Smith, E. A., & Hayden, M. T. (2025). A Systematic Literature Review of the Economic Sustainability of Farm Enterprises and a Future Research Agenda. *Accounting, Finance & Governance Review*, *34*. https://doi.org/10.52399/001c.137123

PUBLISHED RESEARCH ARTICLES

A Systematic Literature Review of the Economic Sustainability of Farm Enterprises and a Future Research Agenda

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Keywords: economic sustainability, financial sustainability, sustainable agriculture, farm enterprises, systematic literature review

https://doi.org/10.52399/001c.137123

Accounting, Finance & Governance Review

Vol. 34, 2025

Sustainability is an issue of global concern, especially in agriculture where balancing food production for a growing population with environmental impact is vital. This systematic literature review focuses on the economic pillar of sustainability of farm enterprises. Gaps in this area of research are revealed, including the lack of attention this issue has received in business and accounting journals, a dearth of qualitative studies on this topic, and the absence of insights into the financial impact of environmental policy changes on farm enterprises. A future research agenda to contribute to developing the literature in this area is provided.

1. Introduction

Sustainability has become an area of focus globally and is becoming more prevalent in our daily lives. Transitioning to more sustainable practices throughout all aspects of our society is considered the primary answer for the most threatening challenge facing the planet – climate change. As awareness increases, the focus on sustainability and the impact of climate change on humanity is permeating all disciplines. Sustainability is a broad concept and encompasses many elements. However, a widely recognised "three-pillar conception of sustainability" best describes three intertwined categories of sustainability: social sustainability, environmental sustainability, and economic sustainability (Gibson, 2006). This three-pillar concept was adopted by the United Nations (UN) when developing its sustainable development goals (SDGs) (United Nations, 2015). Of these goals, SDG 2 specifically emphasises the important role of the agricultural industry in its title "End hunger, achieve food security and improved nutrition and promote sustainable agriculture". This connection between SDG 2 and climate change is becoming increasingly significant for the agricultural industry as it rises to the challenge of achieving this goal while simultaneously reducing greenhouse gas emissions.

Climate change itself is impacting the agricultural industry in many ways, including unpredictable temperature and weather patterns, altered growing seasons, and changes in precipitation. Meanwhile, the industry is being highlighted as a potential area where a reduction in emissions must be achieved (Smith et al., 2008). The industry is a significant contributor to greenhouse gas emissions for various reasons including enteric fermentation

in livestock, the use of synthetic fertilisers and energy-intensive requirements for machinery, and irrigation systems (Challinor et al., 2014; Malhi et al., 2021). The pressures on farmers are increasing due to a growing worldwide population that requires more nutritious food to be produced. The challenge of achieving food security and balancing environmental sustainability is a global concern.

In addition to food production, the agrifood sector serves as a source of income and employment, particularly in developing countries. These nations face significant adaptation challenges, which can lead to loss of income and wellbeing (Food and Agriculture Organization of the United Nations, 2023a). Factors such as currency weakness, price inflation and low incomes threaten farmers' ability to purchase agricultural inputs, particularly in countries with a history of conflict and instability (Food Security Information Network, 2024). Farms worldwide are experiencing new challenges, and small-scale farms in low-income countries are particularly vulnerable to the impacts of climate change and natural resource depletion (Food and Agriculture Organization of the United Nations, 2021). Reports by international organisations emphasise the need to adapt agrifood systems to address environmental, social and economic issues to work towards long-term sustainability and resilience (Food and Agriculture Organization of the United Nations, 2023b), and the importance of a holistic understanding of the difficulties experienced by farm enterprises.

The agricultural industry is at a critical juncture where it must implement fundamental changes to move towards more environmentally sustainable farming practices. It is important to acknowledge that for a farm enterprise to be considered sustainable, it must embrace all three pillars of sustainability: social, environmental, and economic. The inclusion of the economic pillar is necessary to successfully balance the financial viability of farming practices with their social and environmental impacts. Awareness of each sustainability pillar is important, especially for policymakers, as the improvement of one pillar can impact the others (Di Simone et al., 2022). A balanced approach across all pillars is essential to achieve effective sustainability, making research into each pillar critically important. Pressure is mounting from governments and the public for the agricultural industry to make sustainable, climate-friendly decisions while providing increasing levels of nourishing food (Tilman et al., 2002). Therefore, farmers face the predicament of minimising negative environmental impacts while remaining financially viable. The findings emerging from this study highlight that, despite the importance of economic sustainability to the survival of farm enterprises, the economic pillar has not received much attention in prior academic literature.

As accounting researchers, we argue that understanding the financial implications of transitioning to a more sustainable food supply is of utmost importance. The existing literature on financial and accounting research related to food supply networks remains limited, underscoring the need to identify vulnerabilities in the system (Jack et al., 2018) and understand

the influential role of accounting in shaping the supply chain (Spence & Rinaldi, 2014). Beyond traditional financial reporting, accounting can be used to support and guide sustainability initiatives and the agrifood industry (Maughan & O'Dochartaigh, 2023). This focus on sustainability and the financial implications for the agricultural sector is particularly relevant in Ireland, and many other countries around the world, where a significant number of farm enterprises are financially vulnerable. In Ireland, for example, Teagasc[1] conducts a National Farm Survey annually, highlighting in its most recent (2023) survey this economic vulnerability by classifying only 28% of Irish farms as "economically viable", 41% as "economically sustainable", and a significant portion, 31%, as "economically vulnerable" (Dillon et al., 2024). Transitioning to more sustainable farming practices may involve considerable capital investment by farmers, which may be difficult for many given this economic vulnerability. Therefore, the need for farm enterprises to balance economic sustainability with environmental sustainability is critical to ensure the long-term sustainability of individual farm enterprises, which make a substantial contribution to the rural economy.

In this context, the objective of this study is to conduct a systematic review of prior academic literature on the economic pillar of sustainability of farm enterprises. This is achieved through the systematic review of peer-reviewed published articles, as described in Section 2, to enable a comprehensive overview of the research undertaken in this area to be conducted and profiled in Section 3. Subsequently this body of literature is reflected upon in Section 4 to identify knowledge gaps, and to propose potential avenues for future research projects in Section 5.

2. Method

The research undertaken in this study identified peer-reviewed academic articles on the economic sustainability of farm enterprises using two academic research databases, Web of Science (WoS) and Business Source Complete, on 3 January 2025 to pinpoint all articles published up to 31 December 2024. The justification for using WoS over others is that it has become a synonym of quality for all social science journals (Wang et al., 2014), while Business Source Complete was chosen based on its comprehensive coverage of peer-reviewed academic journals. Conscious decisions were made in the search criteria options, including not limiting the timeframe for when studies were undertaken on this topic. No limitations were placed on the search based on the type of journal or journal rankings, except that only peer-reviewed articles were included. As the topic of sustainability in agriculture is interdisciplinary, these choices were made to gain a comprehensive understanding of research undertaken on this topic across various disciplines.

1 The national body providing integrated research, advisory and training services to farmers in Ireland.

Grey literature has not been included in this systematic literature review to reduce the risk of bias and potentially unreliable data. Grey literature is broadly defined as "information produced on all levels of government, academia, business and industry in electronic and print formats not controlled by commercial publishing i.e. where publishing is the not the primary activity of the producing body" (Schöpfel, 2011). Examples include reports, conference papers and dissertations, which often lack the quality control measures of peer-reviewed journals. Guidance surrounding the use of grey literature in systematic literature reviews is available. According to Adams et al. (2017), grey literature may focus on reporting conclusions but omit detail on how such conclusions were reached, thereby calling into question the academic rigour applied to reach such conclusions. Therefore, this study focuses on peer-reviewed articles published in academic journals and follows a similar approach to literature reviews on the topic of corporate sustainability by de Oliveira et al. (2024) and Velte (2023). The articles were narrowed down to those in English due to personal language restrictions. A wildcard character was used to ensure variations in the keywords searched were identified.[2]

Two separate searches were performed in each database utilising the following keywords:

- "Economic sustainab*" or "Financial sustainab*", and
- "Agriculture" or "farm*"

The terms "economic" and "financial" are often used interchangeably in similar contexts. Therefore, the Boolean operator "or" was placed between these phrases. To avoid off-topic results from the agrifood industry, such as food-processing companies and animal-feed producers, the full keyword "agriculture" was used to focus the search for articles on studies of farm enterprises. Between the keywords, the Boolean operator "and" was used so that the relevant words appeared together in articles. Finally, the keyword search was designated to appear in the abstract of the article to ensure that these keywords featured as a main theme within relevant studies.

Based on the pre-determined parameters above, the keywords were searched for under "AB – Abstract or Author Supplied Abstract" in the Business Source Complete database, resulting in 160 articles selected in the identification process. When the search was focused on selecting only peer-reviewed articles and those in English, 119 articles remained. In the WoS database, when the relevant keywords were searched for under the "Abstract" field, this resulted in 836 articles selected in the identification process. After the filters for peer-reviewed articles and English filters were applied, 736

2 Using the wildcard character after the term "Sustainab*" allowed for inclusion of articles with the words "sustainability" and "sustainable". Likewise, the use of "farm*" allowed for the inclusion of articles that had the words "farming" or "farmer" present.

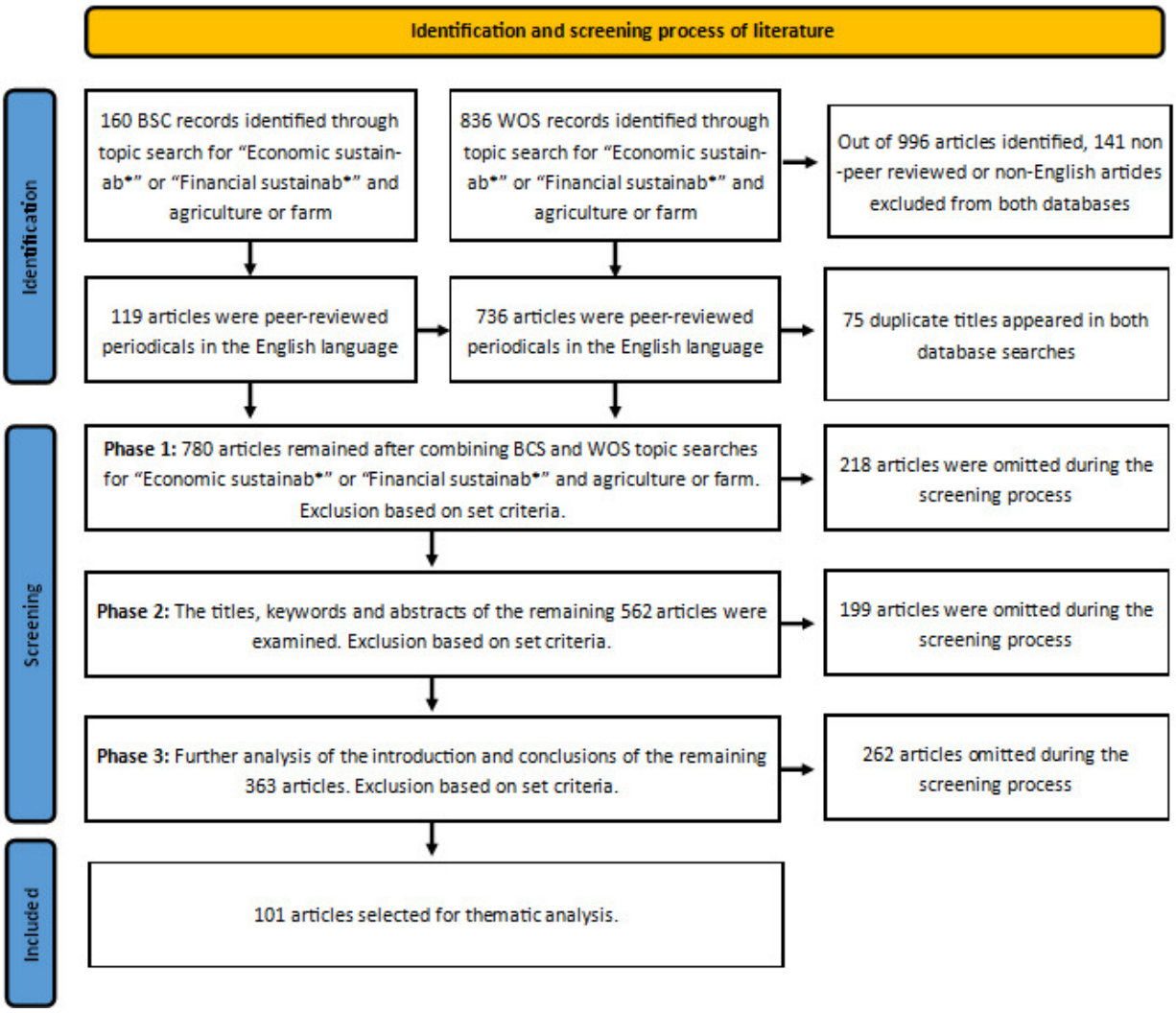

Figure 1. PRISMA Flowchart of the Systematic Literature Review Process Conducted

articles remained. Of the articles identified from both databases, there were 75 duplicate titles, resulting in 780 articles for inclusion. The results from both databases were exported and analysed in Phase 1 of the criteria for inclusion evaluation. **Figure 1** presents a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart that visually depicts the phases and inclusion criteria used in this systematic literature review.

After completing the identification process, a screening process to exclude articles that did not fit with the objective of this study was conducted. As the objective of this study is to conduct a systematic review of prior academic literature on the economic pillar of sustainability of farm enterprises, two main exclusion criteria were applied. Firstly, the focus of enquiry remained on literature related to research conducted on farm enterprises as opposed to sustainability in agriculture more broadly, for example agricultural supply chains and water management systems (Hamam et al., 2023; Nalluri & Karri, 2024).

Secondly, as there is considerable variation in the types of farm systems in operation globally, it was decided to include only studies that focused on conventional farming systems. While "conventional" farming may be

Table 1. Peripheral Themes Excluded in Screening Process

Theme	Reason for theme omission in this study
Agroforestry	Agroforestry relates to the integration of trees and shrubs into farming systems. This is a specialist type of farming and is not considered to be conventional farming.
Farm cooperatives and community supported agriculture (CSA)	Farm cooperatives or CSAs are systems in which farmers and a local community collaborate. Consumers purchase shares in the farm in advance for a season and the risks and rewards of farming are shared. This model is not based on the conventional consumer-based system that most farms operate.
Irrigation systems and water management on farms	Water-management systems can be integral to farm practices. However, studies focused on this area do not align with a focus on the economic sustainability of farm enterprises.
Soil science and nutrient cycles	Soil and nutrient cycle studies typically look at the properties of the soil and farmland health. While these practices help farm enterprises to remain viable, the focus of enquiry in these studies was not the economic sustainability of farm enterprises.
Pest management	Studies on pest control focus on strategies to improve crop health through effective pest management. These studies emphasise farming techniques rather than focus on economic sustainability.
Animal welfare	Animal welfare studies typically focus on the health and ethical welfare of animals such as housing conditions and humane treatment practices. They are not deemed relevant for a review focused on economic sustainability.
Animal disease and antibiotics	While livestock farming involves care and routine antibiotic use for disease prevention, these types of studies do not focus on the economic sustainability of farms.
Agrifood supply chains and value chains	Research related to the entire food production system and transactions outside the farm enterprise are not relevant to this study as it focuses on the economic sustainability of the actual farm enterprise.
Agri-tourism	Agri-tourism is a very specific area and is not considered a conventional farming system. Therefore, it was deemed outside the scope of this study.

defined in different ways around the world, the FADN[3] (Farm Accountancy Data Network) database classifies and reports on the following conventional farming systems: crop, livestock, and mixed (which includes both crop and livestock farms). Therefore, "non-conventional" farm systems that may operate under different markets and regulatory frameworks were omitted in the screening process. In essence, most farms worldwide fall under the category "conventional farming", and it was therefore decided to focus on these. Any farm that does not fall under the classification of crop, livestock or mixed is regarded as "non-conventional". Examples of "non-conventional" farm systems include bee, wine, and fish farming.

In summary, when the identification process was completed an initial high-level review of the articles selected for inclusion uncovered that many of the studies were not conducted on farm enterprises, and it was evident that many of the studies were not focused on conventional farming. Many of the studies included related to economic sustainability in agriculture but focused on themes outside the scope of this study. **Table 1** summarises some of the main peripheral themes of studies that were excluded during the screening process.

To proceed with the screening process and to eliminate articles based on the exclusion criteria described above, three phases of article screening were undertaken independently by each author. As discussed above, during Phase

3 The FADN is a collection of information derived from national surveys of farms, which includes reports on income, agricultural assets, as well as farm achievements and the impacts of European financial subsidies.

1, a broad search was conducted to identify if the selected articles were within the remit of this study by reviewing the title and keywords of the articles identified. If it was clear based on the title of the article, and/or the keywords, that some articles were not deemed relevant to the focus of this study, they were removed. If there was a possibility that the article was relevant, it remained for more detailed analysis in Phase 2. If there was an inconsistency in the choice of articles by any author, the article content was examined by all authors together to gain consensus of inclusion or exclusion. Of the 780 articles initially identified, 218 were omitted during Phase 1 of the screening process. The inclusion and exclusion criteria was further refined in Phase 2, with each article's abstract screened in detail by each author of this study to ensure that articles included referred to the context of the research objective. Based on this careful review of the abstract of the articles, many of the 562 remaining articles were deemed to be outside the remit of this study. A total of 199 articles were omitted during Phase 2, with water management and irrigation systems emerging as the most prevalent topics for exclusion. During Phase 1 and Phase 2, systematic literature reviews were also identified and excluded as recommended in a systematic literature review guide by Hardies et al. (2023). Of the articles identified and omitted in the screening process, 18 were systematic literature reviews. These systematic literature review articles were analysed to ensure that the focus of those studies did not overlap with the objective of this study. **Table 2** presents an overview of the 18 systematic literature review articles excluded.

None of the prior studies outlined in **Table 2** share the specific objectives or themes central to the systematic literature review undertaken in this study. As evident in **Table 2**, many of the prior systematic literature reviews on sustainability in agriculture concentrate on technology adoption or types of farming (for example, fishing, wine production and forestry) that fall outside the scope of this study. Therefore, this study extends the literature by focusing on the economic sustainability of conventional farming systems.

Next, Phase 3 of the screening process involved examining the remaining 363 articles in more detail to ensure that the articles included in the search were focused on the research objective. This phase involved the authors reading the introduction and conclusion sections of each article and applying the inclusion/exclusion criteria. In Phase 3 a further 262 articles were omitted from the search, leaving 101 articles for characteristic and thematic analysis – see PRISMA flowchart, **Figure 1**. These final exclusions were driven by the strict criteria outlined above designed to focus the study on the economic sustainability of conventional farm enterprises.

The 101 remaining articles were comprehensively reviewed, evaluated and synthesised to gain a comprehensive understanding of the research undertaken in this area and to identify gaps where future research could be undertaken. The articles were checked to ensure that they had not been retracted, as this would threaten the integrity of this study. Next, these 101 articles were uploaded to Mendeley to enable key data to be extracted and

Table 2. Systematic Literature Review Topics Identified

Article reference	Description
Gunnarsson, Segerkvist, Goransson et al. (2020) – Systematic mapping of research on farm-level sustainability in egg and chicken meat production	Focuses on the sustainability of chicken meat and egg production
Gunnarsson, Segerkvist, Wallgren et al. (2020) – Systematic mapping of research on farm-level sustainability in finfish aquaculture	Focuses on farm enterprise sustainability related to fish aquaculture
Lee et al. (2021) – Analyzing precision agriculture adoption across the globe: A systematic review of scholarship from 1999–2020	Relates to the adoption of precision agriculture, which is an approach that uses technology and data to optimise farming
Gbejewoh et al. (2021) – The 3Ps (profit, planet, and people) of sustainability amidst climate change: A South African grape and wine perspective	Relates to the three pillars of agriculture in relation to grape and wine production
Bunge et al. (2022) – A systematic scoping review of the sustainability of vertical farming, plant-based alternatives, food delivery services and blockchain in food systems	Focuses on the sustainability of new food technologies and innovations, with a stronger focus on environmental sustainability
di Santo et al. (2022) – Climate change and natural resource scarcity: A literature review on dry farming	Explores how climate change is impacting the sustainability of dryland farming and land management
Rao et al. (2022) – Cultivating sustainable and healthy cities: A systematic literature review of the outcomes of urban and peri-urban agriculture	Explores urban and peri-urban agriculture, meaning the systems of producing, processing and distributing food in urban areas
Teixeira et al. (2022) – How to quantify the impacts of diversification on sustainability? A review of indicators in coffee systems	Reviews how sustainability is related to agroforestry coffee production systems
Santoni et al. (2022) – A review of scientific research on biodynamic agriculture	Focuses only on biodynamic agriculture
Dorotea et al. (2023) – A scoping review on GIS technologies applied to farmed fish health management	Reviews literature related to health management in farmed fish
Joshi et al. (2023) – Blockchain technology for sustainable development: A systematic literature review	Focuses on blockchain technology and its contribution to sustainable development
Brenya et al. (2023) – Can agriculture technology improve food security in low- and middle-income nations? A systematic review	Reviews how agricultural technology is being used in relation to the production of healthy food
Basset (2023) – The evaluation of social farming through social return on investment: A review	Focuses on social farming practices and social return on investment (SROI) and impacts, comparing SROI ratios
Azerigyik et al. (2024) – Contextualising sustainable transhumant pastoralism: A systematic review	Focuses on livestock management between grazing areas and the impact of sustainability
Becerra-Encinales et al. (2024) – Agricultural extension for adopting technological practices in developing countries: A scoping review of barriers and dimensions	Reviews the literature on technological agriculture practices and adoption trends
Fiorillo & Amico (2024) – Milk quality and economic sustainability in dairy farming: A systematic review of performance indicators	Focuses solely on performance indicators for milk quality, high competition in the industry, and sustainability of dairy farms
Bazargani & Deemyad (2024) – Automation's impact on agriculture: Opportunities, challenges, and economic effects	Explores the potential of automation and robotics in farming practices
Giganti et al. (2024) – The impact of blockchain technology on enhancing sustainability in the agri-food sector: A scoping review	Relates to blockchain technology and its impact on the agrifood industry

summarised independently by each author of this study using Microsoft Forms. The data was subsequently downloaded to Microsoft Excel for further interrogation and analysis. The extraction of key data allowed the authors to conduct an in-depth analysis of the selected articles to identify patterns and themes to enable the reporting of the findings outlined in Section 3. Throughout the process of data analysis, communication between the authors was vital to discuss and establish appropriate categorisations of patterns and themes.

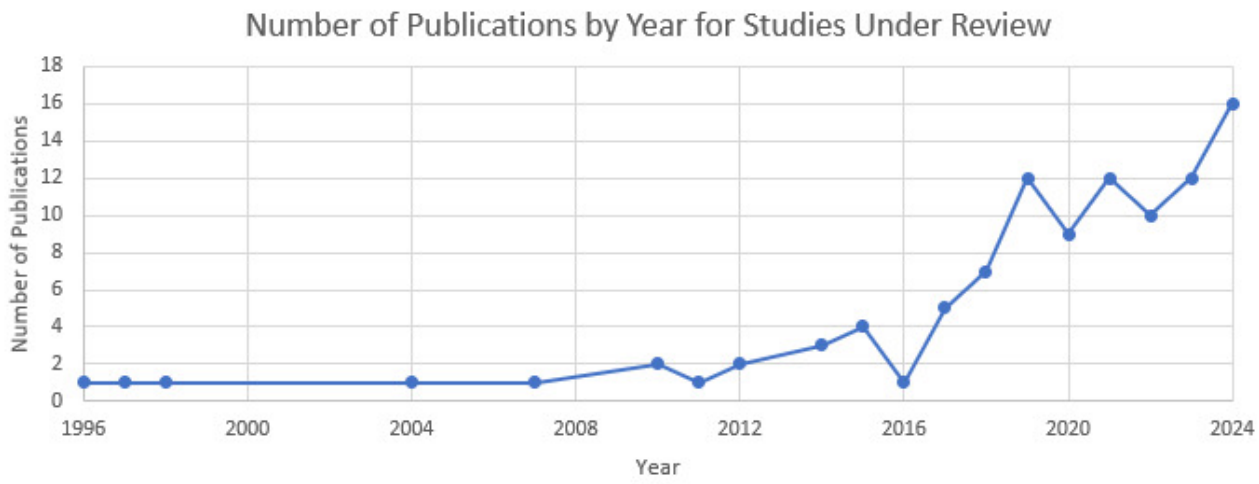

Figure 2. Number of Publications by Year for Studies Under Review

3. Review Findings

In this section, the findings emerging from an analysis of the 101 articles identified in the systematic review described in Section 2 are presented and discussed. By exploring the prior research in this systematic manner, themes and patterns within the data are identified, which assist in developing an understanding of the research conducted on the economic pillar of sustainability of farm enterprises up to 31 December 2024 and identifying notable gaps to provide avenues for future research. First, a bibliometric analysis of the articles is profiled in Section 3.1. Next, in Section 3.2, a focus on the study context of the articles is presented by exploring the type of farm system in operation and its geographical location. These factors are important to gain a deeper insight into farm-level economic sustainability. The type of farm system directly influences economic outcomes such as farm profitability. Likewise, geographical location plays a role in understanding the regional differences that might impact a farm's economic viability, such as the market conditions and agricultural policies in existence. Section 3.3 summarises the research methods adopted within these articles and in Section 3.4 the focus of enquiry within these publications is summarised using thematic analysis.

3.1. Bibliometric Analysis

The bibliometric analysis began with an investigation of the year of publication of the 101 articles under review to explore how the trend in publications has developed over time. The analysis reveals that the articles were published between 1995 and 2024, with the number of publications in each year presented in **Figure 2**. It is widely acknowledged that "sustainability" has gained significant attention in recent decades and in the context of the economic sustainability of farm enterprises, the analysis highlights a clear upward trend in the number of peer-reviewed publications.

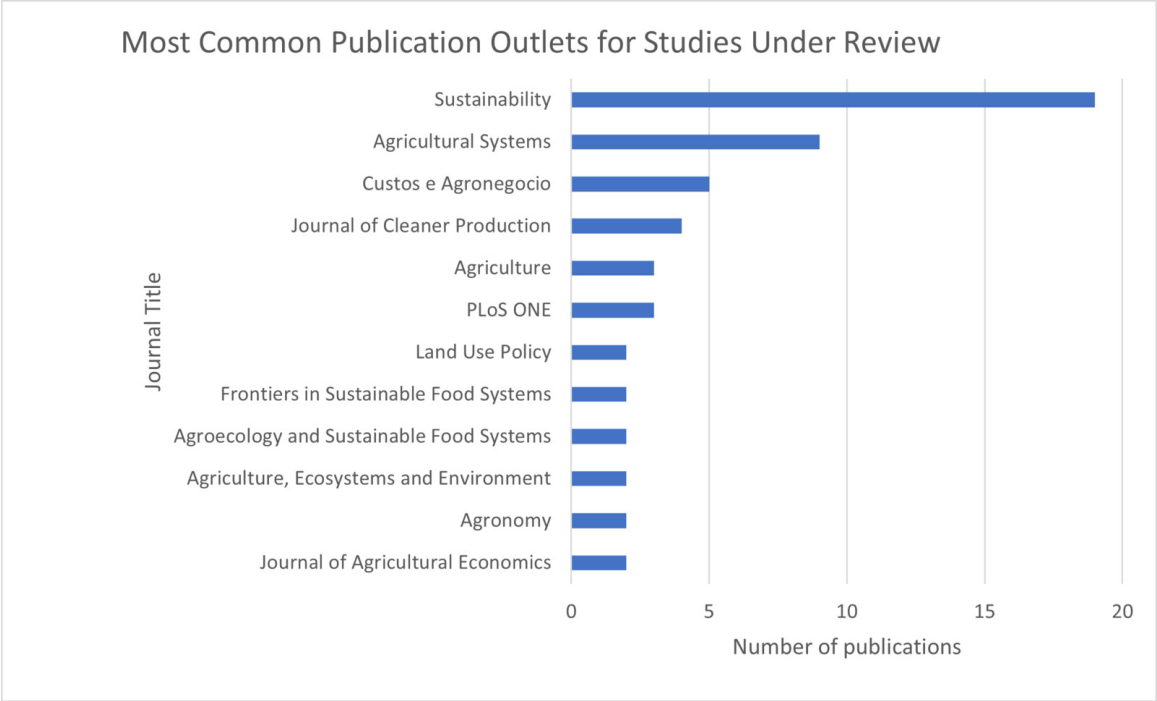

Figure 3. Most Common Publication Outlets for Studies Under Review

As evident in **Figure 2**, the upward trend in publications is most notable between 2016 and 2024 when a surge in the number of publications occurred. In 2015 the UN published its SDGs, including SDG 2, which specifically aimed to "End hunger, achieve food security and improved nutrition and promote sustainable agriculture". This likely drew international attention to sustainable agriculture, leading to an increase in research output in the following years. Despite minor dips in 2020 and 2022, there has been a significant increase in publications in the area in the past decade.

Next, the disciplines where this research has been conducted is explored by profiling the journal outlets of the published articles. The 101 articles included in the analysis have been published in 61 different academic journals. Articles were published in a wide array of interdisciplinary journals, from highly specialised niche sectoral journals to those more mainstream. To focus on the most common outlets of publication, the journals that have published two or more of these articles are highlighted in **Figure 3**.

As evident in **Figure 3**, the journal with the greatest number of articles published is *Sustainability* with a total of 19 articles. This is unsurprising as *Sustainability* is an international transdisciplinary journal that strives to publish research to support the UN's *2030 agenda for sustainable development*. The next most common publication outlet is *Agricultural Systems*, which publishes articles focusing on components of agricultural systems, and the balance within national, social and economic environments. The remaining most common publication outlets were *Custos e Agronegocio*, a Brazilian scientific agricultural journal (five articles), the *Journal of Cleaner Production* (four articles) and *Agriculture* (three articles).

The 12 most common publication outlets depicted in **Figure 3** account for approximately half of the 101 articles published, while the remaining articles appear in 49 separate outlets, each with a single article. This shows that a broad spectrum of researchers, from various disciplines, are investigating the economic pillar of sustainability of farm enterprises. The aim and scope of each of the publication outlets for the 101 articles were reviewed and categorised based on keywords used in the journal's description of its aim and scope. Some of the more common keywords included "sustainability studies", "agriculture systems", "land use systems", "crop science" and "food science". Numerous studies included in this review were published in journals outside the realm of economics and business. It is clearly an interdisciplinary area, but the lack of attention in business and accounting journals is staggering.

Of the journals with two or more publications in **Figure 3**, none are journals that primarily focus on business or accounting. The closest alignment to business or accounting was found with *Custos e Agronegocio*, as it acknowledged that it publishes studies from various disciplines, including agribusiness and the costs related to agriculture. Furthermore, of the remaining 49 single-publication outlets, very few include business or accounting within their scope. Interestingly, 10 of the journals specifically include economics and finance within their scope, such as the *Agricultural Finance Review* and *Agricultural Economics.* This suggests that either the topic of economic sustainability appears to be of interest to economists and finance researchers, but lacking among accounting researchers, or that business and accounting journals are not interested in publishing studies on this topic. The articles that were published by finance and economics journals, such as those listed above, typically use FADN samples to review quantitative factors that impact cash flows and the economic sustainability of farms (Cecchini et al., 2023; Coppola et al., 2022; Dono et al., 2021). Therefore, the publications in these fields tend to focus on data from structured farm surveys rather than holistically looking at farm enterprise management.

3.2. Analysis by Farm System and Geographical Location

To explore the study context of the selected articles, the type of farm system in operation and the geographical location of farms included in the respective studies were analysed. This analysis assisted in developing an understanding of where prior research had focused on the economic sustainability of farm enterprises. **Figure 4** highlights the type of farming system in operation in the 101 studies under review.

Figure 4 highlights that livestock farming is the system most featured in studies when the issue of economic sustainability of farm enterprises is explored, accounting for approximately 44% of articles reviewed. The next most popular farming system present in the studies is crop farming (often referred to as tillage), accounting for 32% of articles. Many working farms do not focus on just one type of food production and are therefore referred to as "mixed farms" (21% of articles reviewed), with a combination of crops

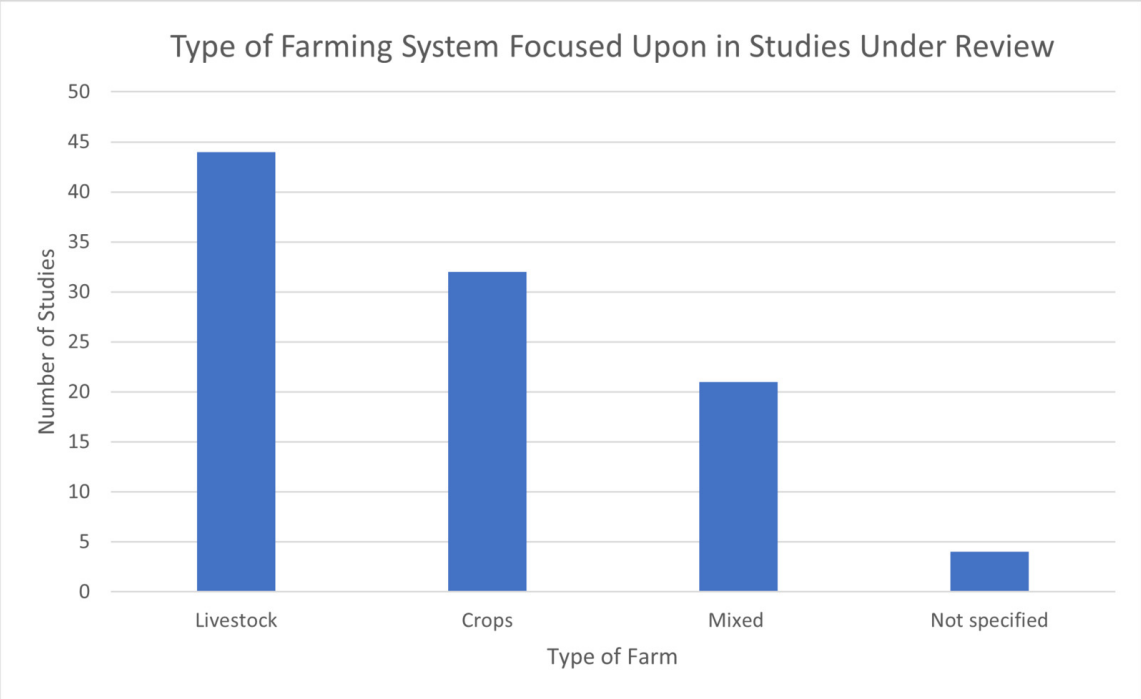

Figure 4. Type of Farming System Focused Upon in Studies Under Review

and livestock managed within the same farm enterprise. The livestock farming articles consist of several sub-groups including dairy, cattle rearing, sheep, goat and pig farming, with the most featured being dairy farms at 23 articles. Depending on the various types of livestock farm, management practices and economic sustainability may vary greatly.

After exploring the system of farming as the focus of the articles examined, it was decided to assess the extent of focus on organic farming within the prior studies. Given the increasing focus on organic farming and its potential to contribute to improved environmental sustainability in agriculture, the authors felt it was important to identify if organic farming was a theme in the prior literature surrounding the economic sustainability of farm enterprises. It emerged that 14 of the 101 articles focused on organic farming, with five articles comparing organic with non-organic farming practices. This strong emphasis on organic farming is not surprising as it is often synonymous with implementing more sustainable practices compared with non-organic farming. As Kremen and Miles (2012) report, there are many environmental benefits of organic farming including reduced chemical and fertiliser inputs, increased soil health, and promotion of biodiversity through practices such as crop rotation. A deeper analysis reveals that the type of organic farm system explored in these 14 studies has a breakdown of nine related to crop farming, two focused on dairy farming, and three on other types of organic farms. Only one of the 14 articles focused on the subsidies available to organic farmers and the impact on farm profitability (Graczyk & Kociszewski, 2021).

The geographical location of the farms featured in the 101 articles under review was examined both at continent (**Figure 5**) and country level (**Figure 6**). Firstly, **Figure 5** depicts the locations on a continental basis and shows

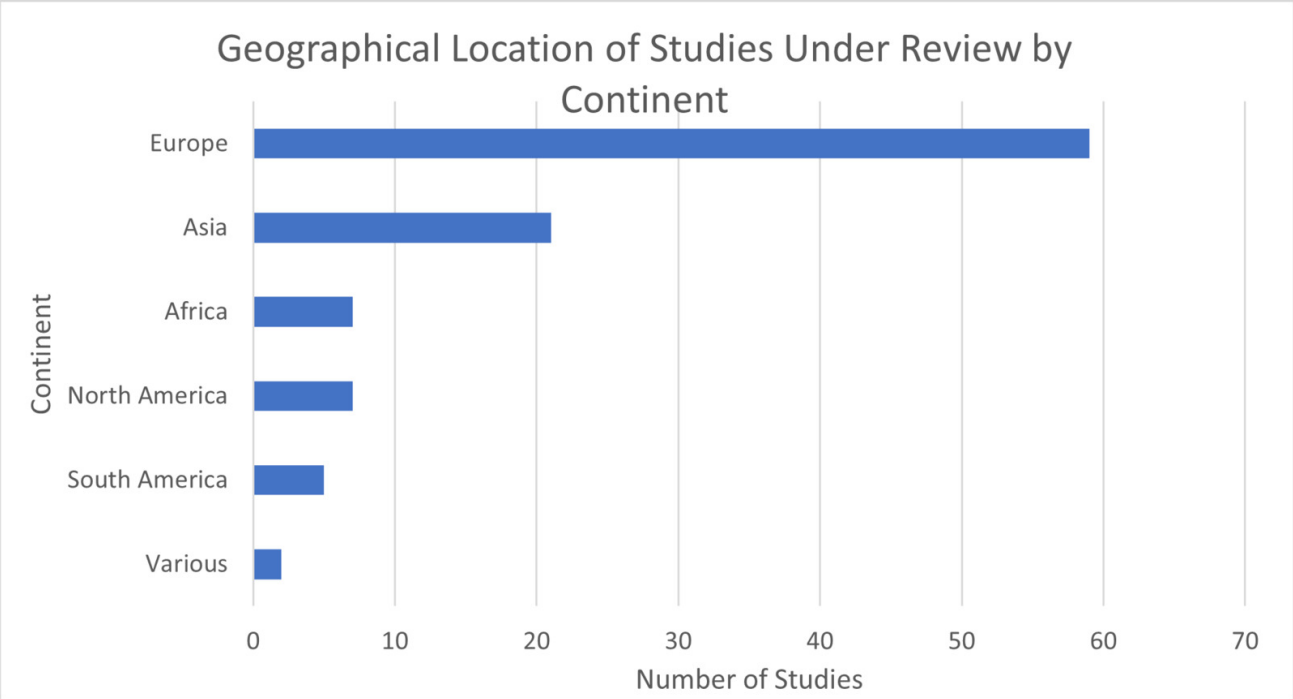

Figure 5. Geographical Location of Studies Under Review by Continent

that more than 50% of the analysed studies were based in Europe. After Europe, the next most prominent location explored is Asia, encompassing approximately 20% of the studies. Africa and North America have seen a moderate level of attention in this respect, but South America has rarely been evaluated in this prior literature on the economic sustainability of farm enterprises. Perhaps most surprising is that no studies in Australia were uncovered based on the search criteria. Finally, a mere one article included comparisons across multiple continents.

Secondly, an evaluation of the countries featured in these articles underscores the widespread international significance of this topic. Out of the 101 articles examined, 44 different countries were studied. To highlight the most prominent countries featured in the studies under review, **Figure 6** presents the number of countries, with two or more studies focusing on the economic sustainability of farm enterprises.

The analysis highlights that the most featured country in the articles reviewed is Italy with 11 relevant studies. Some studies explored multiple countries with **Figure 6** highlighting 12 articles falling into this category. Typically, these studies compared the same farm system in different settings, most exclusively looking at European countries. After Italy, Turkey, Spain and the United States were the most common countries featured in these studies. Many other countries, including Ireland, had only two or three studies focusing on the economic sustainability of farm enterprises. It is evident that farms from a wide geographical range of locations are being explored. It should be noted that geographical location is an important variable that can play a crucial role in the economic viability of farm

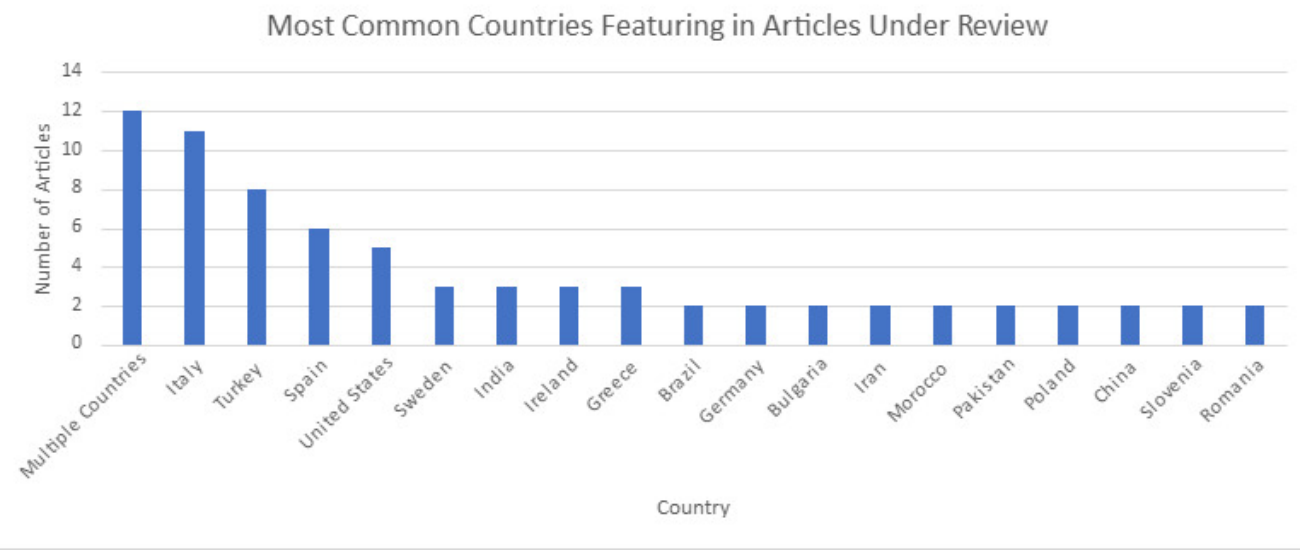

Figure 6. Most Common Countries Featuring in Articles Under Review

enterprises. For example, the availability of subsidies and trade systems differs from country to country and therefore impacts the farm's profitability and investment opportunities.

3.3. Research Methods Adopted

In this section the research methods adopted are summarised by categorising the studies as either qualitative or quantitative. The findings are depicted in **Figure 7**.

It is evident from **Figure 7** that there is a notable imbalance between the research approach adopted in the 101 articles analysed. The majority of articles (81% – 82 articles) adopted a quantitative approach (for example, FADN survey data), and a mere 17% (17 articles) adopted a qualitative approach, involving methods such as focus groups or interviews to collect data for analysis. Only 2% used a mixed-methods approach by incorporating both qualitative and quantitative aspects.

There are numerous advantages to quantitative, numerical-based studies, especially from an economic sustainability perspective, as results are objective, can be easily produced, and analysis can reveal patterns and trends that provide rich insights (Cooper & Schindler, 2014). Of the 82 quantitative studies, 33 analyse data from FADN, with most specifically focusing on the profitability aspects of farm enterprises.

Qualitative studies also have many advantages, including allowing for in-depth and contextual understanding of a phenomena, which can provide rich insights into the complexity of situations (Cooper & Schindler, 2014). Focusing on the 17 qualitative articles, the earliest was published in 1996, with the remaining published between 2010–2024. Of the 17 articles – 10 of which were based on various farm systems in Europe – six were dedicated to crop farming, seven focused on livestock farming, and four explored mixed farming systems.

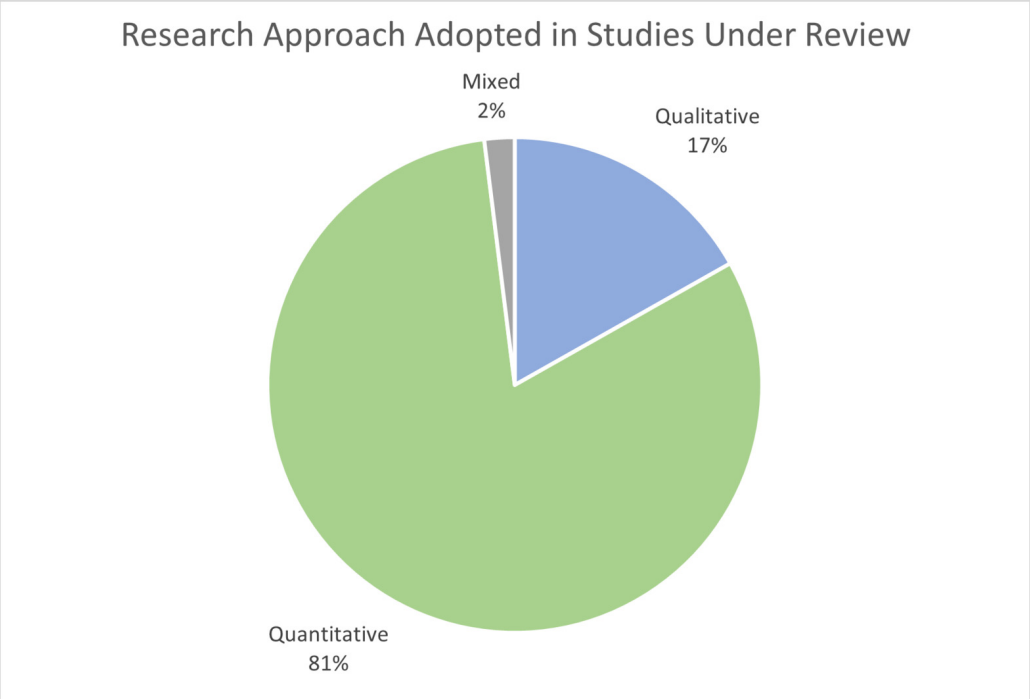

Figure 7. Research Approach Adopted in Studies Under Review

3.4. Focus of Enquiry

The focus of enquiry within the articles under review was summarised by conducting a thematic analysis of the issues that they explore. An in-depth review of the 101 articles was undertaken to discover patterns and ascertain themes emerging surrounding specific aspects of sustainability within the respective studies.

While this study focuses on the economic pillar of sustainability, the identification and relationship between all three pillars was analysed. Economic sustainability, social sustainability and environmental sustainability are distinct concepts that may be explored independently, although some studies address all three in unison (Cruz et al., 2024; Oyinbo & Hansson, 2024b, 2024a). The thematic analysis conducted revealed that approximately 50% of the 101 articles discussed economic sustainability in the context of the importance of the broader concept by encompassing environmental dimensions. Looking more closely at the studies that focused on both the economic and environmental pillars, three main themes inductively emerged: an assessment of sustainability of farming practices using various indicators, the impact of when changes in farm practices are introduced, and an analysis of the profiles of farms related to the three pillars of sustainability. The other 50% of the articles was focused on the economic or financial sustainability of farm enterprises without a focus related to the impact of climate change and environmental sustainability. These latter articles concentrated on strategies to cover expenses and support the farm enterprises with the goal of long-term

economic viability. While social sustainability was referenced in many of the studies, few focused on this aspect, which is often difficult to quantify and measure with precision.

Looking more closely at the specific themes emerging from the 101 studies under review, some key overarching themes come to the fore. These include agri-payments (subsidies) and the shift towards environmentally focused payments and policies, and the role of technology and innovation.

Firstly, agri-payments and subsidies, such as those under the European CAP (Common Agricultural Policy), involve payments to farmers that contribute to the economic viability of a farm. For many farms, financial assistance is essential to maintain income stability (Jitea & Arion, 2015; Maria et al., 2022; Smędzik-Ambroży et al., 2021; Šumrada et al., 2024). However, the extent of the financial impact varies depending on many factors (Arisoy et al., 2017; Guth et al., 2020). For instance, larger farms have been shown to be favoured under CAP supports (Guth et al., 2020; Smędzik-Ambroży et al., 2019). Farmers are also hesitant to commit to long-term schemes because they may limit their flexibility to adapt to changing circumstances (Sutherland, 2010).

The shift towards environmentally focused subsidies has shown positive outcomes, including increased farmer participation in sustainable farming practices, as these subsidies play a role in the decision-making process (Sutherland, 2010). Upcoming CAP reforms are anticipated to align with the objectives of the European Green Deal (European Commission, 2022). Outside the EU, other Agri-Environmental Schemes (AES) and environmental grants offer similar supports. Such subsidies also play an important role in encouraging environmentally sustainable practices by financially supporting farm changes, for example the transition to organic farming (Ataseven, 2014). However, the administrative burden of the required paperwork to adhere to such policies can discourage participation (Varacca et al., 2023). Furthermore, the risk of penalties for non-compliance with environmentally focused schemes adds another layer of pressure to participating farmers. Another study showed that environmental subsidies do not impact eco-efficiency significantly (Cecchini et al., 2023). Many of the reviewed articles conclude with a call for further research and policy reforms to address the connection between environmental and economic sustainability, a perspective shared by the authors of this study.

Another notable theme in the articles reviewed is the transition to sustainable agriculture practices through the integration of technology and innovation of farm enterprises. This theme emerged across the reviewed studies, by driving progress in efficiency, profitability, and environmental sustainability. The adoption of new technologies increases the potential for economic sustainability (Balaine et al., 2020; Kaoneka & Solberg, 1997), and Erdem and Ağır (2024) demonstrate a positive correlation between technology uptake and farm efficiency. Ecological innovations, such as improved pesticide management and low-emission fertilisation, also

contribute to better economic sustainability (De Santis et al., 2024; dos Santos Neto et al., 2017; Mariyono et al., 2022). A variety of new techniques and technologies further contribute to environmental sustainability (Başer & Bozoğlu, 2023; Kausar et al., 2024; Wisniewska, 2011), which is a foundation for policy shifts and changes to agri-payments and subsidies.

As emphasis on, and the implementation of, sustainable farming practices grows globally, all three pillars of sustainability will be essential in guiding the future of farm enterprises. Policies and subsidies will likely play a pivotal role in how and when changes are made on farm enterprises. Ultimately, the success of these transitions will help determine the long-term viability and resilience of the agriculture industry.

4. Discussion

The findings emerging from this study reveal several important insights and provide a valuable contribution to the literature, which is an important aspect of a systematic literature review (Hiebl, 2023; Kunisch et al., 2023). The analysis of the prior literature formulates recommendations for shaping a future research agenda, which will act as a catalyst for future studies to be undertaken in this important area of research.

The bibliometric analysis examined the main academic disciplines involved in conducting research on the economic sustainability of farm enterprises by identifying the journals where such studies are published and reveals interesting insights. It is surprising that more journals in the research disciplines of business and accounting are not focused on publishing studies on the economic sustainability of farm enterprises. Farms are not only businesses, but extremely important enterprises that have "every single person as a stakeholder, relying on them for food and clothing" (Jack, 2005). Therefore, we argue a greater focus on farm enterprises in such disciplines is warranted. The prior accounting literature acknowledges that this lack of focus may be attributed to several factors. Historically, there has been quite a low level of financial management conducted by farmers (Argilés & Slof, 2001) and traditionally a culture exists where farmers dislike conducting financial management activities (Jack, 2005). Ndemewah et al. (2019) highlight that accounting researchers tend to focus on large organisations, for example manufacturing and services firms, and focus less on small and micro enterprises such as farms. Hayden et al. (2022) contend that accounting researchers tend not to have much interest in farm management research and farm management researchers tend not to have much interest in accounting; consequently, only a small number of researchers have the interdisciplinary knowledge, interest and skills to explore financial management in agriculture. Additionally, the editorial boards of business and accounting journals may view research related to farm enterprises as more suitable for publication in sectoral journals that have a specific focus on agriculture rather than in mainstream business and accounting journals. The very limited number of studies that are based on the economic and financial sustainability of farm enterprises and the low number of academic articles published in business or

accounting journals demonstrate that this area of study is underdeveloped. Farm enterprises, just like any other business, must remain financially viable to ensure their long-term sustainability.

The articles analysed in this study draw on several theoretical frameworks to explore the factors influencing sustainable farming practices. These include the "Theory of Planned Behaviour" (Sutherland, 2010), which developed an understanding of how the extent of the efforts that a farmer exerts to adopt sustainable farming practices affects the likelihood of those practices occurring. The "Welfare Maximisation Theory" (Gorjian et al., 2021) was applied to analyse how population pressures may lead to competition for land use and the economic impacts. The "Theory of Input-Saving Technological Changes" (Mariyono et al., 2022) was adopted to explain the impact of the farmer field school participation on pesticide use and crop productivity. These theories, along with others, can act as a useful lens through which a deeper understanding of the factors that influence behaviours towards the adoption of sustainable farming practices can be achieved.

Turning attention to the studies included in this systematic review that focus on both the environmental and financial aspects, it is notable that livestock farming was focused on most commonly. This is perhaps not surprising as livestock farming has been identified as a key contributor to the greenhouse gas emissions problem in agriculture. In particular, cattle rearing is one of the most land-demanding agricultural outputs globally (Hayek & Garrett, 2018). In many areas around the world, deforestation has been common practice to establish new farms, enabling the intensification of livestock farming (Hadley & Betts, 2009; López-Carr, 2021). This trend of clearing land will have long-term negative impacts on carbon sequestration and biodiversity (Veldkamp et al., 2020). In addition, for new animals being bred and raised, there will be an increased demand for the feed required to sustain their health and well-being (Makkar, 2018). This elevated demand for animal feed requires additional crop farms, thereby increasing greenhouse gas emissions through the use of fertilisers and the energy required for crop management and irrigation systems.

As noted, many of the prior studies conducted focus on livestock farming due to its significant impact on emissions of methane, which is one of the most dangerous greenhouse gases. As awareness around this subject grows, more studies are being undertaken related to methane emission measurement and reduction (Bačėninaitė et al., 2022; Yusuf et al., 2012). As governmental policies look at the type of farm systems for emissions reduction, livestock farms (including both cattle rearing and dairy) are of central focus. Consequently, in additional to environmental pressures being placed on livestock farms in particular, many may consequently face economic sustainability pressures.

Crop farming systems also featured quite prominently in the studies under review due to the potential for carbon sequestration and storage. For example, there are promising studies surrounding reduced or no-till farming, which

promotes better yields and economic results compared with traditional crop cultivation practices that can release greenhouse gas emissions, especially when non-organic fertilisers are used (Feng et al., 2020; López-Fando et al., 2007; Pearsons et al., 2023). While the economic impact of adapting crop management practices to improve environmental sustainability has featured in some prior studies, it is an important area of research that needs to be explored further.

The focus on the economic sustainability of farms has attracted attention across a multitude of countries worldwide, which highlights the global interest in the subject matter. However, most studies explored in this article have been based on farm enterprises in Europe, with very few studies in South America and none in Australia. When the geographical location of studies by country is explored, it is evident that very few countries have been the focus in more than two studies, which highlights that the economic sustainability of farm enterprises in most countries has not been investigated to any meaningful extent. Across continents and indeed countries, different farming practices and cultural perspectives on agriculture exist. In addition, different government policies and subsidies are available to farmers to assist in maintaining economic sustainability. Economic factors such as labour costs and access to capital play a role in farm profitability, with farm characteristics such as climate, landscape and soil types varying greatly and also contributing to the financial performance of farms in different countries.

The vast majority of the studies reviewed are quantitative and either use models to simulate changes or employ financial ratios to highlight key trends in the economic sustainability of farms. However, there remains a lack of understanding of how farmers are coping with the financial challenges surrounding a move to more sustainable farming practices. With a shift in policies and standards aimed at addressing climate change, it seems that the views of famers have not been fully captured in prior studies. Qualitative research can be valuable to uncover trends and gain insights into farmer attitudes, behaviours, and decision-making strategies. A mere 15 articles collected empirical data directly from farmers through interviews, surveys, questionnaires and focus groups. Four studies did not speak to farmers at all but looked for trends through case studies. Clearly, there are few researchers who are actively talking to farmers about their views on economic sustainability. In summary, while the quantitative studies conducted make a significant contribution to knowledge, the lack of qualitative studies suggests that a range of rich data is being missed. Qualitative studies have the unique advantage of a deeper understanding of human perspectives and experiences. The fact that a mere 17 articles are qualitative in nature underscores the neglect of important areas of research related to social processes, behaviour patterns and decision-making, and essentially understanding perspectives on farm enterprises. There is a need for a more inclusive approach to studying

sustainable farming decisions, one that incorporates qualitative research and provides a holistic understanding of the economic sustainability of farm enterprises.

5. Conclusion and Areas for Future Research

This study aimed to systematically review the prior literature on financial and economic sustainability related to conventional farming in agriculture. While the upmost care and attention has been given throughout the process, several inherent limitations emerge that must be acknowledged. The initial limitation lies with the selection of keywords that were chosen by the authors to identify articles that focused upon the research objective. This choice may have inadvertently excluded relevant studies and omitted pertinent research. In addition, the selection process focused on peer-reviewed journal articles, which excludes other relevant literature such as grey literature and books that may be apposite for this topic. Once the body of literature was identified based on the keywords, the interpretation of the relevancy of the articles by the authors may have resulted in bias due to varying perspectives. These limitations emphasise the importance of transparency throughout the process, which is vital to strengthen the reliability of systematic literature reviews.

Notwithstanding the above limitations, this systematic literature review has synthesised a comprehensive understanding of the literature surrounding the economic pillar of sustainability of farm enterprises. The findings reveal that the economic pillar, which is necessary to successfully balance and implement sustainable farming practices, has not been extensively researched. Through an in-depth analysis, key themes were identified along with many areas for future development and research. This review may serve as a catalyst for future researchers and policymakers for years to come, and some key recommendations emerging from this study to close the research gaps, of which there are several, were identified.

First, more publications related to the economic pillar of sustainability of farm enterprises in business and accounting journals is required. Researchers should consider submitting relevant studies to these publication outlets rather than focusing on agriculture- or sustainability-specific journals. We argue that if industry stakeholders (for example agricultural advisors, accountants and educators) gain an understanding of issues that contribute to the economic sustainability of farm enterprises, it will enable them to assist farmers in their decision-making and contribute to their sustainable development. This is important, because as Maughan and O'Dochartaigh (2023) confirm, beyond traditional financial reporting, accounting can be used to support and guide sustainability initiatives and the agrifood industry.

Second, the editorial boards of business and accounting journals should actively encourage and attract studies on this topic by launching special issues dedicated to the financial and economic sustainability of micro, small and medium-sized (MSME) enterprises. These special issues could also include a focus on the sustainability challenges and opportunities of farm enterprises.

This is important because agriculture has a critical role in global economies, and with a better understanding of the economic sustainability of farm enterprises, improved policies and farm management practices may emerge. These improvements could assist the sector to meet the significant challenges of climate change and the need to feed a growing worldwide population.

Third, it is important that future studies focus on exploring how various farm systems can implement changes to farm practices that can benefit both environmental and economic sustainability. For example, researchers could focus on livestock farming and the financial impact of adapting practices on farm enterprises to meet environmental goals. This is crucial as this farming system is key to reducing greenhouse gas emissions in agriculture. Crop farming is another important area where advances in technology are resulting in the increased automation of crop management activities to improve environmental sustainability, for example the use of solar-powered robotics instead of traditional diesel-powered vehicles (Gorjian et al., 2021). Further research that assesses the economic impacts of such changes to farming practices is warranted.

Fourth, the findings highlight that there is great scope and perhaps a necessity for research projects on economic sustainability to be conducted in geographical regions that have received very little, or no, attention. Sustainability challenges vary across regions, and as global pressures grow it is important to have a comprehensive understanding of their economic impact on agricultural systems worldwide. Additional research could provide unique insights, innovations and knowledge sharing that promote sustainability and economic viability across different regions. Research that focuses on the economic sustainability of farms within a single country would allow for more in-depth analysis and focus on specific variables such as government policies, market dynamics and cultural norms. However, cross-country comparisons in the field are also valuable, as they can shed light on successful policy and decision-making strategies implemented in other countries, therefore offering valuable opportunities for learning and improvement.

Fifth, there is a deficit of qualitative studies in this area of research. Therefore, a call for additional qualitative studies that can provide a more holistic understanding of the economic sustainability of farm enterprises is imperative. Such qualitative studies could involve interviews of various stakeholder groups in agriculture. For example, none of the prior studies explored have involved engagement with agricultural consultants to explore this research topic. Agricultural consultants have a specialised, technical knowledge that is crucial in supporting farmers to make informed decisions to optimise the economic sustainability of their farm enterprises. Furthermore, their understanding of current regulations, best practices, and the latest technological developments could be instrumental in guiding farm operations. Future qualitative studies involving agricultural consultants and their insights into farm enterprise decisions and consequences over time could

provide a valuable contribution to knowledge. In this context, the absence of empirical data collected from agricultural consultants in the articles reviewed highlights a significant gap in the literature.

To conclude, it is important to highlight that this systematic literature review provides some important implications for practice. We argue that a balanced awareness of all three pillars of sustainability (environmental, social and economic) is crucial in contributing to sustainable agriculture and achieving worldwide food security. In this context, the findings emerging from this study provide important insights for various stakeholder groups in the agricultural industry. Policymakers can deepen their understanding of the importance of developing agricultural environmental schemes that incorporate elements that will assist farmers in achieving economic sustainability. Agricultural advisors can learn about the importance of advising and educating farmers on ways to achieve both environmental and economic sustainability. Lastly, the findings of this study may contribute to farmers making informed decisions that will assist them in developing sustainable farm enterprises.

Published: May 20, 2025 IST.

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