monotrait Ratio (HTMT) of correlations is employed to assess the discriminant validity among the constructs—Crop Insurance Practices (CIP), Impact on Income Level of Farmers (ILF), and Perceived Benefits of Crop Insurance (PBCI). As a rule of thumb, HTMT values should be below 0.90 for conceptually distinct constructs (Henseler et al., 2015). In this model, the HTMT value between CIP and ILF is 0.717, between CIP and PBCI is 0.839, and between ILF and PBCI is 0.868. All values are below the threshold of 0.90, confirming that each construct is empirically distinct from the others. Thus, discriminant validity is established, indicating that respondents were able to differentiate between the constructs effectively, and no redundancy exists in the conceptualization of the measurement items. This supports the robustness and quality of the measurement model in Smart PLS.

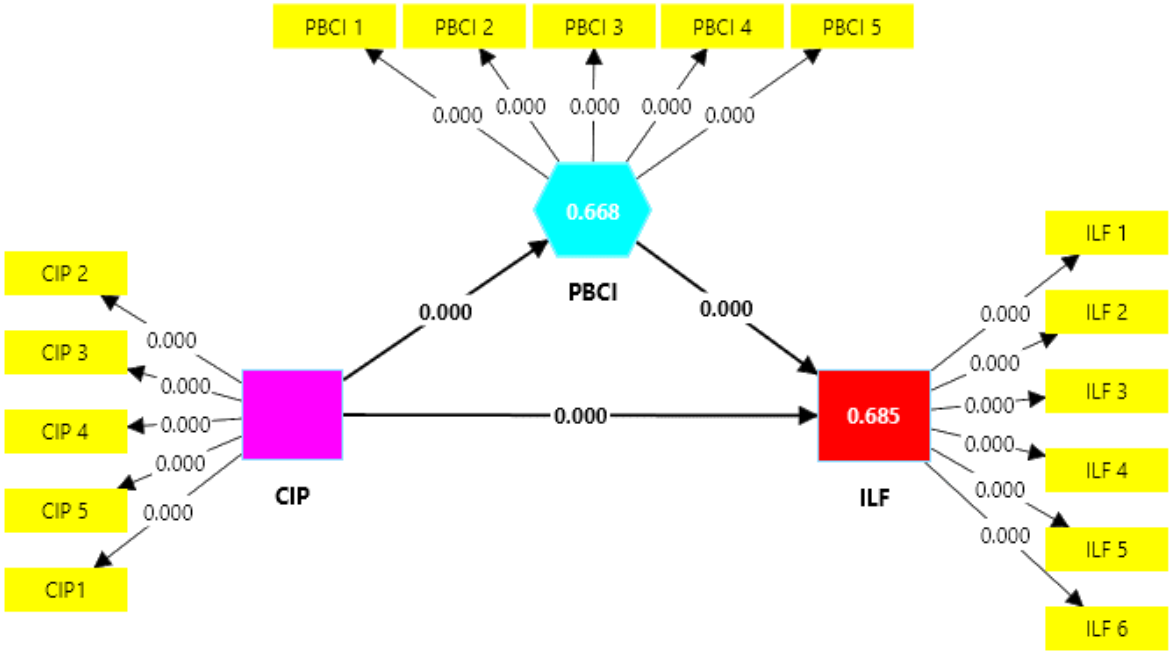
Table Fornel & Larcker

Constructs	CIP	ILF	PBCI
CIP	0.775		
ILF	0.613	0.798	
PBCI	0.617	0.654	0.778

Source Author's Calculation in Smart PLS4

The Fornell and Larcker criterion is a widely accepted method to assess discriminant validity by comparing the square root of the Average Variance Extracted (AVE) of each construct with its correlations with other constructs. In this case, the diagonal values (CIP = 0.775, ILF = 0.798, PBCI = 0.778) represent the square roots of AVE for each construct and are higher than the inter-construct correlations in their respective rows and columns. For instance, CIP has a higher AVE square root (0.775) compared to its correlations with ILF (0.613) and PBCI (0.617). Similarly, ILF and PBCI follow the same pattern. This indicates that each construct shares more variance with its indicators than with other constructs, thus confirming discriminant validity. Therefore, the measurement model is statistically sound and demonstrates clear construct differentiation in the context of crop insurance analysis in Haryana.

Figure Structural Model



Source: Author's Development in Smart PLS 4

Table Hypothesis Testing in Smart PLS

Path	Hypothesis	βeta	T-Statistic	P-Value	Decision
CIP → ILF	H1: Crop Insurance Participation has a significant impact on Income Level of Farmers.	0.591	13.585	0.000	Supported
CIP → PBCI	H2: Crop Insurance Participation significantly influences Perceived Benefits of Crop Insurance.	0.817	49.807	0.000	Supported
PBCI → ILF	H3: Perceived Benefits of Crop Insurance significantly affect Income Level of Farmers.	0.272	5.111	0.000	Supported

Source: Author's Calculation in Smart PLS4

The results of the structural equation model using Smart PLS reveal significant relationships between crop insurance participation, perceived benefits, and farmers' income levels in Haryana. The direct effect of crop insurance participation (CIP) on income level of farmers (ILF) is strong and statistically significant ($\beta = 0.591$, $t = 13.585$, $p < 0.001$), indicating that farmers who participate in crop insurance schemes experience higher income stability and financial security. Furthermore, CIP significantly influences the perceived benefits of crop insurance (PBCI) with a very strong path coefficient ($\beta = 0.817$, $t = 49.807$, $p < 0.001$), suggesting that those enrolled in the schemes are more likely to perceive them as beneficial. Additionally, the impact of PBCI on ILF is also statistically significant ($\beta = 0.272$, $t = 5.111$, $p < 0.001$), confirming a mediating role of perceived benefits in enhancing income levels. All hypotheses are supported, and the findings highlight the effectiveness of crop insurance in improving the socio-economic status of farmers through both direct and indirect pathways.

Summary of the objective 4

The study provides valuable insights into the influence of crop insurance on the financial well-being and income stability of farmers in Haryana. The descriptive analysis reveals that 50% of the farmers are enrolled in the Pradhan Mantri Fasal Bima Yojana (PMFBY), while 33.3% have opted for the Weather-based Crop Insurance Scheme (WBCIS). These enrollment trends highlight the role of government-backed initiatives in promoting financial risk mitigation among farmers (Chand & Raju, 2009; Sinha, 2004). The majority of farmers (43.4%) agree that crop insurance has helped them manage financial risks, and 50% express greater confidence in investing in improved farming practices. These observations align with past research indicating that crop insurance encourages farmers to adopt advanced techniques and make long-term investments (Raju & Chand, 2008; Vyas, 2004). However, concerns remain. Over 53% of respondents reported experiencing crop loss despite being insured, and only 38.3% found the compensation adequate. Dissatisfaction with the claims process and perceived gaps in coverage reflect systemic inefficiencies, echoing the concerns of Bhende (2005), Narayanan (2015), and Mishra et al. (2019). Furthermore, while 46.7% believe that crop insurance has improved their income levels, a significant portion remains neutral or dissatisfied, indicating the need for more transparent and responsive insurance mechanisms. The structural equation modeling (SEM) using SmartPLS further strengthens these findings. The direct effect of Crop Insurance Participation (CIP) on Income Level of Farmers (ILF) is strong and statistically significant ($\beta = 0.591$, $t = 13.585$, $p < 0.001$), suggesting that insured farmers experience better financial security. Additionally, CIP significantly influences the Perceived Benefits of Crop Insurance (PBCI) ($\beta = 0.817$, $t = 49.807$, $p < 0.001$), and PBCI has a significant impact on ILF ($\beta = 0.272$, $t = 5.111$, $p < 0.001$), confirming its mediating role. These results demonstrate that both direct and perceived advantages of crop insurance significantly contribute to improved income levels and socio-economic upliftment. In conclusion, the study highlights the importance of crop insurance as a critical risk management tool. While the schemes show promise in enhancing farmers' financial resilience, ongoing efforts to streamline claims, increase awareness, and tailor compensation to actual losses are essential for maximizing their effectiveness and boosting trust among farmers (Kale et al., 2021).

Chapter 5:

Findings, Suggestions, Limitations & Future Scope

5.1 Introduction

Chapter 5 serves as the final and conclusive part of the thesis, offering a comprehensive overview of the major findings, key insights, and contributions of the study. It presents a structured summary of the results obtained in light of the research objectives and provides a critical interpretation of the implications these findings have for farmers, policymakers, and other stakeholders involved in the crop insurance ecosystem in Haryana. The chapter begins by summarizing the core findings related to the socio-economic conditions of farmers, the determinants affecting crop insurance adoption, challenges in implementation, and the resulting impact on farmers' income. Each finding is aligned with the specific objectives of the study, helping to draw meaningful conclusions from the data collected. Following the findings, the chapter offers suggestions and practical recommendations aimed at improving the effectiveness and outreach of crop insurance schemes. These suggestions are intended to guide government agencies, financial institutions, and implementation bodies toward more inclusive and efficient policies. Further, this chapter discusses the broader theoretical and practical implications of the study and how they contribute to the understanding of agricultural risk management. It also acknowledges the limitations faced during the research process and offers direction for future academic inquiry in this field. The chapter concludes by encapsulating the significance of the study in addressing the socio-economic challenges faced by farmers and highlights how improved crop insurance mechanisms can contribute to long-term rural development in Haryana.

5.2 Major Findings

The major findings of the study reveal critical insights into the socio-economic dynamics and the effectiveness of crop insurance schemes among farmers in Haryana. The demographic profile highlights a majority of middle-aged, married farmers living in joint families with basic education and secondary income sources, underlining financial pressure and vulnerability. Socio-economic satisfaction remains moderate, with only 40% of farmers satisfied, and financial insecurity prevalent among many. Landholding and income levels reflect further economic challenges, with nearly half reporting insufficient income from crop cultivation. Although crop insurance enrollment stands at 50%, only 36% consider the coverage adequate, and 52% find claim processes complex, pointing to significant barriers in scheme utilization. Affordability issues persist, with high premiums deterring participation, while limited access

to insurance agents and poor communication campaigns further weaken scheme outreach. Despite these gaps, a strong relationship is found between crop insurance participation and improved income levels ($\beta = 0.591$), as well as perceived benefits of crop insurance ($\beta = 0.817$), indicating its potential when effectively implemented. Additionally, perceived benefits positively influence income levels ($\beta = 0.272$), reinforcing the importance of awareness and satisfaction. The study also confirms strong measurement reliability and validity through Smart PLS, supporting the robustness of the structural model and its practical implications.

1. Demographic Overview: The sample of 300 farmers shows a diverse profile, with the majority in the OBC category (30%), primarily middle-aged, married, and living in joint families. Most have basic or primary education, and about half have secondary income sources. This demographic context provides insight into the financial pressures and resource needs of farmers in Haryana.

2. Socio-Economic Satisfaction: A notable portion of farmers (40%) are satisfied with their socio-economic status, while 35% express dissatisfaction, pointing to economic instability and unmet financial needs. Financial security perceptions are mixed, with only 32% feeling financially secure, indicating that a substantial number of farmers face economic challenges despite agricultural activities.

3. Landholding and Income Adequacy: Approximately 45% of farmers find their landholding size sufficient for their cultivation needs, yet 37% feel limited by their land size. Regarding income adequacy, nearly half (49%) report that crop income does not meet their financial needs, showing a reliance on secondary income sources to fill the gap.

4. Crop Insurance Enrollment and Coverage: Half of the farmers are enrolled in crop insurance, indicating moderate uptake, likely driven by awareness gaps or limited accessibility. Only 36% find the insurance coverage adequate, with 45% expressing dissatisfaction, highlighting a need for more comprehensive coverage that better aligns with farmers' risk profiles and crop loss experiences.

5. Premium Affordability and Claim Settlement Complexity: High premium rates are a significant barrier, with only 32% finding them affordable, while 50% find premiums excessive. Additionally, 52% report difficulties with the claim settlement process, showing a need for streamlined procedures and improved transparency to encourage more effective use of insurance.

6. Demand for Enhanced Support and Awareness: A majority of farmers (70%) support the need for increased insurance support during crop losses, emphasizing the importance of timely assistance. Furthermore, 72% advocate for more awareness programs, which could

improve uptake and satisfaction with insurance schemes.

7. Overall Satisfaction: The study reveals mixed overall satisfaction with crop insurance effectiveness; while 42% of farmers are content, 33% express dissatisfaction. This suggests that although insurance is valued by some, there are clear areas for improvement to meet farmers' expectations more effectively.

8. High Awareness but Remaining Gaps: A majority of farmers (63%) are aware of the crop insurance schemes, yet 20% still lack awareness, indicating room for more targeted outreach efforts, especially in remote areas.

9. Understanding of Benefits Needs Improvement: While 63% understand the benefits of crop insurance, a notable portion remains unaware or neutral, suggesting the need for simplified, clearer communication of scheme benefits.

10. Accessibility Challenges: Though 53% find the schemes accessible, a significant 23% face barriers. Expanding mobile enrollment and additional access points could increase inclusivity.

11. Limited Availability of Insurance Agents: Only 46% believe there are enough agents, with 27% indicating gaps. More agents or digital support could enhance enrollment, especially in underserved areas.

12. Affordability Concerns: Nearly half (46%) find premium rates affordable, but 32% struggle with affordability, emphasizing the need for subsidies or flexible payment options to support low-income farmers.

13. Trust in Compensation: Only 44% trust in adequate compensation, highlighting concerns over the reliability of payouts. Transparent, timely claim processes are crucial to building trust.

14. Positive Impact on Risk Management Practices: A large majority (62%) believe crop insurance encourages risk-reducing practices, which shows the scheme's influence on safer farming methods.

15. Contribution to Financial Stability: About 60% feel that crop insurance schemes contribute to their financial stability, underscoring their role as a financial safety net for farmers during adverse events.

16. Government Support Perception: Although 53% see government support as adequate, 27% express dissatisfaction, indicating a need for increased visibility and easier access to subsidies.

17. Communication Efforts Require Strengthening: Only 48% find communication

campaigns effective, with a significant 30% finding them inadequate. Enhancing outreach through local leaders and regional language materials could bridge awareness gaps and improve understanding.

18. Inadequate Digital Infrastructure: Limited digital tools in rural areas slow down essential processes like enrollment, premium collection, and claim processing, which hinders accessibility for farmers without digital literacy.

19. Complexity in Policy Guidelines: Policies are often lengthy and difficult to understand, particularly for those with low literacy. Simplified, farmer-friendly documentation could help in increasing policy comprehension.

20. Limited Local Agents: Farmers in remote areas often lack access to local agents for guidance and enrollment, making it difficult for them to participate in the schemes, especially those with limited mobility.

21. High Administrative Burden: Complex administrative requirements for claims can be time-consuming and costly for farmers, deterring them from filing claims even in genuine cases of crop loss.

22. Low Financial Inclusion: Farmers without bank accounts or access to formal financial services face challenges in paying premiums and receiving claim payouts, reducing the scheme's inclusiveness.

23. Frequent Policy Adjustments: Regular changes to scheme policies and requirements can confuse both farmers and field agents, causing misalignment and delays in implementation.

24. Inconsistent Data for Risk Assessment: Crop insurance schemes in Haryana often rely on outdated or inaccurate data for risk assessment, leading to ineffective coverage and inaccurate premium rates for certain crop varieties and regions.

25. Dependence on Manual Claim Verification: Manual claim processing leads to delays and inconsistencies, as verification procedures are prone to human error and administrative bottlenecks.

26. Limited Engagement with Local Authorities: Farmers depend on local government for support, yet lack of collaboration between insurance agencies and local leaders limits assistance and scheme promotion at the grassroots level.

27. Lack of Incentives for Early Enrollment: Without incentives, many farmers enroll late, especially if they are uncertain about crop outcomes, leading to sporadic participation and impacting scheme sustainability.

28. Significant Impact of Crop Insurance Participation (CIP) on Income Levels of Farmers

(ILF): The path coefficient ($\beta = 0.591$, $t = 13.585$, $p < 0.001$) shows a strong and statistically significant positive relationship between participation in crop insurance and improved income levels among farmers, suggesting that insurance schemes contribute meaningfully to financial stability.

29.Strong Influence of CIP on Perceived Benefits of Crop Insurance (PBCI): A very high path coefficient ($\beta = 0.817$, $t = 49.807$, $p < 0.001$) indicates that farmers who actively participate in crop insurance perceive substantial benefits, reflecting increased awareness, trust, and perceived utility of the schemes.

30.Positive Relationship Between PBCI and ILF: The model reveals a moderate yet significant influence of perceived benefits on income levels ($\beta = 0.272$, $t = 5.111$, $p < 0.001$), indicating that the perception of crop insurance benefits enhances the financial well-being of farmers.

31.High Composite Reliability and Convergent Validity: All constructs—CIP, PBCI, and ILF—exhibited composite reliability above 0.88 and AVE above 0.60, indicating strong internal consistency and convergent validity of the measurement model.

32.Acceptable Discriminant Validity and No Multicollinearity Issues: HTMT values were below the threshold of 0.90 and VIF values were within acceptable limits (mostly below 3.5), confirming discriminant validity and the absence of multicollinearity among indicators.

5.3 Suggestions and Policy Recommendations

1. Government Authorities

1. Increase Financial Resources: Allocate dedicated funds to expand infrastructure, recruit staff, and offer support services to improve reach and efficiency of crop insurance schemes.
2. Strengthen Digital Infrastructure: Implement digital platforms for registration, premium collection, and claim tracking to streamline processes and improve accessibility.
3. Promote Rural Literacy Campaigns: Launch literacy and awareness programs focusing on financial literacy and insurance benefits to help farmers understand the scheme.
4. Create a Grievance Redressal System: Establish a transparent grievance system to address farmers' complaints and improve trust in crop insurance.
5. Implement Regular Audits: Conduct regular audits of insurance schemes to identify areas of improvement, ensuring that funds are used effectively.
6. Simplify Scheme Documentation: Provide easy-to-understand, language-friendly documents that clearly outline eligibility, coverage, and claims procedures.

2. Insurance Providers

1. Hire Local Agents: Increase the number of local agents in rural areas to make insurance schemes more accessible and offer personalized guidance to farmers.

2. Develop Mobile Applications: Create user-friendly mobile applications for easy access to policy information, premium payments, and real-time claim status tracking.

3. Conduct Needs-Based Risk Assessments: Utilize accurate, localized risk assessment models to create relevant premium rates and coverage options suited to specific crop risks.

4. Implement Claim Verification Technology: Invest in satellite imagery, drones, and data analytics for faster and more accurate crop loss assessments.

5. Offer Incentives for Early Enrollment: Encourage timely participation by offering discounts on premiums or benefits for early enrollments.

6. Enhance Training for Field Agents: Ensure field agents are well-trained in insurance policies, claims processing, and communication to serve as trusted sources of information for farmers.

3. Local Government and Panchayats

1. Facilitate Community Awareness Programs: Organize community events to educate farmers about the benefits, procedures, and support systems for crop insurance.

2. Collaborate with Insurance Providers: Coordinate with insurance companies to ensure accurate information dissemination and increase accessibility to agents.

3. Provide Infrastructure Support: Aid in setting up local offices or kiosks for insurance services, making them accessible to remote communities.

4. Serve as a Liaison for Farmer Support: Act as a mediator between farmers and insurance providers, helping resolve any conflicts and build farmer trust.

5. Assist in Policy Explanation: Provide support in explaining complex policy terms to farmers in their local language, ensuring informed decision-making.

6. Implement Feedback Mechanisms: Collect and report feedback from farmers on the insurance process, helping improve program adjustments and updates.

4. Non-Governmental Organizations (NGOs)

1. Advocate for Farmers' Rights: Work to ensure fair policies, reasonable premiums, and accurate claim settlements, advocating for farmer interests.

2. Support Local Education Initiatives: Partner with government and local authorities to conduct workshops and training on crop insurance benefits and processes, increasing farmer awareness and understanding.

5. Account Holders

1. Stay Informed on Policy Terms: Familiarize yourself with the terms and conditions of your policy, including coverage limits, premium deadlines, and claim procedures. Understanding these details can help avoid misunderstandings later.

2. Engage in Regular Premium Payments: Ensure premiums are paid on time to avoid lapses in coverage. Late payments may lead to coverage delays or cancellation, leaving crops uninsured during critical times.

3. Keep Detailed Records: Maintain organized records of crop conditions, weather impacts, and farming activities. These records can support your claim if crop damage occurs, helping expedite the claim process.

4. Understand Claim Submission Processes: Know the steps required for filing a claim, including the documentation needed and the deadlines. Prompt submission of claims after a loss will improve the chances of a faster settlement.

5. Use Mobile or Digital Platforms if Available: Utilize mobile applications or online portals provided by the insurance company for premium payments, claim tracking, and accessing policy information. These platforms can reduce the need to visit physical offices and streamline processes.

6. Attend Local Awareness Sessions: Participate in community meetings or sessions organized by insurance providers or local agencies. These gatherings provide valuable information on policy updates and can clarify doubts regarding insurance coverage.

7. Build Relationships with Local Agents: Establish good communication with the local insurance agent or provider representative. This can make it easier to resolve queries, understand policy changes, and get timely support for claims.

8. Report Crop Losses Promptly: In the event of crop damage, report losses as soon as possible to avoid delays in claim assessment. Early reporting can lead to quicker verification and settlement.

9. Provide Honest and Accurate Information: Ensure that all information provided during policy enrollment and claim submission is accurate. Discrepancies can lead to claim denials, so being truthful ensures a smoother process.

10. Review Coverage Periods and Renewals: Check when your coverage period ends and plan for renewal well in advance. Renewing policies on time will prevent coverage gaps and ensure continuous protection for crops against unforeseen events.

5.3 Discussion

This study investigates various aspects of crop insurance schemes in Haryana, focusing on the socioeconomic conditions of crop insurance holders, key determinants of insurance adoption, implementation challenges, and the impact on farmers' income. The discussion examines each objective in light of the findings and places them within the context of existing literature to highlight the study's contributions. The study's first objective explores the socioeconomic

conditions of crop insurance holders in Haryana, revealing critical insights into the demographic, educational, and economic profiles of these farmers. Findings show that most policyholders come from lower- to middle-income backgrounds, which aligns with previous studies suggesting that crop insurance schemes primarily appeal to financially vulnerable farmers seeking protection against unpredictable weather patterns and crop failures (Kumar & Gupta, 2021). Furthermore, the study found that a significant portion of insured farmers have limited education, which poses challenges in understanding complex insurance policies. This issue has been echoed in existing literature, where researchers argue that literacy levels significantly influence insurance participation and comprehension (Sharma et al., 2019). The data also indicate that crop insurance holders often depend heavily on agricultural income, reinforcing the importance of crop insurance as a financial safety net for these farmers. Previous research by Singh and Chauhan (2020) shows that insurance schemes serve as essential tools for income stability among economically vulnerable populations. The study thus reinforces the need for policies that address these socioeconomic characteristics, ensuring that crop insurance schemes are accessible, understandable, and appealing to farmers from diverse backgrounds. The second objective identifies the determinants influencing crop insurance scheme adoption in Haryana, revealing factors like government subsidies, premium affordability, and perceived risk mitigation benefits as key drivers. This study found that government subsidies play a significant role in farmers' decision to opt for crop insurance, which aligns with findings from earlier studies indicating that financial incentives are critical for promoting insurance adoption in rural areas (Agarwal & Gupta, 2020). Additionally, farmers are more inclined to participate in insurance schemes if they perceive a high risk of crop loss due to unpredictable weather events, supporting Pradhan et al.'s (2021) assertion that perceived risk is a primary motivator for insurance uptake among small and marginal farmers. The study also identified social influence and community participation as important determinants, with many farmers reporting that peer recommendations played a role in their decision to enroll. This finding is consistent with the work of Nair and Bhatt (2020), who argue that social networks and peer influence are vital factors affecting farmers' risk management choices. Such social dynamics suggest that community-based insurance awareness programs may enhance the reach and impact of crop insurance schemes. The third objective evaluates the challenges encountered in the implementation of crop insurance schemes, with findings indicating significant obstacles, such as delayed claim settlements, inadequate awareness, and bureaucratic inefficiencies. These findings are corroborated by previous studies, where researchers highlight that delayed claim processing undermines trust and discourages

participation (Chand & Kumar, 2019). Farmers reported prolonged waiting times for claim settlements, which negatively impacts their cash flow, especially during critical periods like the sowing season. Moreover, inadequate awareness and complex policy terms emerged as major challenges. This supports research by Rai and Gupta (2021), who found that a lack of awareness about insurance benefits and terms limits farmers' participation. Farmers often struggle to understand intricate policy details, which are rarely communicated in local languages or simplified formats (Singh, 2020). The study also identifies bureaucratic bottlenecks as barriers, echoing Kumar and Tripathi's (2018) observation that extensive paperwork and limited government support hinder effective insurance delivery. These challenges suggest that simplifying insurance procedures and improving transparency are essential for effective implementation. The final objective analyzes the impact of crop insurance on the income levels of farmers in Haryana. The findings reveal that crop insurance offers a measure of income stability by providing financial relief during crop failures, aligning with the work of Gupta and Mehta (2021), who found that insured farmers are better able to withstand crop loss shocks. The study indicates that insured farmers have a more stable income and are less likely to take on high-interest debt to cover losses, which supports Prakash et al.'s (2020) conclusion that crop insurance reduces income volatility and financial stress among farmers. However, the impact on overall income growth remains limited, as insurance primarily mitigates losses rather than directly contributing to income enhancement. This observation aligns with a study by Verma and Singh (2019), which suggests that while crop insurance is essential for risk management, it does not replace the need for broader income-generating policies. Thus, while insurance schemes help in stabilizing income, complementary policies that enhance productivity and access to markets are necessary for substantial income growth. The findings from each objective underscore the multifaceted role of crop insurance schemes, with implications for policymakers, insurers, and farmer welfare organizations. Crop insurance appears to be a crucial safety net for economically vulnerable farmers in Haryana, providing income stability and reducing financial risks associated with crop loss. The insights on determinants highlight the importance of subsidies, community influence, and risk perception in shaping insurance adoption, suggesting that targeted awareness campaigns could boost participation rates. Additionally, the implementation challenges point to a need for administrative reforms, including simplifying policy terms, enhancing transparency, and ensuring timely claim settlements. In terms of broader socioeconomic impacts, crop insurance alone may not suffice in enhancing farmers' income, but it complements other initiatives focused on agricultural productivity, market access, and financial inclusion. The study thus

calls for a holistic approach to agricultural risk management that integrates crop insurance with development programs aimed at income growth. This research contributes to the growing body of literature on crop insurance schemes in India by examining the unique conditions in Haryana. It reinforces existing knowledge on the socioeconomic characteristics and challenges of insured farmers while adding insights on the social determinants influencing insurance adoption. The findings also highlight the critical role of government support in improving scheme accessibility and the need for systemic reforms to streamline the insurance process. Future research could further explore the role of technology in enhancing claim processing and transparency, as well as the integration of crop insurance with income-generating agricultural policies for sustainable rural development. In sum, the study provides evidence that crop insurance is a valuable tool for risk mitigation but requires careful attention to local socio-economic dynamics and administrative efficiency to realize its full potential for Haryana's farmers.

5.4 Conclusion

This thesis offers a comprehensive analysis of crop insurance schemes in Haryana, delving into the socioeconomic conditions of policyholders, identifying key determinants for adoption, exploring challenges in implementation, and assessing the impact on farmers' income levels. The findings have significant implications for policymakers, insurers, and agricultural support organizations, underscoring the critical role crop insurance plays as a financial safety net for economically vulnerable farmers and as a tool for promoting agricultural resilience in the face of climate risks. The study highlights that the socioeconomic profile of crop insurance holders in Haryana primarily consists of small and medium-sized farmers, many of whom rely solely on agriculture for their livelihoods. This aligns with studies suggesting that smallholder farmers often exhibit greater vulnerability to climate risks and rely heavily on insurance as a risk mitigation tool (Kumar & Gupta, 2021). The predominance of lower-income, less-educated farmers among insurance holders reveals the critical role of crop insurance in providing financial security to disadvantaged communities. Yet, limited literacy and income levels may also present barriers to fully understanding and benefiting from complex insurance schemes, an issue well-documented in the literature (Sharma et al., 2019). These socioeconomic insights point to the necessity of designing insurance policies that are accessible, understandable, and affordable for farmers across varying economic and educational backgrounds. The findings reveal that several factors influence the adoption of crop insurance schemes, with government subsidies, affordability, perceived risk reduction, and social influence standing out as primary determinants. This supports the conclusions of studies emphasizing that financial incentives,

such as subsidies, play a significant role in promoting insurance adoption among farmers with limited disposable income (Agarwal & Gupta, 2020). Additionally, the perception of insurance as a buffer against crop loss due to unpredictable weather events aligns with findings by Pradhan et al. (2021), highlighting the importance of perceived risk in shaping farmers' insurance decisions. Social influence also emerged as a notable factor, with peer recommendations playing a key role in enrollment decisions, reflecting findings by Nair and Bhatt (2020) on the impact of social networks on farmers' risk management choices. These determinants underscore the need for targeted awareness campaigns and community-based promotion efforts to encourage insurance participation. By emphasizing the tangible benefits of crop insurance and addressing common misconceptions, such campaigns could significantly increase scheme uptake and ensure that more farmers benefit from the security insurance provides. The study identifies a range of challenges in implementing crop insurance schemes, including delayed claim processing, limited awareness, bureaucratic hurdles, and affordability issues. Delays in claim settlements emerged as a major source of dissatisfaction, consistent with the findings of Chand & Kumar (2019), who highlight that delayed processing times negatively affect farmers' trust and willingness to participate in insurance programs. Additionally, the complexity of policy terms, often presented in technical language, further complicates the process for farmers with limited literacy, as noted by Singh (2020). This issue underscores the importance of simplifying insurance documentation and enhancing transparency to make schemes more accessible to all farmers. Bureaucratic inefficiencies also impede effective implementation, particularly the excessive paperwork and lack of coordination among agencies, which echoes Kumar and Tripathi's (2018) findings on the role of administrative barriers in limiting insurance access. The results suggest that streamlining claim procedures, reducing paperwork, and providing assistance in local languages could significantly improve the overall experience for policyholders and encourage wider participation. Regarding the impact of crop insurance on farmers' income levels, the study finds that while insurance provides income stability by compensating for crop losses, it does not necessarily lead to income growth. This is consistent with Verma and Singh's (2019) observation that insurance primarily serves as a risk mitigation tool rather than a means of increasing income. Crop insurance reduces the financial burden on farmers after crop failures, allowing them to avoid high-interest debt and stabilize their livelihoods, as noted by Prakash et al. (2020). However, the study indicates that insurance alone may not be sufficient for income enhancement, especially in regions where farmers face challenges such as low productivity, limited access to markets, and inadequate infrastructure. For meaningful improvements in

income, crop insurance must be integrated into a broader development framework that includes policies aimed at enhancing agricultural productivity, market access, and financial inclusion. By combining insurance schemes with initiatives that address these complementary needs, policymakers can create a more holistic approach to improving rural incomes and reducing poverty. This study offers several recommendations to improve the effectiveness of crop insurance schemes in Haryana. First, simplifying insurance documentation and procedures could make schemes more accessible and understandable for farmers with limited literacy. Second, targeted awareness programs should emphasize the benefits of insurance, using local languages and community leaders to foster trust and improve participation. Third, government agencies should address bureaucratic delays and streamline claim processing to improve the overall experience for policyholders. Additionally, the study suggests that policymakers should consider linking crop insurance with other income-enhancing programs, such as agricultural extension services, input subsidies, and market access initiatives. This integrated approach could enhance the resilience and income levels of farmers, enabling them to invest in productivity-boosting technologies and practices. This study's findings highlight several areas for future research, particularly the potential of technology to improve the efficiency and transparency of crop insurance schemes. For instance, digital platforms could streamline claim processing, reduce paperwork, and allow for faster disbursement of payments, addressing one of the main implementation challenges. Future research could also explore the impact of bundled insurance and credit products on farmer welfare, examining how these products affect income levels, debt management, and investment in sustainable agricultural practices. Additionally, further studies could investigate the potential of parametric insurance models, which base payouts on specific triggers such as rainfall levels, to provide quicker and more predictable compensation for crop losses. Such models may offer a viable alternative to traditional insurance, especially for farmers in regions with high climate variability. In conclusion, crop insurance schemes play a vital role in promoting agricultural resilience and providing income stability for farmers in Haryana. While the schemes offer a critical safety net, several challenges must be addressed to maximize their impact, including improving accessibility, addressing bureaucratic delays, and promoting awareness. By considering the socioeconomic realities of farmers and adopting a more holistic approach, policymakers and insurers can enhance the effectiveness of crop insurance schemes, helping farmers manage risks and maintain their livelihoods. This study contributes to the understanding of crop insurance dynamics in Haryana and offers actionable insights for enhancing the design, implementation, and accessibility of these schemes.

5.5 Limitations

1. Limited Generalizability: The findings of this study may be specific to Haryana, and outcomes might vary across different regions due to variations in climate, crop types, and socio-economic factors.
2. Sampling Constraints: Due to logistical and budgetary limitations, a purposive sampling technique was used. This may not fully capture the diversity of farmer experiences and could introduce sample bias.
3. Data Reliability: Reliance on self-reported data from farmers and insurance officials can introduce biases or inaccuracies, as respondents may not recall events accurately or may respond based on perceived expectations.
4. Temporal Limitations: The study's findings may reflect only the current status of crop insurance schemes, which may evolve with new policies, technological advancements, or changes in government priorities.
5. Limited Scope of Variables: While some factors such as awareness and administrative efficiency were studied, other potentially influential variables (e.g., climate change impacts, socio-political influences) were beyond the scope.
6. Resource Constraints: Insufficient financial and manpower resources limited the extent of primary data collection, restricting the ability to conduct more in-depth, longitudinal studies across multiple seasons.
7. Lack of Comprehensive Technological Assessment: The study touches on technological tools for claims and data processing but does not fully explore emerging digital platforms or advanced tech interventions like remote sensing.
8. Policy Variability: The study may not account for frequent policy adjustments that affect crop insurance structures and processes, which can change implementation dynamics over time.
9. Farmer Literacy Levels: The study assumes a basic level of literacy among farmers for understanding insurance terms, which may not apply to all. This limits the depth of analysis on communication efficacy.
10. Exclusion of Non-Insured Farmers: The focus on insured farmers and policyholders means that the perspectives of those who have opted out of or lack access to insurance are not covered, limiting the understanding of barriers to enrolment.

5.6 Future Scope

1. Comparative Analysis with Other States: Expanding the study to include multiple states could provide insights into the differences and best practices that could inform policy adjustments specific to Haryana.
2. Longitudinal Studies: Conducting longitudinal studies to track the impact of crop insurance on farmers' financial stability over time would provide valuable data on the long-term effectiveness of such schemes.
3. Technology Integration Studies: Exploring the role of advanced technologies, such as remote sensing, AI, and block-chain, could reveal ways to improve efficiency in risk assessment, claim processing, and fraud detection.
4. Investigating Non-Participating Farmers: Future studies could examine why certain farmers do not participate in crop insurance schemes, revealing barriers and potential incentives to increase enrolment.
5. Impact of Climate Change: Given the influence of climate change on agriculture, future research could investigate how crop insurance schemes can adapt to and mitigate climate-related risks.
6. Gender-Based Impact Analysis: Examining the impact of crop insurance on female farmers could highlight unique challenges and opportunities for more inclusive scheme design.
7. Role of Financial Literacy Programs: Research could focus on the impact of targeted financial literacy programs in improving farmers' understanding and utilization of crop insurance.
8. Exploring Public-Private Partnerships: Analyzing the role of public-private partnerships in improving scheme efficiency and outreach could identify ways to better leverage resources and expertise.
9. Sustainability Assessment: Future studies could assess the long-term financial sustainability of crop insurance schemes for both the government and insurance providers.
10. Evaluating Community-Based Insurance Models: Research on alternative models, such as community-based insurance, might offer insights into more decentralized, community-driven approaches to agricultural risk management.

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Bibliography

QUESTIONNAIRE FOR A RESEARCH STUDY FOR PH.D. ON TOPIC: "SOCIO-ECONOMIC ANALYSIS OF CROP INSURANCE SCHEMES IN HARYANA"

Dear Sir/Madam,

I'm Priyanka Awasthi, a Ph.D. Research scholar, pursuing my doctoral degree under the Guidance of Dr. Rajendra Singh, Associated Professor of the Department of Economics, at Lovely Professional University, Phagwara. My research is to study ***"SOCIO-ECONOMIC ANALYSIS OF CROP INSURANCE SCHEMES IN HARYANA***. I am researching to identify the factors contributing to the recent decline in enrollment in a particular scheme. I would appreciate your insights on crop insurance programs in Haryana, as this information will be valuable in developing more effective crop insurance schemes in the future. The data gathered will solely be used for academic purposes. Please take a few minutes to complete this questionnaire. Your participation in this survey is essential to this research. Your responses will be kept confidential and only utilized for this academic study. I am genuinely grateful for your time and assistance.

Section-A

PERSONAL INFORMATION OF THE FARMER

Demographic Information: Please tick (√) and give appropriate information.

1.1 Name of the farmer : _____

1.2 Block : _____

1.3 Village : _____

1.4 Category : _____ (GENERAL/EWS/OBC/SC/ST)

1.5 Gender: Male ☐ Female ☐

1.6 Age : (i) 18 to 30 ☐ (ii) 31 to 40 Years ☐
Years (iii) 41 to 50 Years ☐ (iv) Above 50 Years ☐

1.7 Nature of the Family : (i) Joint family ☐ (ii) Nuclear family ☐
(ii) Unmarried ☐

1.8 Marital status : (i) Married

1.9 Educational Qualification : (i) Illiterate
(iii) Secondary Level
(v) ITI/Diploma/Agri

1.10 Family Size members	**:** (i) Up to 3	☐	(ii) Primary level ☐
		☐	(iv) Graduate/Professional ☐
	(iii) Above 6 members	☐	(ii) 4 to 6 members ☐

1.11 Secondary Income apart from Agriculture and allied farming: ☐ Yes No ☐

Source: -

(i) Government Job ☐
(ii) Private Job ☐
(iii) Self-Employed ☐
(iv) Professional (Advocate/Doctor/Engg.) ☐
(v) Pension ☐

Income:-

(i) Less than 50 thousand ☐
(ii) 50 Thousand to 1 Lakh ☐
(iii) 1 Lakh to 2.5 Lakhs ☐
(iv) 2.50 Lakhs to 5 Lakhs ☐
(v) More than 5 Lakhs ☐

To study the Socio-economic conditions of Crop Insurance holders in Haryana.

Section-B

FARM AND FINANCIAL CHARACTERISTICS

1.1 Farming Experience :

(i) Less than 5 years ☐
(ii) 5 to 10 years ☐
(iii) 10 to 15 years ☐
(iv) More than 15 years ☐

1.2 Category of land holding:

(i) Marginal (Up to 1 hectare) ☐
(ii) Small (1 to 2 hectare) ☐
(iii) Semi-Medium (2 to 4 hectare) ☐
(iv) Medium (4 to 10 hectare) ☐
(v) Large (Above 10 hectare) ☐

1.3 Landholding particulars (in acres)

Type of Land		**Total**
Owned by Farmer		
Leased in		
Leased out		

1.4 a) Do you have an Irrigation facility?

(i) Yes (ii) No

b) If yes, select your source of irrigation (Multiple selections are also possible)

(i) Canal (ii) Tube Well
(iii) Any Other

Section 1: Demographic Information

I am satisfied with my current socio-economic status.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

I feel financially secure in my current situation.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Section 2: Farming and Income

The size of my landholding for crop cultivation is adequate for my needs.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

My annual income from crop cultivation meets my financial needs.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Section 3: Crop Insurance

I am enrolled in a crop insurance scheme to protect my crops.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

1. The coverage and benefits provided by my crop insurance scheme are sufficient.
2. Strongly Disagree
3. Disagree
4. Neutral
5. Agree
6. Strongly Agree

Section 4: Challenges and Concerns

The premium rates for crop insurance are affordable for me.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

The claim settlement procedures for crop insurance are straightforward and easy to understand.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Section 5: Suggestions for Improvement

Crop insurance schemes should provide more support to farmers during crop loss incidents.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

There should be more awareness programs about the benefits of crop insurance for farmers.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Section 6: Overall Satisfaction

Overall, I am satisfied with the effectiveness of crop insurance schemes for farmers in Haryana.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

I would recommend crop insurance schemes to other farmers in Haryana.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

1. To identify the determinants of crop insurance schemes in Haryana

Awareness and Understanding

I am aware of the different crop insurance schemes available in Haryana.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

I understand the benefits provided by crop insurance schemes for farmers.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Access and Availability

Crop insurance schemes are easily accessible to farmers in Haryana.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

There are sufficient insurance agents or representatives available to assist farmers in enrolling in crop insurance schemes.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Affordability

The premium rates for crop insurance schemes are affordable for farmers in Haryana.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Trust and Reliability

I trust that the crop insurance schemes will provide adequate compensation in case of crop loss.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Perceived Benefits

Crop insurance schemes encourage farmers to adopt risk-reducing agricultural practices.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Crop insurance schemes contribute to the overall financial stability of farmers in Haryana.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Government Support

The government provides adequate support and subsidies to promote crop insurance schemes among farmers.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Communication and Awareness

There is sufficient communication and awareness campaigns conducted by the government or insurance agencies to educate farmers about crop insurance schemes.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Overall Satisfaction

Overall, I am satisfied with the effectiveness of crop insurance schemes in Haryana.

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

2. To evaluate the problems in implementation of crop insurance schemes in Haryana.

Section 1: General Information

Name:

Designation:

Duration of experience in crop insurance schemes:

A. Less than 1 year
B. 1-3 years
C. 3-5 years
D. More than 5 years

Section 2: Understanding of Crop Insurance Scheme

How well do you understand the objectives of the crop insurance scheme in Haryana?

A. Very well
B. Well
C. Moderately well
D. Poorly
E. Not at all

Have you received adequate training on the imple6mentation of crop insurance schemes?

A. Yes

B. No

Section 3: Challenges in Implementation

Which of the following do you consider as significant challenges in implementing crop insurance schemes in Haryana? (Select all that apply)

A. Lack of awareness among farmers about the scheme
B. Delays in premium payments
C. Inadequate risk assessment methods
D. Difficulty in verifying claims
E. Insufficient support from government agencies

How would you rate the coordination among different stakeholders involved in the implementation of crop insurance schemes?

A. Excellent
B. Good
C. Fair
D. Poor
E. Very Poor

Section 4: Communication and Outreach

How effective do you think the communication channels are in disseminating information about crop insurance schemes to farmers?

A. Very effective
B. Effective
C. Moderately effective
D. Ineffective
E. Very ineffective

Section 5: Administrative Processes

Rate the efficiency of administrative processes involved in handling crop insurance claims.

A. Excellent
B. Good
C. Fair
D. Poor
E. Very Poor

How would you rate the transparency in the selection of beneficiaries and claim settlements?

A. Highly Transparent
B. Transparent
C. Somewhat Transparent
D. Not Transparent

Section: Overall Assessment

Overall, how satisfied are you with the current implementation of crop insurance schemes in Haryana?

A. Very satisfied
B. Satisfied
C. Neutral
D. Dissatisfied
E. Very dissatisfied

3. To analyze the impact of crop insurance on income levels of farmers in Haryana.

Which crop insurance scheme are you enrolled in?

A. Pradhan Mantri Fasal Bima Yojana (PMFBY)
B. Weather-based Crop Insurance Scheme (WBCIS)
C. Other (please specify): [Text Box]

Impact on Income Levels

Crop insurance has helped me manage financia7l risks associated with crop losses.

1. Strongly Disagree
2. Disagree

3. Neutral
4. Agree
5. Strongly Agree

Crop insurance has increased my confidence in investing in better farming practices.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Crop Loss and Compensation

I have experienced crop loss in the past despite having crop insurance.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

The compensation received from crop insurance adequately covers my losses.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Satisfaction and Recommendation

Overall, I am satisfied with the impact of crop insurance on my income levels.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

I would recommend crop insurance to other farmers in Haryana.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Thank you for completing the questionnaire. Your valuable insights are crucial for advancing research. Your contribution is sincerely appreciated and will greatly benefit the study. Your time and effort are invaluable to our research endeavors.

Source for Each question used In the Questionnaire

Question Number	***Source from Literature***	***Authors***
1	*Socio-Economic Status Scale (SES Scale)*	*Brown, T. A. (2006)*
2	*Socio-Economic Status Scale (SES Scale)*	*Brown, T. A. (2006)*
3	*Research findings on landholding adequacy*	*Mishra, A. K. et al. (2019)*
4	*Research findings on income sufficiency*	*Mishra, A. K. et al. (2019)*
5	*Research findings on crop insurance enrollment*	*Kumar, A. et al. (2020)*
6	*Research findings on crop insurance coverage and benefits*	*Singh, R. K. et al. (2018)*
7	*Research findings on premium affordability*	*Sharma, S. et al. (2017)*
8	*Research findings on claim settlement procedures*	*Gupta, P. et al. (2019)*
9	*Research findings on support during crop loss incidents*	*Sharma, S. et al. (2017)*
10	*Research findings on awareness programs about crop insurance*	*Kumar, A. et al. (2020)*
11	*Research findings on satisfaction with crop insurance effectiveness*	*Mishra, A. K. et al. (2019)*
12	*Research findings on recommendation of crop insurance*	*Gupta, P. et al. (2019)*
13	*Research findings on awareness and understanding of crop insurance schemes*	*Singh, R. K. et al. (2018)*
14	*Research findings on access and availability of crop insurance schemes*	*Sharma, S. et al. (2017)*
15	*Research findings on premium rates affordability*	*Sharma, S. et al. (2017)*
16	*Research findings on trust in compensation provision*	*Gupta, P. et al. (2019)*
17	*Research findings on perceived benefits of crop insurance*	*Kumar, A. et al. (2020)*
18	*Research findings on government support for crop insurance*	*Mishra, A. K. et al. (2019)*
19	*Research findings on communication and awareness campaigns about crop insurance schemes*	*Singh, R. K. et al. (2018)*
20	*Research findings on satisfaction with crop insurance implementation*	*Kumar, A. et al. (2020)*
21	*Research findings on determinants of crop insurance scheme enrollment*	*Sharma, S. et al. (2017)*
22	*Research findings on impact of crop insurance on financial risks management*	*Gupta, P. et al. (2019)*
23	*Research findings on impact of crop insurance on investment in farming practices*	*Mishra, A. K. et al. (2019)*

24	*Research findings on experience of crop loss despite insurance coverage*	*Kumar, A. et al. (2020)*
25	*Research findings on adequacy of compensation for crop loss*	*Sharma, S. et al. (2017)*
26	*Research findings on satisfaction with impact of crop insurance on income levels* 9	*Singh, R. K. et al. (2018)*
27	*Research findings on recommendation of crop insurance to other farmers*	*Mishra, A. K. et al. (2019)*
28	*Research findings on awareness and understanding of crop insurance schemes*	*Sharma, S. et al. (2017)*
29	*Research findings on access and availability of crop insurance schemes*	*Gupta, P. et al. (2019)*
30	*Research findings on premium rates affordability*	*Kumar, A. et al. (2020)*
31	*Research findings on trust in compensation provision*	*Mishra, A. K. et al. (2019)*
32	*Research findings on perceived benefits of crop insurance*	*Sharma, S. et al. (2017)*
33	*Research findings on government support for crop insurance*	*Singh, R. K. et al. (2018)*
34	*Research findings on communication and awareness campaigns about crop insurance schemes*	*Kumar, A. et al. (2020)*
35	*Research findings on satisfaction with crop insurance implementation*	*Gupta, P. et al. (2019)*
36	*Research findings on determinants of crop insurance scheme enrollment*	*Mishra, A. K. et al. (2019)*
37	*Research findings on impact of crop insurance on financial risks management*	*Sharma, S. et al. (2017)*
38	*Research findings on impact of crop insurance on investment in farming practices*	*Singh, R. K. et al. (2018)*
39	*Research findings on experience of crop loss despite insurance coverage*	*Kumar, A. et al. (2020)*
40	*Research findings on adequacy of compensation for crop loss*	*Mishra, A. K. et al.*