

IMPACT OF CLIMATE CHANGE ON FINANCIAL SUSTAINABILITY IN AGRICULTURAL INDUSTRIES

T Adiatma¹, O Irianto², D Hyronimus¹, and J R Kuntag¹

¹Departement of Management, Faculty of Economic and Business, Universitas Musamus,
Jalan Kamizaun Mopah Lama, Merauke, 99611, Indonesia

²Departement of Accountancy, Faculty of Economic and Business, Universitas Musamus,
Jalan Kamizaun Mopah Lama, Merauke, 99611, Indonesia

Author coreponden : T Adiatma
E-mail: tiniadiatma@unmus.ac.id

Submit: 29 January 2024, Revised: 05 February 2024, Accepted: June 2024

DOI : <https://doi.org/10.22487/agroland.v11i1.2064>

ABSTRACT

Climate change nowadays became the most problematic matter including in agricultural industries. Agriculture area productivity affected national food security and a county's economic development. As an agricultural county, Indonesia must be ready to adapt and prepare for the worst impact of climate change. This paper aims to explore the impact of climate change on financial sustainability in agricultural industries. This research uses a systematic literature review method related to financial sustainability, climate change impact, and agriculture industries. The result shows that financial sustainability in agricultural industries must be impacted by climate change. The impact of climate change on agriculture industries is associated with reducing profitability, destroying capital, portfolio reallocation, and financial instability. Climate change caused environmental uncertainty that affects agricultural productivity. To reduce the impact of climate change on financial sustainability in agricultural industries, there must be a design of mitigation must be prepared and realized so agricultural industries are more prepared and ready to face climate change impact.

Keywords: Agricultural Industries, Climate.

INTRODUCTION

The human population on the earth increasing year by year making the demand for food also increase. Food is provided by the agricultural industry's ability to supply food for all humans on this planet. This makes agricultural industries an important part of human existence on Earth. This industry should be

thinking about how to make this business work to support human life. This business is a business that will exist for a long time. This industry's existence makes a contribution to the food security of a country. The capability of a country to provide food also contributes to the financial stability of a country. Food price became one factor that impact the inflation rate. The food commodity price is the

biggest contributor to the inflation rate in Indonesia (Santoso T, 2011). Agricultural industries are a business that should exist for a long time to support human existence and also country stability.

On the other side, the agriculture industries not a business that has no challenges. The agriculture sector contributes significantly to economic change by addressing a wide range of unemployment, income poverty, and food security issues (Mang'ana K M, et, al., 2023) . Agricultural industries also can face uncertainty. Agriculture industries depend on the weather and also the climate condition. Agriculture productivity depends on climate stability. Nowadays, climate stability is disturbed by climate change. Climate change will affect agricultural activities. In the course of climate change, farmers often suffer crop failures due to excessive rainfall and prolonged dry seasons (Harini R and Susilo B, 2017).

Climate change became the most popular subject nowadays. This issue impacts all aspects of human life. Climate change makes the weather condition more uncertain. This uncertain condition also impacts agriculture industries. Climate change makes floods more devastating to the environment, droughts, and others. Climate uncertainty makes the agriculture sector more devastating. Changing precipitation patterns, extreme temperatures and unpredictable weather conditions affect agricultural production, reduce crop yields and increase financial risks. A concerted and comprehensive effort is needed to strengthen the resilience of agribusiness as climate change becomes more pronounced. Only through the engagement of all stakeholders and sustainable approaches can we reduce losses in the agricultural sector caused by climate change and ensure future food system sustainability.

Climate change might make a significant impact on the economy direct or indirect (Giuzio M, 2019). Climate change forces every industry to prepare for the worst scenario. Financial sustainability

is key to maintaining business working in the worst scenario including climate change. Financial sustainability start grows, and maintains a business with financial sustainability. Financial sustainability is assessed by assessing capital, profitability, reporting, and planning. As an industry, agriculture also should think about financial sustainability. There is a lot of research conducted on climate change's impact on financial stability, such as research examining the influence of financial performance, operational performance on climate change disclosure, and firm value, revealing that both financial performance and operational performance have a significant positive effect on climate change disclosure. Moreover, it is found that only financial performance and climate change disclosure have a significant positive impact on firm value (Pratama H and Wijayanti R, 2022).

Additionally, research on reviewing the role of accountants in addressing climate change issues indicates that the accounting profession can play a greater role in various climate change issues (Mahardika D P K, 2020). However, research exploring the impact on the agricultural industry remains relatively scarce. This research aims to explore the impact of climate change on financial sustainability in agricultural industries.

METHODS

This study used a systematic literature review as a method for identifying, evaluating, and interpreting all the research evidence to provide answers to research questions. The stages in this process are: 1) identifying literature, 2) data cleaning, 3) analysis and synthesis, and 4) presentation of results (Bichler B F, 2022). The systematic review carried out involved a comprehensive and transparent search of various databases and unpublished material, which could be replicated by other researchers. To identify literature that is relevant to this research question, keywords are used by combining

the terms “climate change”, “financial sustainability”, and “agricultural industry”. Relevant literature was selected based on the type of information reported in the last five years (2019-2023). Each literature was analyzed descriptively, and to get a complete picture, results were categorized based on a combination of three keywords:

1) climate change and the agricultural industry, 2) climate change and financial sustainability, and 3) the impact of climate change on financial sustainability in the agricultural industry. The end of this whole process brings recommendations based on previous research.

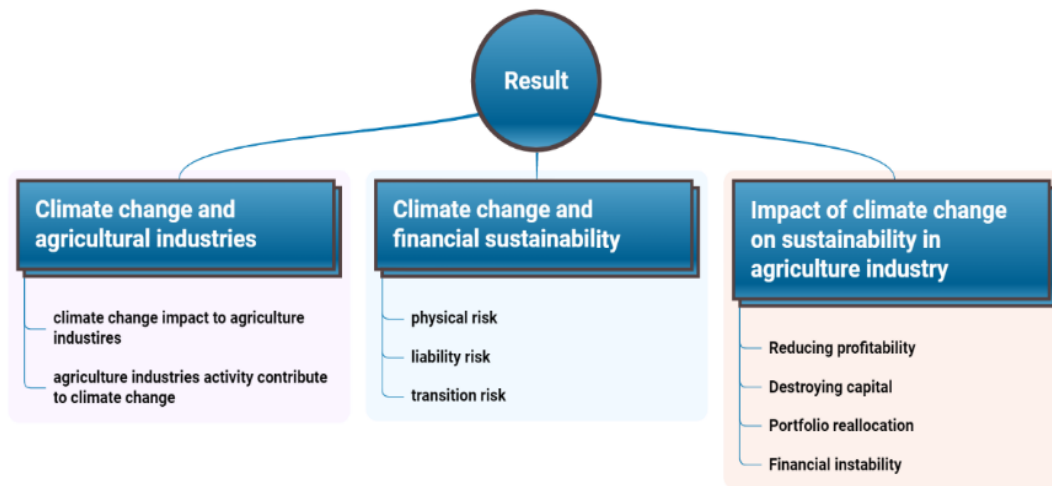


Figure 1. Research framework

RESULT AND DISCUSSION

Climate change and agricultural industries

Climate change makes natural hazards affecting agricultural production. The condition caused by climate change is extreme temperature both high and low, more frequent drought, heavy rain/rainstorm, short growing season, flood, landslide, soil erosion, wet season, cyclones/tornadoes, pest/disease outbreak, long winter/late spring, and late spring frost (Reza M S and Sabau G, 2022). The threats of climate change caused concern because crop production could be severely affected by climate uncertainty (Altieri M A and Nicholls C I, 2017).

There is a relationship between climate change and agriculture industries. Agriculture industries provide food based on climate change, but climate change gets impacts agricultural activities (D’Orazio P and Thole S, 2022). Agriculture industries

make a bad impact on climate change by using chemical fertilizers, pesticides, and herbicides. Agriculture also makes the forest percentage is decreased by transforming the forest became an agricultural land. The long supply chain of agricultural products also contributed to climate change. Agricultural activities that contribute to climate change are mono-cropping, land clearing, field burning, soil tillage, irrigation, using pesticides, using chemical fertilizer, manure management, food waste, food production, food distribution, size of the farm operation, using fossil fuel to operate the machine (Reza M S and Sabau G, 2022).

There are also dilemmas because global demand for agriculture industries products increasing. The human population in this world is increasing which made humans need more food to survive. Agriculture provides the largest share of food supplies and ensures a critical number of ecosystem services.

Agriculture is vital for food security and supports Sustainable DG zero hunger (Viana C M, et, al., 2022).

Climate change and financial sustainability

Financial sustainability refers to the ability of an organization or economy to meet its financial obligations in the present and future. It involves managing financial resources in a way that ensures long-term stability and growth. Financial sustainability important aspect to a firm's competitiveness and long-term survival of an organization (Githaiga P N, 2022).

Climate change, on the other hand, refers to the changes in the Earth's climate caused by human activities, such as the burning of fossil fuels and deforestation. The two are related in that addressing climate change often requires significant investment, both in terms of transitioning to clean energy sources and in adapting to the impacts of a changing climate. Ensuring financial sustainability can help organizations and governments make the necessary investments to address climate change and create a more sustainable future.

Climate change can be a systemic risk to the financial sector. This systemic risk has the potential to destabilize the system's normal function and make serious negative consequences for the real economy (Gelzinis G and Steele G, 2019). Climate risk affected financial stability through three aspects which are physical risk, liability risk, and transition risk. Physical risks come from the increasing frequency and severity of climate and weather-related events. Liability risks come from the increasing of people who suffer from loss due to climate change and seek compensation from those responsible. Transition risks come from sudden and disorderly adjustment to a low-carbon economy (Marx C, 2020).

Impact of climate change on financial sustainability in agricultural industries

Climate change impacts agriculture industries, and this also affected financial

sustainability (Malhi G S, Kaur M and Kaushik P, 2021). There is some effect of climate change on financial sustainability in general 1) destroying the capital of firms and reducing profitability, 2) portfolio reallocation, and 3) credit expansion because of financial instability (Dafermos Y, et, al., 2018). There's a more detailed explanation of how climate change impacted financial sustainability in agriculture industries.

Reducing profitability.

Financial sustainability must be maintained by increasing the profitability of the business. Unfortunately, agriculture industries that depend on the environment hard to avoid climate uncertainty. This makes a huge chance of reducing profitability in agricultural industries. This aspect must become a consideration to plan a business that maintains financial sustainability in agricultural industries. Crops might be destroyed before they can be harvested. So, this makes no profit for the business. This also just reduces the number of tilths, so the profit cannot be maximized. Operating costs must be also counted in agriculture industries (Echhelh A, et, al., 2020).

Climate change can significantly impact the profitability of agriculture industries by causing crop failures, droughts, and other challenges for farmers. These impacts can occur due to a variety of factors including:

- a. Rising temperatures and changes in precipitation patterns, can affect the growth and yield of crops.
- b. Increased frequency and severity of extreme weather events such as floods, hurricanes, and droughts, which can damage crops and infrastructure.
- c. Changes in the distribution of pests and diseases, can impact crop health and yields.
- d. The reduction in the amount and quality of available water for irrigation can affect crop growth.

These challenges can lead to reduced crop yields, higher costs, and decreased

profitability for agriculture businesses. Increasing the frequency of natural disasters can lead to increased insurance costs, which can also reduce profitability.

Destroying capital. Climate uncertainty make floods, storms, landslide, and other disaster destroy the capital in agricultural industries. This capital usually has a big value to the agricultural industries. If this is destroyed, the business needs a big cap to restore the capital. For example, if there's a landslide, the agriculture industries need to move to a new place to build again their business.

Climate change can have a significant impact on the capital of agriculture industries by causing damage to crops, infrastructure, and equipment. Extreme weather events such as floods, droughts, and storms can destroy crops and damage farm equipment, reducing the value of capital assets. Additionally, changes in precipitation patterns and rising temperatures can make it more difficult to grow certain crops, leading to a decrease in the value of farmland. These factors can also make it more difficult for agriculture businesses to secure financing, as lenders may be hesitant to invest in businesses that are facing increased risks due to climate change.

The destruction of capital can also lead to a decrease in productivity, as farmers may have to invest more money to replace damaged assets or invest in new equipment. This can lead to a decrease in profitability and the ability to generate cash flow, which can make it difficult for agriculture businesses to meet their financial obligations and maintain long-term financial stability.

Portfolio reallocation. Climate uncertainty make floods, storms, landslide, and other disaster destroy the capital in agricultural industries. This capital usually has a big value of capital to the agricultural industries. If this is destroyed, the business needs a big cap to restore the capital. For example, if there's a landslide, the agriculture industries need to move to a new place to build again their business.

The impact of climate change on profitability in agriculture industries makes it necessary for investors to reallocate their portfolios to minimize risk and capitalize on new opportunities. This may involve divesting from companies and industries that are heavily impacted by climate change and investing in companies and industries that are better positioned to adapt to and mitigate the effects of climate change.

For example, investors may choose to reduce investments in companies that rely heavily on water-intensive crops and invest in companies that focus on drought-resistant crops or precision agriculture. Investors may choose to reduce investments in companies that rely on fossil fuels and invest in companies that focus on renewable energy sources, as the transition to clean energy is likely to accelerate in the face of climate change.

It is important to note that portfolio reallocation should be done in a strategic and thoughtful manner, taking into account the investor's risk tolerance and financial goals. It is also important to consider the long-term implications of climate change and not just short-term trends. Professional financial advice would be recommended to make the most appropriate decisions.

Financial instability. Climate change can lead to financial instability in agriculture industries by causing crop failures, droughts, and other challenges for farmers. These impacts can lead to reduced crop yields, higher costs, and decreased profitability for agriculture businesses. As a result, these businesses may struggle to meet their financial obligations and maintain long-term financial stability. For instance, farmers may face difficulties to meet their debt payments, or they may have to sell their assets or land to pay off loans. The destruction of crops and infrastructure can lead to increased insurance costs, which can also reduce profitability and make it more difficult for agriculture businesses to maintain financial stability.

Climate change can also make it more difficult for agriculture businesses to secure financing, as lenders may be hesitant to invest in businesses that are facing increased risks due to climate change. This can make it difficult for agriculture businesses to invest in new equipment, infrastructure, or technology, which can further reduce productivity and profitability.

The financial instability in agriculture industries can lead to a chain reaction, affecting other industries and the economy as a whole. Governments and organizations can help mitigate these impacts by investing in climate-resilient agriculture practices, such as crop diversification, precision agriculture, and water management. Additionally, investing in research and development to improve crop varieties and farming practices that are more tolerant to changes in temperature and precipitation can help agriculture businesses adapt to the impacts of climate change and maintain financial stability.

The agricultural industry's failure to provide the food market demand can lead to financial instability. Food price became a factor that is included in the inflation factor. A country that has high inflation because of food prices also can lead into a country's bankruptcy. Agricultural financial instability must be a certain condition in the future if we can handle climate change. Climate change is an absolute threat to the financial system's stability (Gelzinis G and Steele G 2019). Climate change can make financial shock in countries, and high-income countries are not an exception (Mandel A, et, al., 2021).

Governments and organizations can help mitigate these impacts by investing in climate-resilient agriculture practices, such as crop diversification, precision agriculture, and water management. Additionally, investing in research and development to improve crop varieties and farming practices that are more tolerant to changes in temperature and precipitation can help agriculture businesses adapt to

the impacts of climate change and maintain financial sustainability, maintain their capital. Financial sustainability is counted by some indicators such as 1) growth, 2) survival ability, 3) acceptable overall earning risk, and 4) attractive earning risk profile (Wang H, et, al., 2019).

Financial regulators and also who are working in agriculture industries must think about how to emerge systemic risk of climate change on financial sustainability. There is an important financial decision in business as several of the organizational activities and factors that contribute to corporate failure can be managed with an effective decision-making process from proper strategies and financial management (Al Muhairi M and Nobanee H, 2019). logistic and financial support must be available and integrated into the food-producing system in a country to make a circular economy work (Reza M S and Sabau G, 2022). Reducing the impact of climate change on the financial sustainability of agricultural industries also must be prepared the working people to access financial insurance to reduce financial risk.

CONCLUSION

The result of this research is financial sustainability in agricultural industries impacted by climate change. Financial sustainability is counted by some indicators such as 1) growth, 2) survival ability, 3) acceptable overall earning risk, and 4) attractive earning risk profile. The impact of climate change on financial sustainability in the agriculture industry is shown on reducing profitability, destroying capital, portfolio reallocation, and financial instability. Overall, the impacts of climate change on the agriculture industry can have a ripple effect on the economy as a whole, which highlights the importance of addressing climate change and investing in climate-resilient practices to ensure financial sustainability for the industry and beyond. The limitation of this research is a

scientific resource such as articles that are being collected to construct the idea about climate change's impact on financial sustainability in agriculture industries is still limited.

ACKNOWLEDGMENTS

Universitas Musamus supports this research so it can be presented and published in ICEFS 3rd.

REFERENCES

- Al Muhairi M and Nobanee H, 2019. Sustainable financial management *SSRN*.
- Altieri M A and Nicholls C I, 2017. The adaptation and mitigation potential of traditional agriculture in a changing climate *Clim. Change* **140** 33–45.
- Bichler B F, Petry T, Kallmuenzer A and Peters M, 2022. Get on Task: A Pragmatic Tutorial on Planning and Conducting a Systematic Literature Review *Contemp. Res. Methods Hosp. Tour*.
- D'Orazio P and Thole S, 2022. Climate-related financial policy index: a composite index to compare the engagement in green financial policymaking at the global level *Ecol. Indic.* **141** 109065.
- Dafermos Y, Nikolaidi M and Galanis G, 2018. Climate change, financial stability and monetary policy *Ecol. Econ.* **152** 219–34.
- Echchelh A, Hess T and Sakrabani R, 2020. Agro-environmental sustainability and financial cost of reusing gasfield-produced water for agricultural irrigation *Agric. Water Manag.* **227** 105860.
- Gelzinis G and Steele G, 2019. Climate change threatens the stability of the financial system *American Prog.*
- Githaiga P N, 2022. Revenue diversification and financial sustainability of microfinance institutions *Asian J. Account. Res.* **7** 31–43.
- Giuzio M, Krušec D, Levels A, Melo A S, Mikkonen K and Radulova P, 2019. Climate change and financial stability *Financ. Stab. Rev.* **1**
- Harini R and Susilo B, 2017. Kajian Spasial Dampak Perubahan Iklim Terhadap Produksi Pertanian *Agripita J. Agribisnis dan Pambang. Pertan.* **1** 14–20.
- Mahardika D P K, 2020. Meninjau Peran Akuntan dalam Menanggulangi Isu Perubahan Iklim *J. Akunt. Multiparadigma* **11** 581–99.
- Malhi G S, Kaur M and Kaushik P, 2021. Impact of climate change on agriculture and its mitigation strategies: A review *Sustainability* **13** 1318.
- Mandel A, Tiggeloven T, Lincke D, Koks E, Ward P and Hinkel J, 2021. Risks on global financial stability induced by climate change: the case of flood risks *Clim. Change* **166** 4.
- Mang'ana K M, Ndyetabula D W and Hokororo S J, 2023. Financial management practices and performance of agricultural small and medium enterprises in Tanzania *Soc. Sci. Humanit. Open* **7** 100494
- Marx C, 2020. Climate change and financial sustainability: a regulator's perspective *ERA Forum* vol 21 (Springer) pp 171–5.
- Pratama H and Wijayanti R, 2022. Pengungkapan perubahan iklim: faktor penentu dan konsekuensinya terhadap nilai perusahaan *Eqien-Jurnal Ekon. dan Bisnis* **10** 472–8.
- Reza M S and Sabau G, 2022. Impact of climate change on crop production and food security in Newfoundland and Labrador, Canada *J. Agric. Food Res.* **10** 100405.
- Santoso T, 2011. Aplikasi model GARCH pada data inflasi bahan makanan Indonesia *J. Ilm. Aset* **13** 65–76.
- Viana C M, Freire D, Abrantes P, Rocha J and Pereira P, 2022. Agricultural land systems importance for supporting food security and sustainable development goals: A systematic review *Sci. Total Environ.* **806** 150718.

Wang H, Huang J and Yang Q, 2019.
Assessing the financial sustainability of
the pension plan in China: The role of

fertility policy adjustment and
retirement delay *Sustainability* **11** 883.