Indian Journal of Applied Economics and Finance
Vol. 1 No. 1 (January 2025): pp: 107-126

UNDERSTANDING AGRICULTURAL HOUSEHOLD RISKS: A SYSTEMATIC LITERATURE REVIEW

Chandrarathne WRPK[1], Perera DAM[2], Gamage SK[3]

Faculty of Business Studies and Finance, Wayamba University of Sri Lanka

priyankac@wyb.ac.lk[1], aminda@wyb.ac.lk[2], gamage@wyb.ac.lk[3]

Abstract

The agricultural sector plays a fundamental role in economic development by supporting food security, employment, and income generation. Despite its importance, agriculture remains a high-risk sector due to exposure to various uncertainties. Recognising and understanding these risks is essential for farmers, financial institutions, insurers, policymakers, and other stakeholders to design effective risk management strategies and policies that support sustainable farming and resilience in agriculture. This literature review provides a comprehensive overview of the types and sources of risks encountered by agricultural households, synthesising insights from recent studies. Accordingly, the review aims (1) to identify and categorise the different types of risks affecting agricultural households, (2) to examine the primary sources of these risks, and (3) to analyse current trends and gaps in agricultural risk literature. A review of the 17 most relevant publications from 2013 to 2023 revealed seven primary categories of risks: weather and climate, production, financial, human or personal, property, price or market, and institutional risks. These risks were further grouped as internal risks those within the farmer's control, such as production and personal risks and external risks, like market and institutional factors beyond their control. The literature shows an emphasis on climate, production, and market risks, with property risk receiving less attention. Additionally, while risk sources are identified, they are not extensively analysed, highlighting an opportunity for deeper investigation. These findings underscore the need for targeted research on property and social risks and context-specific risk factors, contributing to informed policy and resilience-building in agricultural communities.

Keywords: Agricultural Risks, Risk Management, Sustainable Farming, Structural model

1. Introduction

Risk management is essential for individuals, organisations, and societies to navigate uncertainties, make informed decisions, and build resilience in facing challenges. The concept of risk spans various fields, including finance, insurance, project management, and public health, and is defined by Hardaker et al. (2015) as the potential for an event or situation to lead to undesirable consequences. In this context, risk involves the possibility of harm, loss, or outcomes that deviate from the expectations or objectives of those involved. This definition frames the perspective of risk in this study.

Within agricultural contexts, risk management is particularly critical as agriculture remains a high-risk sector with economic and social significance. Globally, approximately 2.6 billion people depend on agriculture for their livelihoods, especially in developing nations (Merry & Calderon, 2022). Smallholder farmers face frequent agricultural risks, including crop failures, livestock losses, asset damage, and threats from wildlife. Additionally, non-agricultural risks like health issues, accidents, and

Indian Journal of Applied Economics and Finance
Vol. 1 No. 1 (January 2025): pp: 107-126

the death of primary earners further destabilise households. These uncontrollable events severely impact farmers' incomes and living standards.

Lacking sufficient funds and access to formal financial mechanisms, many farmers rely on informal safety nets, such as community-based funeral societies, to manage unexpected expenses. However, frequent and severe risks can overwhelm these mechanisms, perpetuating a cycle of poverty (Liu, et al., 2013; Ranathunga et al., 2018; Zeng et al., 2021). This underscores the need for robust risk management strategies to support vulnerable farming communities and strengthen the rural economy.

Given this backdrop, it is crucial to systematically identify and categorise the types and sources of risks in agriculture. This article aims to provide a comprehensive overview of agricultural risks facing rural households by (1) identifying and categorising risk types, (2) analysing their primary sources, and (3) highlighting trends and research gaps within the literature. Additionally, this review discusses future research directions for developing resilient agricultural communities.

2. Background of the Study

The agricultural sector serves as a fundamental pillar in Sri Lanka's economy, contributing significantly to employment, food security, rural poverty alleviation, and economic growth. Encompassing a diverse range of activities—including paddy, tea, rubber, coconut, vegetable, fruit, export crops, livestock farming, and fisheries—agriculture employs nearly 70% of the rural population (Ministry of Agriculture, 2020). As shown in Figure 01, 89% of workers in this sector are employed informally, (Department of Census and Statistics, 2022) which limits their access to formal social protection and increases their vulnerability to economic shocks. According to the Agricultural Household Survey (2016/17), over 40% of Sri Lankan households engage in agriculture, with 94% involved in crop production and around 12% in livestock, underscoring the sector's importance to livelihoods nationwide.

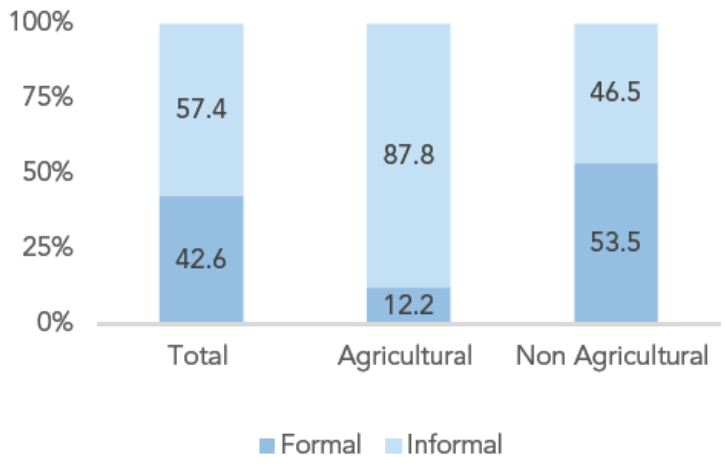

Figure 01: Distribution of informal/formal sector employment by economic sector
Source: (Department of Census and Statistics, 2022)

Despite its importance, agriculture in Sri Lanka is inherently risky due to a wide array of threats, including weather-related shocks, economic instability, environmental pressures, family crises, and other social or legal challenges (Rambukwella et al., 2020; Wickramasinghe, 2019; Department of Census and Statistics, Sri Lanka, 2019; Galappattige et al., 2011). These uncertainties, affecting both agricultural productivity and household income stability, foster cycles of vulnerability that are difficult to escape. While informal risk-sharing practices and limited social safety nets provide some relief, these mechanisms often fall short, particularly when shocks are frequent. Although government policies have attempted to support farmers, issues like resource inefficiency and the absence of formal risk management mechanisms restrict their resilience (Ranathunga et al., 2018). Limited understanding of risk types and sources further hampers the development of effective, tailored risk management strategies.

Despite the recognised importance of managing agricultural risks, current research lacks a structured framework to identify and categorise the types and sources of risks affecting agricultural households, particularly in developing countries like Sri Lanka. Much of the existing literature prioritises weather and production risks while underemphasising other impactful areas, such as nonagricultural risks that significantly affect livelihoods. Without a comprehensive analysis of these risks and their sources, policymakers and stakeholders lack the necessary information to create robust, context-specific strategies that address the full spectrum of challenges farmers face (Komarek et al., 2020).

Addressing this research problem is essential for several reasons. First, by categorising and analysing agricultural risks, this study will fill a critical gap in the literature, providing a holistic view of the challenges smallholder farmers face in developing countries. Such insights can inform policy development, enabling more effective resource allocation toward risk mitigation for Sri Lanka's agricultural sector. Given that agriculture remains a key driver of economic growth and food security, improved risk management strengthens resilience across the sector, benefiting both farmers and the broader economy. Furthermore, by identifying trends and gaps in existing literature, this study will guide future research towards under-researched areas like nonagricultural risks, vital for a comprehensive understanding of agricultural challenges. Thus, this research provides a foundational framework for developing context-specific interventions to reduce vulnerability, promote sustainable agriculture, and contribute to long-term poverty reduction in rural communities.

3. Methodology

This study adopted the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology to systematically identify and categorise the major types and sources of risk in the agricultural sector, covering the literature from 2013 to 2023. Initial searches were conducted in Science Direct, Emerald Insight, and Wiley Online databases using the search strings "types of risk in agriculture", "agricultural risk" and "risk and risk management in agriculture". Then supplemented by Google Scholar due to limited results on specific agricultural risks in the primary databases. The search initially yielded 125 articles, which were then screened and refined through multiple stages. First, articles not in English were excluded, leaving 103. Next, only journal articles and reports were retained, further reducing the selection to 78. This set underwent a title and abstract review to eliminate irrelevant topics, narrowing the count to 42 articles. Following a full-text review focused on specific inclusion criteria—relevance to agricultural risk types, language, and publication type—the

final selection was reduced to 17 key articles that directly contributed to the study's aims. Key information was systematically organised into a data extraction table capturing details like author, publication type, topic, and risk type, while a PRISMA flow diagram (Figure 02) illustrated each stage of article selection for transparency. This systematic PRISMA-based review addresses a gap in the literature by providing a thorough analysis of agricultural risks, establishing a replicable methodology and supporting the development of targeted risk management strategies.

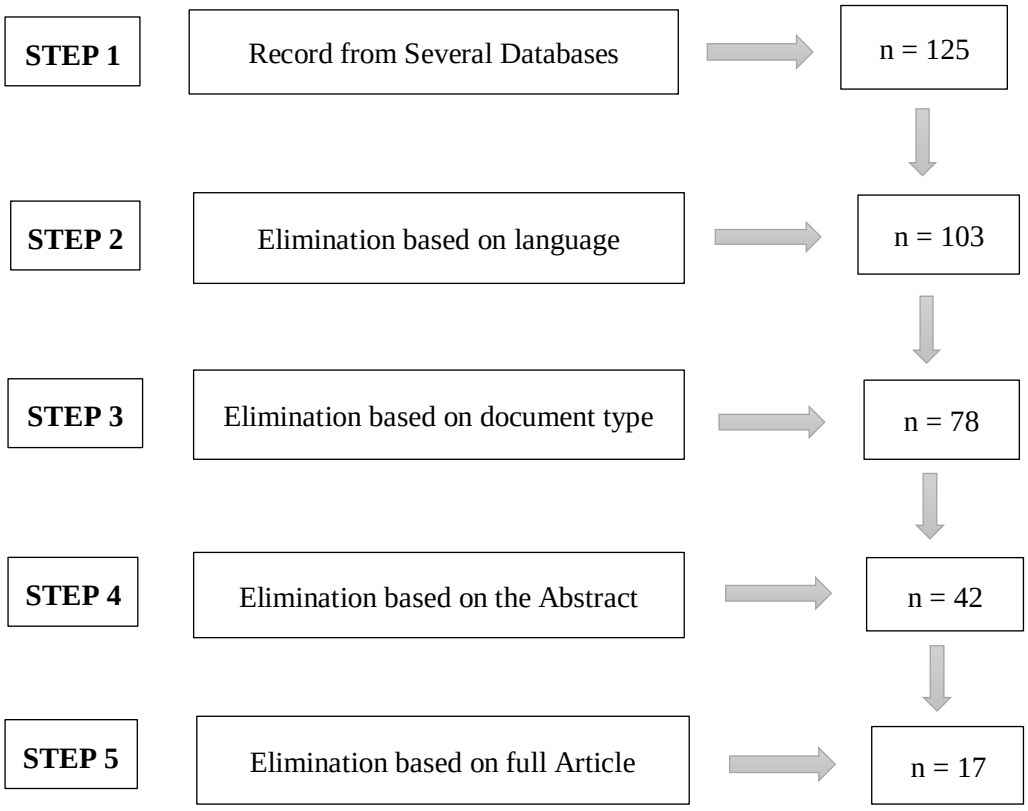

Figure 02: PRISMA flow diagram - Literature Elimination Process

Source: Developed by Author

4. Types and Sources of Risks in Agriculture

The agriculture industry is subject to numerous recurring risks that can disrupt production, financial returns, and the well-being of farming households. Agricultural risk encompasses various adverse events that impact different aspects of farming operations and household stability, arising from sources such as climate and weather changes, natural disasters, pests, and diseases. These risks expose agricultural households, especially in developing nations, to a range of shocks and challenges beyond

Indian Journal of Applied Economics and Finance
Vol. 1 No. 1 (January 2025): pp: 107-126

their control, often affecting household income and overall welfare (Hardaker et al., 2015). Given the broad scope of agricultural risk, it is essential to categorise these risks to better understand and manage them. Consequently, numerous studies have proposed different classifications to organise the various types and sources of agricultural risks, which help to inform effective risk management strategies.

Theuvsen (2013) identified and classified key agricultural risks into seven major categories: production, human resources, financial, production facility, market and price, political, and others. Figure 03 illustrates this classification of agricultural risks as outlined by Theuvsen (2013).

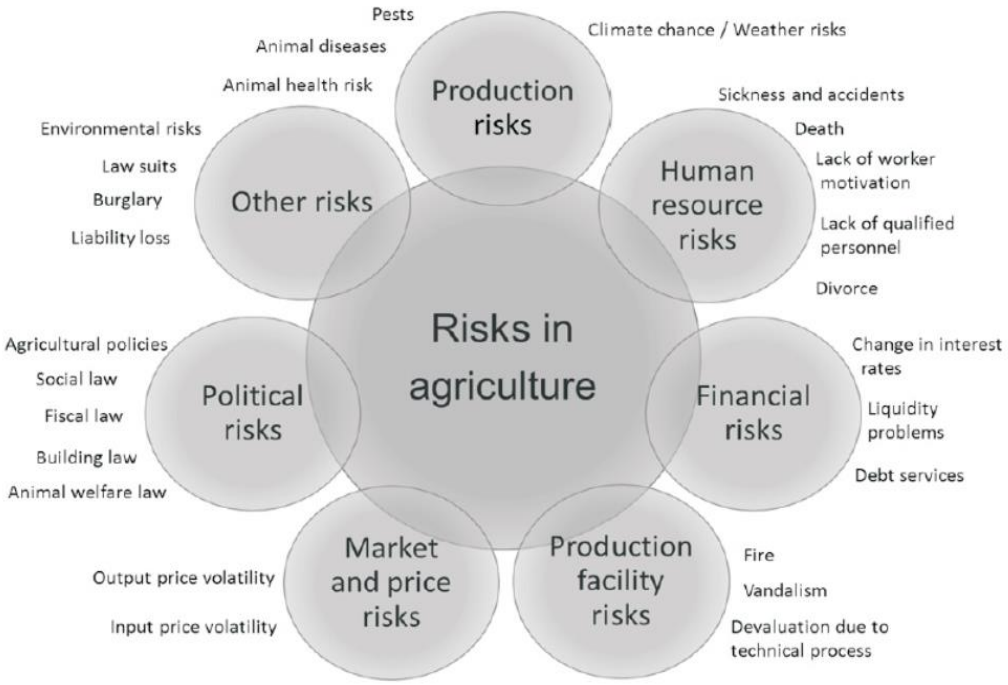

Figure 03: Risks in Agriculture

Source: Theuvsen (2013)

According to Kahan (2013), the main sources of risk in farming can be grouped into five categories: production, marketing, financial, institutional, and human. Climate change poses a serious threat to future food security, which makes it essential to discuss its implications for agriculture. Furthermore, Arias et al. (2015) in their report on Risk Management for Family Agriculture in Latin America and the Caribbean, grouped the main sources of risk in family farming into five categories: production, market, financial, institutional, and human.

Indian Journal of Applied Economics and Finance
Vol. 1 No. 1 (January 2025): pp: 107-126

According to the World Bank Group (2016), agricultural stakeholders face three primary categories of risk: production, market, and enabling environment risks. Each type of risk can vary in prominence depending on how the supply chain interacts with the market and its surrounding environment, potentially impacting specific segments or even the entire chain. Ullah et al. (2016), further expanded on agricultural risks by identifying two major types: business risks and financial risks. Business risks encompass production, market, institutional, and personal risks, while financial risks stem from various approaches to financing agricultural operations.

Jankelova et al. (2017) further classified risk factors into six groups: price risks (such as declines in output prices or increases in input costs), production or income risks (related to weather, animal diseases, output variability, crop diseases, and mechanical errors), institutional risks (involving policy changes, contract issues, and policy violations), financial risks (including capital costs, liquidity issues, share price declines, and exchange rate fluctuations), human or personal risks (from labour carelessness, life crises, and management proficiency), and property risks.
The European Commission (2017) identified the primary risks faced by farmers as price risks, production risks, and income risks, each affecting different aspects of agricultural activities. Similarly, Polycarp and Jirgi (2018), in their literature review, highlighted six key types of agricultural risks: production risk, market risk, financial risk, institutional risk, personal risk, and legal and environmental risk. Novickytė (2018) in her article titled Income Risk Management in Agriculture Using Financial Support, offered theoretical insights on agricultural risks, risk management strategies, and the role of financial support in mitigating risks. She emphasised that agriculture is particularly risky due to its exposure to various external and internal conditions, with farmers facing multiple types of risk from production and market risks to financial and institutional risks. According to Novickytė's classification, production risks encompass climate conditions, biological and environmental hazards, and technological advancements. Financial risks include factors such as access to loans, insurance, credit stability, and capital structure. Institutional risks arise from political regulations, tax policy, trade regulations, and the broader legal framework. Lastly, market or price risks are attributed to fluctuations in agricultural product prices, interest rates, exchange rates, supply and demand shifts, and changes in income or profitability. Figure 04 illustrates the main agricultural risks identified by Novickytė (2018).

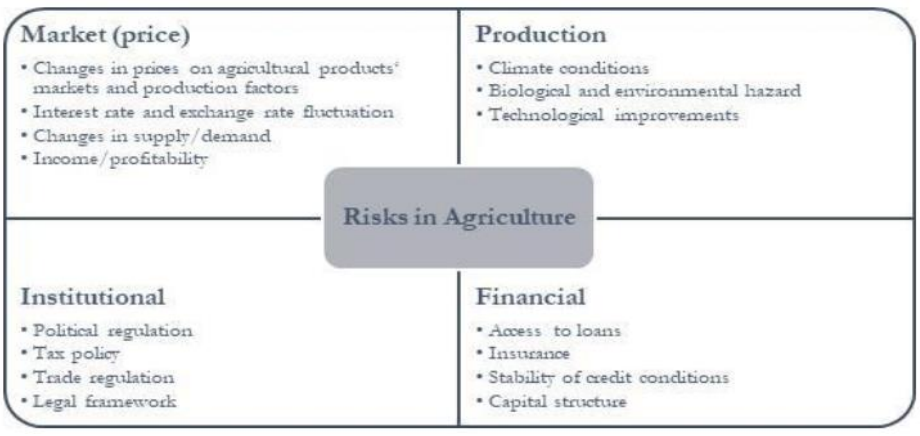

Figure 04: Risks in Agriculture

Source: Novickytė (2018)

A report by the Scottish Government highlighted the most common sources of risk in Scottish agriculture, using categories defined by the Organisation for Economic Co-operation and Development (OECD) in 2008. These categories include market/price risk, production/yield risk, institutional or regulatory risk, financial risk, and personnel risk (Thomas, 2018). Chavas (2019) contributed to this discussion by investigating the impacts of adverse shocks on agricultural production, with a focus on corn yield. His study found that multiple sources of production risk—like weather shocks and unexpected pest damage—affect agriculture, and demonstrated how management practices and technology can mitigate exposure to adverse shocks and reduce the overall cost of agricultural risk.

In their study, Komarek et al. (2020) identified five primary types of agricultural risks: production, market, institutional, personal, and financial. They noted that relatively few studies have examined multiple sources of risk concurrently. Atta and Micheels (2020) used data from a 2017 survey of grain and oilseed farmers in Saskatchewan, employing best-worst scaling and latent class cluster analysis to assess farmers' perceptions of key risk sources and influencing factors. The study included 16 risk factors across marketing, production, financial, institutional, and personal domains. Among these, 'variations in product prices' and 'rainfall variability' emerged as the most significant risks, with other notable risks including changes in input prices, pest and disease outbreaks, accidents and health issues, natural disasters, and quality standards compliance. Through latent class cluster analysis, they classified risk factors into two clusters: financial and business risks, and production and marketing risks. Findings indicated that variations in product prices, input costs, and rainfall were the most prominent risks in the financial and business risk cluster, while rainfall variability, product price changes, and natural disasters led the production and marketing risk cluster. Vroege and Finger (2020) explored weather risks and potential insurance solutions to enhance the resilience of European agriculture to extreme weather, concluding that significant potential exists for new insurance options in crop and livestock production. Lastly, Bencova and Bohacikova (2021), reviewed the agricultural risk literature, discussing the main sources of risk, various quantification methods, and risk management strategies for agricultural enterprises. They categorised agricultural risks into five main types: production, credit, personal, political, and economic.

Dhillon and Moncur (2023) reviewed the literature to identify the major barriers faced by small-scale farmers and the potential opportunities offered by advanced technologies. Their review highlighted key challenges including economics, marketing, climate change, lack of awareness, limited educational resources, inadequate infrastructure, and insufficient information and technology. Abirami et al. (2023) conducted a study to identify the challenges farmers face in adopting farm mechanisation. Their research identified a wide range of obstacles, which they categorised into economic, environmental, extension-related, infrastructural, informational, operational, policy-related, situational, technological, and capacity-related issues.

4.1. Summary of the Literature

According to the literature, different authors and studies have their own distinct categorisations of agricultural risk. Table 1 summarises the literature by using four columns, including author and year, type of source, research title, and types of risk.

Indian Journal of Applied Economics and Finance
Vol. 1 No. 1 (January 2025): pp: 107-126

Table 1: Summary of the Literature

Author and Year	Type of Source	Research Title	Country/region	Types of Risk
(Theuvsen, 2013)	Journal Article	Risks and Risk Management in Agriculture	Eastern Germany	production human resources financial production facility market and price political other
(Kahan, 2013)	Report	Managing Risk in Farming	Food and Agriculture Organisation of the United Nations (FAO)	production Marketing financial institutional human
(Arias, Chavarria, Ávalos, & Garcia-Winder, 2015)	Report	Risk Management for Family Agriculture in Latin America and the Caribbean	Latin America and the Caribbean	Production Market Financial Institutional human
(World Bank Group, 2016)	Report	Agricultural Sector Risk Assessment: Methodological Guidance for Practitioners	Niger, Ghana, Tanzania, Mozambique, Paraguay, Mongolia, Kenya, Senegal, Malawi, Rwanda, Kazakhstan, Tajikistan, Kyrgyzstan, Brazil (State of Paraiba), Brazil (State of Bahia)	production market environment
(Ullah, Shivakoti, Zulfiqar, & Kamran, 2016)	Journal Article	Farm risks and uncertainties: Sources, impacts and management	Literature Review	Business risk Financial risk
(Jankelova, Masar, & Moricova, 2017)	Journal Article	Risk factors in the agriculture sector	Slovakia	price production or income institutional financial human or personal property
(European Commission, 2017)	Report	Risk management schemes in EU agriculture Dealing with risk and volatility	Europe	price production income
(Polycarp & Jirgi, 2018)	Journal Article	Dealing with risks and uncertainties in Agriculture: implications for Central Bank of Nigeria interventions	Nigeria	Production Market Financial Institutional Personal

				Legal and Environmental
(Novickytė, 2018)	Journal Article	Income Risk Management in Agriculture using Financial Support	Europe	Production Market Financial Institutional
(Thomas, 2018)	Report	Risk management in agriculture	Scotland	Market/price Production/yield Institutional or regulatory Financial Personnel
(Chavas, 2019)	Journal Article	Adverse Shocks in Agriculture: The Assessment and Management of Downside Risk	US	Production risk
(Komarek, De Pinto, & Smith, 2020)	Journal Article	A review of types of risks in agriculture: What we know and what we need to know	Literature Review	Production Market Institution Personal financial
(Atta & Micheels, 2020)	Journal Article	Identifying risk in production agriculture: an application of best-worst scaling	Saskatchewan	marketing, production, financial, institutional, and personal financial and business risk cluster, Production and marketing risk cluster
(Vroege & Finger, 2020)	Journal Article	Insuring Weather Risks in European Agriculture	Europe	Weather risks
(Bencova & Bohacikova, 2021)	Journal Article	How to deal with the global concept of Risk in Agriculture? Comparative overview of the literature	Literature Review	Production Credit Personal Political economic risk
(Dhillon & Moncur, 2023)	Journal Article	Small-Scale Farming: A Review of Challenges and Potential Opportunities Offered by Technological Advancements	Literature Review	Economics Marketing climate change lack of awareness educational resources infrastructure

				information and technology
(Abirami , Jaisridhar, Kumar, Sheela, & Ganapati, 2023)	Journal Article	Pioneering Challenges: Exploring Multifaceted Obstacles in Agricultural Mechanisation in Tamil Nadu, India	India	economic, environmental, extension-related, infrastructural, informational, operational, policy-related, situational, technological, and capacity-related obstacles

Source: Developed by Author

Based on the literature review, the researcher categorised the multifaceted risks faced by farmers into seven main categories. Five of these categories production risk, financial risk, human or personal risk, price or market risk, and institutional risk, are widely recognised in the literature (Komarek et al., 2020; Thomas, 2018; Ratas & Nurmet, 2017; Pervez et al., 2016; Arias et al., 2015; Kahan, 2013; Hardaker et al., 2004). Production risks mainly arise from unpredictable weather events, pest and disease attacks (biosecurity), technological constraints and wild animal attacks. Financial risk consists of loans and interest rates and relates to the financing of farms. Human or personal risk is associated with farmers in the event of death, illness, injury, disability, or divorce. Price or market risk includes input and output price fluctuations and any market shocks. Institutional risk comprises unfavourable government-enforced changes in policy, rules, taxes, and regulations.

Weather-related risks are indeed among the main risks faced by farmers (Ankrah et al., 2021). These risks can have a significant impact on agricultural productivity, crop yields, livestock health, and food security (Duonget al., 2019). Acharya (2007) also asserted this. Therefore, considering its importance, weather and climate risk were categorised as one group of risks. Another major type of risk in agriculture is property risk. (Jankelova et al., 2017). Therefore, it was also considered in this study, and a total of seven main categories of risk were identified. Then we separated these risks into two groups: internal and external, as shown in Figure 05. The first group was formed by the risks that farmers have the power to prevent or mitigate by themselves, and the second group was formed by the risks arising from factors of the external environment over which farmers have no control.

Indian Journal of Applied Economics and Finance
Vol. 1 No. 1 (January 2025): pp: 107-126

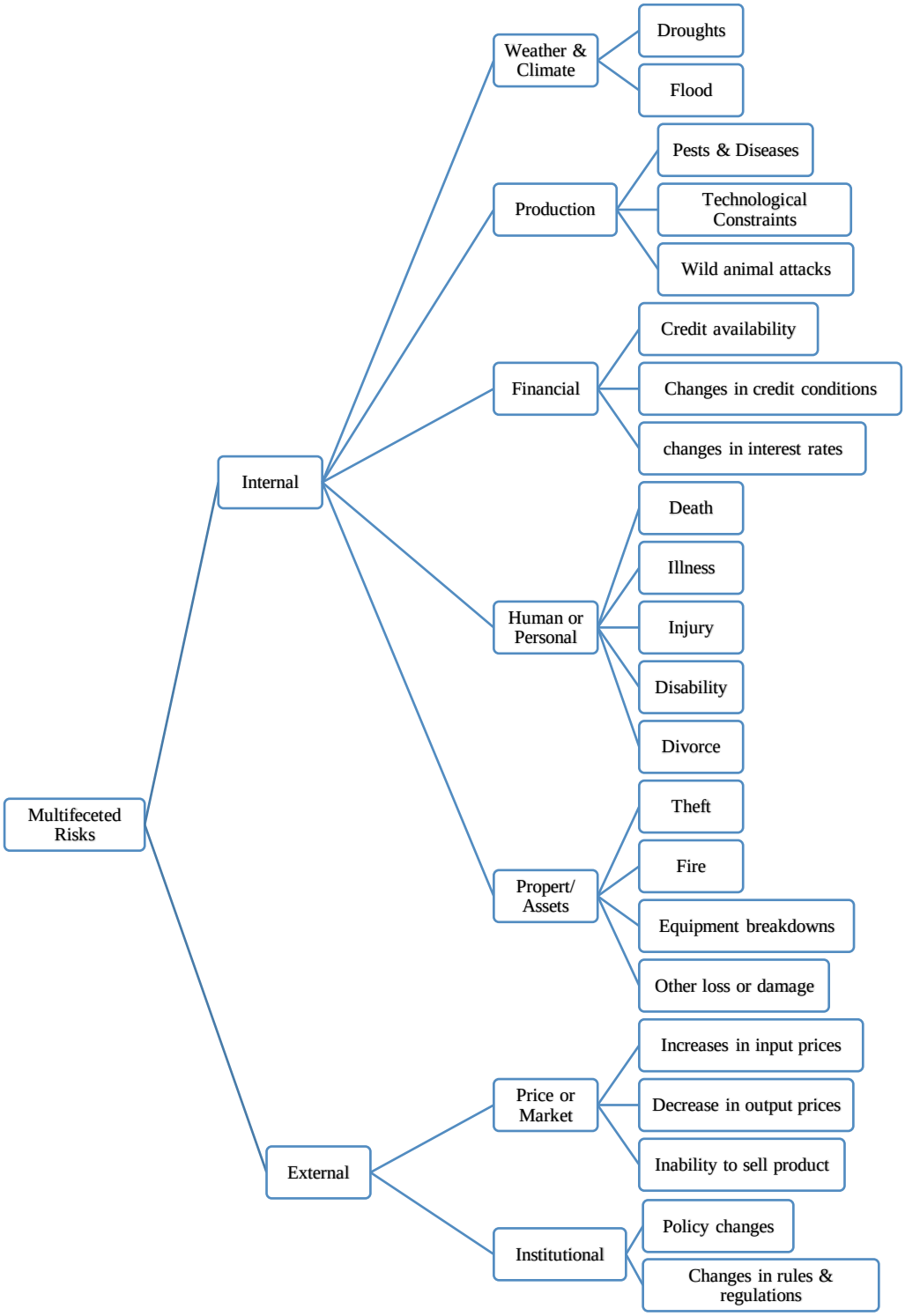

Figure 05: Framework for types and sources of risk faced by agricultural households
Source: Authors developed based on literature review

4.2. Internal and External Risk

Risks that households have the power to prevent or mitigate by themselves are grouped as internal, and they include production risk, financial risk, human or personal risk, and property or asset risk. The risks arising from factors of the external environment over which households have no control are categorised as external, and they include price or market risk and institutional risk.

4.2.1 Weather and Climate Risks

One of the main risks faced by farmers is weather and climate change (Arifah et al., 2022; Duong et al., 2019). Adverse weather and climate conditions are out of a farmer's control and also have significant importance not only among field crop farmers but also among livestock farmers. Agricultural producers might face different kinds of climate risks namely drought, hail damage, flooding, frosts and unseasonal weather such as changes in the rainfall pattern (Ratas & Nurmet, 2017). At the time of cultivation, farmers do not know how much rain will fall, or whether there will be a hail storm or drought. Sometimes low rainfall or drought may lead to low yields. Hail or heavy rains could damage or even wipe out crops. Farmers face great pain as a result of these occurrences since they cannot manage the loss of produce and agricultural income. In Sri Lanka, climate change is rapidly occurring, and therefore the country frequently faces more extreme weather conditions. (Rambukwella et al., 2020). Floods, excessive rainfall, lack of rain, and droughts are the major types of climate-induced risks in Sri Lanka. Further, drought is an almost annual phenomenon in many places in Sri Lanka, and it is seriously harming and financially depleting agricultural production as well as other economic and social activities like food consumption, the ability of farm households to invest, and rising healthcare costs. (Prasanna, 2018).

4.2.2 Production Risks

Farmers, unlike most other business owners, cannot precisely predict the output of their production processes. As a result, agriculture is often characterised by high levels of production risk or fluctuations, which is considered one of the most significant risks affecting the sector (Atta & Micheels, 2020). Because of that, the majority of studies focused solely on production risk (Komarek et al., 2020). Production risks are associated with factors that can impact crop yields and livestock production (Komarek et al., 2020; Thomas, 2018). Accordingly, the production variability is mainly influenced by changes in pests and diseases (Atta & Micheels, 2020; Komarek et al., 2020; Ratas & Nurmet, 2017), technological constraints (Duong et al., 2019; Thomas, 2018), and wild animal attacks (Sumitha & Shaharban, 2022; Desai et al., 2021; Ananya et al., 2020; Kumar 2018; Mehta et al., 2018).

Outbreaks of pests or diseases could also cause major yield losses in crops and livestock (Tofu et al., 2022; Hohl, 2018). Insects, worms, fungi, bacteria, viruses, birds, rodents, and occasionally other mammals are the numerous pests that can cause plant diseases (Polycarp & Jirgi, 2018). In general, pest infestations are less severe and more common during heading and ripening, although they can occasionally destroy an entire crop (Chatterjee & Oza, 2017). Therefore, farmers produce with uncertainty about their production.

Technology significantly influences the production risk in agriculture. New paddy seeds, chemical fertiliser, agrochemicals, new farm machines, and developed irrigation systems are some of the new technological methods applied in the paddy sector. Paddy yield is mostly determined by these new production techniques, and implementing new technologies and innovations in rice cultivation offers

the potential to boost paddy production and farming revenue for those who cultivate paddy (Bidzakin et al., 2020; Awotide et al., 2016). However, many reasons and barriers deter farmers from adopting the new farming innovations and techniques in cultivation (Karunathilaka & Thayaparan, 2016). These constraints hinder their ability to achieve optimal crop yields.

One of the main risks of lowering the crop yield in the field of agriculture is crop damage brought on by wild animal attacks (Sumitha & Shaharban, 2022; Desai et al., 2021; Ananya et al., 2020; Kumar, 2018; Mehta et al., 2018). Farmers in the main agricultural districts of Sri Lanka face serious threats from wild animals Compared to other wild animals, elephants are the most problematic. Additionally, animals, including monkeys, peacocks, wild boars, and rabbits, are harming crops (Sajla & Famees, 2021; Jayathilaka et al., 2021).

4.2.3 Financial Risks

Financial risk is the probability of threats to the financial health and stability of the agricultural farm that stem from problems with liquidity (Jankelova et al., 2017; Arias et al., 2015; Kahan, 2013), leverage position (Atta & Micheels, 2020; Polycarp & Jirgi, 2018; Hardaker et al., 2004), interest rate (Komarek et al., 2020; Polycarp & Jirgi, 2018; Thomas, 2018; Kuzman et al., 2017; Arias et al., 2015), and asset control. Farmers do not need to depend on external sources to finance farm operations if they keep financial reserves. Therefore, financial risks are mostly incurred by farmers, who actually borrow money to finance production.

A lot of agricultural production cycles are lengthy, and farmers have to budget for anticipated expenses that they are unable to recover until the product is sold (Austin & Baharuddin, 2012). Consequently, to pay off debt and fulfil other financial commitments, farmers must finance their operations and maintain sufficient cash flow. Thus, a lack of liquidity creates financial risk (Jankelova et al., 2017) and frequently appears as a precursor to financial issues. Short-term price drops or a one-year output glitch, such as a drought, can create liquidity issues. It means there is not enough cash for farmers to cover short-term expenses.

It is necessary to obtain the loans to protect cash flow and productive assets. Therefore, financial risk is associated with leverage in addition to liquidity. Excessive borrowing may create risk due to leverage (Polycarp & Jirgi, 2018). When debt levels are higher, the leverage becomes higher and can have a huge impact on overall financial performance. There is no financial risk owing to leverage if the farmer is not obtaining a loan and is 100% financed by himself (Hardaker et al., 2004).

Interest rate risk is another component of financial risk. When farmers borrow money at high interest rates, they may have to face particular difficulty in making debt repayments. Financial risk is exacerbated by the high cost of borrowing (Arias et al., 2015).

Financial risk may arise, depending on the farmer's capacity to acquire or keep access to assets like land and equipment that are necessary to manage the business. Thus, asset control is also another factor contributing to financial risk. In addition, the unanticipated calling-in of a loan by the lender, restricted credit availability, higher cash demand for family needs, and lack of adequate cash or credit reserves, are also aspects of financial risk (Hardaker et al., 2004).

Production, marketing, and financial risks are interconnected, as the ability to repay debt relies on production levels and the price received for that production. Similarly, financing production and storing goods depend on access to capital (Kuzman et al., 2017). However, the literature has paid less attention to financial risks compared to production and market risks, despite financial risks being of greater concern than personal risks (Komarek et al., 2020).

4.2.4 Personal Risk

Personal risks are specific to an individual and relate to problems with human health or personal relationships that affect farm activity or the farm household's well-being. Personal or human risk mainly results from events such as death, disability, injury or serious illness of a family member (Komarek et al., 2020; Polycarp & Jirgi, 2018; Kuzman et al., 2017; Chatterjee & Oza, 2017; Jankelova et al., 2017; Kahan, 2013; Girdziute, 2012). These health risks lead not only to higher medical costs or last-minute expenses but also to the need to hire outside labour, which can eliminate a farmer's profit margin. Nevertheless, farmers ignore these considerations, leaving them vulnerable to this rare but serious financial danger (Chatterjee & Oza, 2017). One of the most common causes of detrimental impacts on human health in a farming family is the use of pesticides (Komarek et al., 2020). Due to the lack of information or the high prices, it is difficult for farmers to obtain fewer toxic products, and they also do not use pesticide-safe types of equipment. As a result, agricultural workers are exposed to pesticides, fertilisers and other agrochemical products, and are affected by pesticide poisoning. Also, chronic kidney disease has become an endemic public health problem among farmers (Arias et al., 2015). In addition, disease transmission between livestock and humans also affects the loss of health (Komarek et al., 2020). Finally, these affect farm activity and the household's well-being too.

Human or personal risks may result from divorces, separations or quarrels in the family too (Komarek et al., 2020; Polycarp & Jirgi, 2018; Girdziute, 2012; Hardaker et al., 2004). Family quarrels or divorces can have a significant negative effect on the ongoing viability and profitability of an operation by changing the value of the property, reducing funding, and also bringing businesses into the loss zone (Kuzman et al., 2017).

Furthermore, the changing objectives of individuals involved in farming may have significant effects on the long-term performance of the operation (Hardaker et al., 2004). Retirement or old age is another form of personal risk if there is not enough replacement available in the family (Kuzman et al., 2017).

Compared to production and price risk, farmers are less concerned about health and personal risks (Atta & Micheels, 2020; Jankelova et al., 2017; Kuzman et al., 2017). Furthermore, compared to production and market risk, personal risk has received less attention in the literature. Only a limited number of studies examined personal risk (Komarek et al., 2020). However, it is obvious that, as with other types of risks, these personal or human risks must be recognised and managed if farming activities are to be successful.

4.2.5 Property or Asset Risks

Agricultural households have various types of properties. Houses and their contents, machinery and equipment (tractors, ploughs, harvesters, etc.) and vehicles are some of them. Farmers face various

property or asset risks that are related to theft, fire, and other potential losses or damages. These risks can have significant financial implications and may impact the farmer's ability to sustain their livelihood.

At times producers might have to contend with possible loss of production due to breakdown or unavailability of agricultural equipment. When agricultural equipment, such as a tractor, breaks down during the production season, farmers may be unable to harvest in time, which negatively impacts yields. Additionally, if a farmer relies on shared or hired equipment, they face the risk of equipment being unavailable when needed, further exacerbating production delays and losses (Girdziute, 2012).

Compared to other types of agricultural risks, there is very little literature on property risk, which has been given less importance (Jankelova et al., 2017).

4.2.6 Price or Market Risks

Price or market risks arise from uncertainties in agricultural commodity prices and market conditions. Therefore, input and output price volatility (Thomas, 2018; Chatterjee & Oza, 2017; Jankelova et al., 2017) and market access are considered the key aspects of price or market risk in agriculture (Komarek et al., 2020; Novickytė, 2018; Polycarp & Jirgi, 2018; Austin & Baharuddin, 2012; Schaffnit-Chatterjee, 2010).

Farmers experience fluctuations in prices that they receive for agricultural commodities, such as grains, oilseeds, and livestock. These fluctuations can be influenced by factors such as changes in supply and demand, weather conditions, global economic trends, trade policies, and geopolitical events (Komarek et al, 2020; Arias et al., 2015). These fluctuations in the prices of agricultural commodities can affect the income and profitability of farmers.

Agricultural producers face uncertainty about the prices they pay for inputs such as seeds, fertilisers, pesticides, and fuel. Fluctuations in the prices of inputs can affect the cost of production for farmers. Sudden increases in input costs without a corresponding increase in commodity prices can impact the profitability of farming operations.

Accordingly, the price of agricultural products is influenced by supply, demand, and production costs, which are subject to unpredictable market trends. The supply of a product is impacted by a combination of farmers' collective production decisions and external factors like weather that affect yields. Demand, on the other hand, is shaped by consumer preferences, income levels, the overall strength of the economy, and the supply and price of competing products (Kuzman et al., 2017). The cost of production per unit is determined by both input costs and yield. Although input costs are typically less variable than output prices, when combined with fluctuating yields, production costs become a significant source of risk. Price fluctuations may sometimes follow predictable seasonal or cyclical trends, but more often, unexpected changes in supply or demand cause market prices to shift unpredictably.

Another kind of market risk arises in the process of delivering the produce to the marketplace. Producers may find their efforts hindered if they are unable to get perishable goods to the appropriate market at

the right time. Absence of mature markets and infrastructure makes it a major source of risk (Austin & Baharuddin, 2012).

4.2.7 Institutional risk

Another significant source of uncertainty for farmers is institutional risk. Institutional risks arise from unexpected changes in policies, regulations, or institutional frameworks that affect farming activities. These changes can be introduced by the government or other formal and informal institutions, potentially disrupting agricultural operations and decision-making processes (Komarek et al., 2020).

The government can introduce risks by making unpredictable changes to policies and regulations. For example, tax laws, regulations governing chemical use, animal waste disposal rules, and the level of price or income support payments are government decisions that can significantly impact agricultural production or trade (Polycarp & Jirgi, 2018). Farmers have limited control over these changes. Due to these changes in government policies and regulations, farmers might have to face issues regarding obtaining seeds, other agrochemicals, and fertiliser on time. On the other hand, the quality of fertiliser also impacts their production. A recent example is the Import and Export Regulations No. 7 of 2021, implemented by the Sri Lankan government, which prohibits the importation of chemical fertilisers and other agrochemicals. Because of that, the cultivated paddy extent was reduced by 5%, and there was an average of 53% yield loss of paddy per acre (Bandara et al., 2022). Considering this paddy reduction and the recommendation of the Department of Agriculture on the usage of fertiliser, the fertiliser subsidy policy of the government for paddy cultivation has been changed to a "70% chemical and 30% organic fertiliser policy" in the 2022/23 Maha Season from a "100% organic fertiliser policy" (The Ministry of Finance, Economic Stabilisation & National Policies, 2022). The success and impact of such policies often depend on factors such as adequate support mechanisms, farmer education, and the availability of alternative inputs.

Trade regulations represent another significant institutional risk for agricultural households. Shifts in both national and international trade policies can directly influence farmers' production decisions and the prices they receive for their goods. For instance, in response to rising rice prices, the Sri Lankan government reduced the Special Commodity Levy (SCL) on rice imports starting November 2, 2021, to ensure affordable rice availability in the market. However, in December 2022, the government suspended import control licenses for all rice types except *Basmathi*, citing sufficient domestic rice stocks and an anticipated increase in production during the 2022/2023 Maha Season (The Ministry of Finance, Economic Stabilisation & National Policies, 2022). This back-and-forth illustrates how changes in trade regulations can disrupt planning for farmers.

5. Conclusion

This systematic literature review of agricultural household risks provides fresh insights and contributes novel findings to the understanding of risk landscapes in agriculture, addressing gaps in the classification, analysis, and management of diverse risk factors. By categorising risks into seven primary types- weather and climate, production, financial, human or personal, property, price or market, and institutional risks and further grouping these as internal and external risks, this review offers a structured perspective that enhances risk management frameworks.

A novel aspect of this review is its identification of under-explored risk areas, such as property risks, which are often overshadowed by the more extensively studied climate, production, and market risks. Highlighting these less-researched areas opens avenues for deeper, targeted inquiry into how property and social risks impact agricultural households differently across various contexts. Moreover, the distinction between internal and external risks adds nuance to risk management, suggesting that strategies should account not only for the types of risks but also for the degree of control that farmers can exercise over them.

The findings have significant implications for future research, underscoring the need to examine property risks and other specific factors more closely and within diverse agricultural settings. By exploring how these risks interact with more commonly recognised issues like climate variability, future research can help shape more comprehensive and resilient agricultural policies. This gap also suggests that research on the interdependence of risks such as how financial risks may be influenced by climate shocks, could yield actionable insights for a more integrated risk response.

Practically, this review provides stakeholders farmers, policymakers, financial institutions, and insurers with a refined framework to assess and prioritise agricultural risks. Recognising that some risks are more susceptible to mitigation through proactive measures, while others are influenced by external forces, allows for more effective risk management planning. For instance, insurers and policymakers could develop tailored risk management solutions, such as risk-transfer products for external risks and improved support systems for internal risks, to address the unique needs of agricultural communities.
In summary, the systematic approach and classification presented in this review not only advances the understanding of agricultural risks but also lays the groundwork for more resilient and adaptable risk management strategies in the agricultural sector. This refined framework and the identified research gaps provide a robust foundation for future studies and practical applications aimed at enhancing the sustainability and resilience of agricultural households worldwide.

References

Abirami, S., Jaisridhar, P., Kumar, A., Sheela, M., & Ganapati, P. S. (2023). Pioneering challenges: Exploring multifaceted obstacles in agricultural mechanization in Tamil Nadu, India. International Journal of Environment and Climate Change, 13(10), 3745–3753.

Ankrah, D. A., Kwapong, N. A., Eghan, D., Adarkwah, F., & Boateng Gyambiby, D. (2021). Agricultural insurance access and acceptability: Examining the case of smallholder farmers in Ghana. *Agriculture & Food Security, 10*(19).

Arias, J., Chavarria, H., Ávalos, I., & Garcia-Winder, M. (2015). *Risk management for family agriculture in Latin America and the Caribbean*. Inter-American Institute for Cooperation on Agriculture.

Atta, C., & Micheels, E. (2020). Identifying risk in production agriculture: An application of best-worst scaling. *International Food and Agribusiness Management Review, 23*(2), 283–299.

Austin, O. C., & Baharuddin, A. H. (2012). Risk in Malaysian agriculture: The need for a strategic approach and a policy refocus. *Kajian Malaysia, 30*(1), 21–50.

Bandara, S., Buhary, R., & Rambodagedara, M. (2022, December). *Import ban on chemical fertilizers and other agrochemicals: Short-term impacts on the paddy sector*. Hector Kobbekaduwa Agrarian Research and Training Institute.

Bencova, T., & Bohacikova, A. (2021). How to deal with the global concept of risk in agriculture? Comparative overview of the literature. *SHS Web of Conferences, 92*.

Chatterjee, A., & Oza, A. (2017). *Agriculture insurance*. Asian Development Bank (ADB). https://doi.org/10.22617/BRF178762-2

Chavas, J.-P. (2019). Adverse shocks in agriculture: The assessment and management of downside risk. *Journal of Agricultural Economics, 70*(3), 731–748.

Chen, K., & Hsu, C. (2014). Managing climate change risk in China's agricultural sector: The potential for an integrated risk management framework. *Journal of Integrative Agriculture, 13*(7), 1418–1431.

Department of Census and Statistics. (2020). *Sri Lanka labour force survey*. Department of Census and Statistics.

Department of Census and Statistics. (2021). *Statistical pocket book*. Publication Division, Department of Census and Statistics.

Department of Census and Statistics. (2022). *Sri Lanka labour force survey annual report*. Department of Census and Statistics.

Department of Census and Statistics, Sri Lanka. (2019). *Agricultural household survey 2016/17*.

Dhillon, R., & Moncur, Q. (2023). Small-scale farming: A review of challenges and potential opportunities offered by technological advancements. *Sustainability, 15*.

Duong, T. T., Brewer, T., Luck, J., & Zander, K. (2019). A global review of farmers' perceptions of agricultural risks and risk management strategies. *Agriculture, 9*(10).

European Commission. (2017). *Risk management schemes in EU agriculture: Dealing with risk and volatility*. European Union.

Gehrke, E. (2014). The insurability framework applied to agricultural microinsurance: What do we know, what can we learn? *The Geneva Papers on Risk and Insurance—Issues and Practice, 39*, 264–279.

Girdziute, L. (2012). Risks in agriculture and opportunities of their integrated evaluation. *Procedia - Social and Behavioral Sciences, 62*, 783–790.

Hardaker, J., Lien, G., Anderson, J., & Huirne, R. (2004). *Coping with risk in agriculture* (3rd ed.). CAB International.

Hardaker, J., Lien, G., Anderson, J., & Huirne, R. (2015). *Coping with risk in agriculture* (3rd ed.). CAB International.

Hardelin, J., & Lankoski, J. (2015). Climate change, water, and agriculture: Challenges and adaptation strategies. *EuroChoices, 14*(2), 10–15.

Hohl, R. M. (2018a). Agricultural markets and risk management. In *Agricultural risk transfer: From insurance to reinsurance to capital markets* (pp. 1–20). John Wiley & Sons, Ltd.

Hohl, R. M. (2018b). Agricultural perils and risk modelling concepts. In *Agricultural risk transfer: From insurance to reinsurance to capital markets* (pp. 45–101). John Wiley & Sons, Ltd.

Jankelova, N., Masar, D., & Moricova, S. (2017). Risk factors in the agriculture sector. *Agric. Econ. – Czech, 63*, 247–258.

Kahan, D. (2013). *Managing risk in farming*. Food and Agriculture Organization of the United Nations.

Karunathilaka, S. D., & Thayaparan, A. (2016). Determinants of farmers' perceptions towards the adoption of new farming techniques in paddy production in Sri Lanka. *Journal of Economics and Sustainable Development, 7*(12), 37–45.

Komarek, A., De Pinto, A., & Smith, V. (2020). A review of types of risks in agriculture: What we know and what we need to know. *Agricultural Systems, 178*.

Kuzman, B., Prodanovic, R., & Subic, J. (2017). Risk and uncertainty management in agricultural holding. In J. Goral & M. Wigier (Eds.), *Risk in the food economy – Theory and practice* (pp. 133–148). Institute of Agricultural and Food Economics National Research Institute.

Merry, A., & Calderon, J. S. (2022). *The landscape of microinsurance*. Microinsurance Network.

Ministry of Agriculture. (2020). *Annual performance report*. Ministry of Agriculture.

Novickytė, L. (2018). Income risk management in agriculture using financial support. *European Journal of Sustainable Development, 7*(4), 191–202.

Polycarp, I. M., & Jirgi, A. J. (2018). Dealing with risks and uncertainties in agriculture: Implications for Central Bank of Nigeria interventions. *CBN Bullion, 42*(3), 49–68.

Prasanna, R. (2018). Economic costs of drought and farmers' adaptation strategies: Evidence from Sri Lanka. *Sri Lanka Journal of Economic Research, 5*(2), 61–79.

Rambukwella, R., Vidanapathirana, R., Champika, J., & Priyadarshana, D. (2020). *Performance of Weather Index Insurance (WII) scheme in Sri Lanka*. Hector Kobbekaduwa Agrarian Research and Training Institute.

Ranathunga, L. N., Wijemanna, W. D., Sathsara, M., & Gamage, R. (2018). Agriculture in Sri Lanka: The current snapshot. *International Journal of Environment, Agriculture and Biotechnology (IJEAB), 3*(1), 118–125.

Ratas, M., & Nurmet, M. (2017). Risk management practices of agricultural enterprises: Evidence from Estonia. In J. Goral & M. Wigier (Eds.), *Risk in the food economy – Theory and practice* (pp. 41–52). Institute of Agricultural and Food Economics.

Schaffnit-Chatterjee, C. (2010). *Risk management in agriculture: Towards market solutions in the EU*. Deutsche Bank Research.

Schneider, L. (2010). *Risk and risk transfer in agriculture: Facilitating food security and poor farmer participation*. Oxfam America Research Backgrounders.

Singla, S., & Sagar, M. (2012). Integrated risk management in agriculture: An inductive research. *The Journal of Risk Finance, 13*(3), 199–214.

The Ministry of Finance, Economic Stabilization & National Policies. (2022). *Annual report*. The Ministry of Finance, Economic Stabilization & National Policies.

Theuvsen, L. (2013). Risks and risk management in agriculture. *Problemy Rolnictwa Światowego, 13*(4).

Thomas, G. (2018). *Risk management in agriculture*. Scottish Parliament Information Centre (SPICe).

Tofu, D. A., Woldeamanuel, T., & Haile, F. (2022). Smallholder farmers' vulnerability and adaptation to climate change-induced shocks: The case of Northern Ethiopia highlands. *Journal of Agriculture and Food Research, 8*.

Tsikirayi, C. M., Makoni, E., & Matiza, J. (2013). Analysis of the uptake of agricultural insurance services by the agricultural sector in Zimbabwe. *Journal of International Business and Cultural Studies, 7*(1).

Ullah, R., Shivakoti, G., Zulfiqar, F., & Kamran, M. A. (2016). Farm risks and uncertainties: Sources, impacts, and management. *Outlook on Agriculture, 45*(3), 199–205.

Vroege, W., & Finger, R. (2020). Insuring weather risks in European agriculture. *EuroChoices, 19*(2), 54–62.

World Bank Group. (2016). *Agricultural sector risk assessment: Methodological guidance for practitioners*. The World Bank.