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Article

Financial literacy, financial inclusion, and food security: A comparative analysis of green and blue economy in the poorest region of Luzon, Philippines

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Abstract: The study aims to analyze the differences and influences of financial literacy and financial inclusion on food security in the green and blue economies of San Jose, Camarines Sur, located within the poorest region of Luzon, Philippines. The research also seeks to determine the levels of financial literacy, inclusion, and food security among specific members of each economy, namely rice farmers in the green economy and fisherfolk in the blue economy. This study employs a causal-comparative research design utilizing weighted mean, Kruskal-Walli's test, and multivariate linear regression to assess the levels, variances, and impacts of financial literacy, inclusion, and food security. The findings indicate that both the green and blue economies exhibit low levels of financial literacy, as individuals struggle to apply their knowledge and skills to their attitudes and behaviors. Furthermore, given that many rice farmers and a majority of fisherfolk reside in remote areas away from urban centers, they encounter challenges in accessing and effectively utilizing financial services and products. Additionally, due to their informal income status, they experience transient food insecurity. The study highlights a significant difference in financial literacy, particularly in terms of behavior and attitude, attributed to variations in income patterns. Disparities in financial inclusion are observed concerning access, usage, quality, and well-being, stemming from geographical and systemic obstacles such as the coastal isolation of the blue economy and institutional barriers faced by both groups. The research concludes that financial literacy and financial inclusion play significant roles in influencing food security, with their effects varying across specific dimensions of each variable.

Keywords: financial literacy; financial inclusion; food security; green and blue economy

1. Introduction

In a world where millions struggle with hunger, financial literacy and inclusion may hold the key to unlocking food security for vulnerable populations. By 2023, 282 million people in 59 countries faced severe hunger—a grim 24 million increase from the previous year [1]. Adding to this crisis, food price inflation remains alarmingly high, with 48.8% of 166 countries surpassing global food price inflation levels in 2024. Addressing food security requires exploring the green and blue economies, two crucial sectors with the potential to combat hunger. In the green economy, agriculture serves as a lifeline, producing over 200 million metric tons of rice annually, the staple food for billions [2]. Beyond sustenance, agriculture fosters economic growth, reduces poverty, and generates jobs. Meanwhile, the blue economy, led by fisheries and aquaculture, provides livelihoods and nutrition to billions while tackling the challenge

of feeding a population projected to reach 9.6 billion by 2050 [3,4].

In the Philippines, food insecurity remains a critical concern. According to FAO, from 2019 to 2021, there were 5.3 million Filipinos that were severely food insecure. Moreover, fisherfolk and farmers persistently had the highest poverty rates from 2018 to 2021, with 30.6% and 30%, respectively [5]. These statistics highlight the ongoing challenges faced by agricultural and fishing households, which are disproportionately vulnerable to food insecurity. Limited incomes often compel these households to adopt coping mechanisms such as borrowing money, buying food on credit, or depleting savings [6]. One solution lies in enhancing financial literacy, the fusion of financial knowledge, skills, attitude and behaviors needed for informed decision-making. Financially literate individuals are better equipped to budget, save, and manage resources, reducing their risk of food insecurity [7,8]. In addition, financial inclusion refers to the effective access, usage, and quality of a variety of financial products and services tailored to enhance the financial welfare of individuals and enterprises, particularly those who are underserved or excluded by traditional financial systems [9]. While savings accounts significantly mitigate food insecurity, studies show that credit access alone is insufficient to address the issue [10].

Subsequently, 1836 belonged in the green economy, particularly rice farmers, and 1228 are in the blue economy, specifically fisherfolk that reside in San Jose, Camarines Sur, that depict a critical part in the economy in terms of livelihood and income. Green and blue economy is both a key player in San Jose, Camarines Sur, with a total rice farming area of 2198.56 ha and 7 barangays living in coastal areas (Tagas, Calalahan, Telegrafo, Manzana, Dolo, Sabang, and Adiangao). Therefore, it is vital to understand and integrate contemporary literature pertinent to the farming and fishing communities. This might be useful in determining possible issues. This study bestows guidelines for targeted actions to assist the growth of the green and blue sector in San Jose, Camarines Sur. The objectives of the study were to investigate the impact of financial literacy and financial inclusion on food security within the green and blue economies of San Jose, Camarines Sur, Philippines. Specifically, it aimed to achieve the following: 1) Describe the socio-demographic characteristics of respondents in terms of age, sex, civil status, educational attainment, landholdings, monthly income, years of farming and fishing, and household size. 2) Evaluate the level of financial literacy in the green and blue economies based on knowledge, skills, attitude, and behavior. 3) Assess the extent of financial inclusion in the green and blue economies regarding access, usage, quality, and welfare. 4) Determine the level of food security in the green and blue economies, considering availability, access, stability, and utilization. 5) Compare the levels of financial literacy, financial inclusion, and food security between the green and blue economies in San Jose, Camarines Sur. 6) Analyze how financial literacy and financial inclusion influence food security within the green and blue economies.

The study's results will be valuable to various stakeholders, including rice farmers and fisherfolk in San Jose, Camarines Sur, providing insights into financial literacy levels encompassing knowledge, skills, attitude, and behavior; financial inclusion regarding access, usage, quality, welfare, saving, credit, and insurance; and food security concerning availability, access, stability, and utilization. These findings will benefit the local communities by illuminating how financial literacy and inclusion impact food security and the well-being of farmers and fisherfolk. Local banks and

lending institutions can utilize the study's data to adapt their services responsibly, while the local government unit of San Jose can develop programs and policies aimed at supporting the agricultural and fishing sectors. Government agencies like the Department of Agriculture and the Bureau of Fisheries and Aquatic Resources can utilize the information to implement targeted programs, enhance data, and improve food security initiatives for farmers and fisherfolk. Partido State University can use the study's insights to inform their extension activities, and future researchers can reference this study when exploring similar topics related to financial literacy, financial inclusion, and food security among rice farmers and fisherfolk.

This study focuses on financial literacy, financial inclusion, and food security within the green and blue economies of San Jose, Camarines Sur. The qualitative relationships between financial literacy, financial inclusion, and food security are deeply interconnected. Financial literacy acts as a catalyst for financial inclusion, which in turn supports food security by enabling investments, risk mitigation, and resilience building. These relationships are particularly critical in the context of the green and blue economies, where sustainable practices and economic stability are essential for long-term food security. By addressing these linkages, our study provides valuable insights into how targeted interventions in financial literacy and inclusion can enhance food security in vulnerable communities. This qualitative relationship opens for inquiries to conduct causal-comparative research design to better understand correlation, causation, and differences. The inclusion of both the blue and green economies in our study is intentional, as it allows us to explore how financial literacy and inclusion operate in two distinct but interconnected economic contexts. The green economy focuses on sustainable agricultural practices, while the blue economy emphasizes sustainable use of marine resources. By comparing these two sectors, we aim to identify sector-specific challenges and opportunities for improving food security through financial literacy and inclusion [11–14].

The green economy includes registered rice farmers, and the blue economy comprises registered fisherfolk engaged in capture fishing. A total of 300 respondents are chosen using stratified random sampling. The research evaluates financial literacy (knowledge, skills, attitude, behavior), financial inclusion (access, usage, quality, welfare), and food security (availability, access, stability, utilization) among these groups. The goal is to analyze how financial literacy and inclusion impact food security for rice farmers and fisherfolk in San Jose. Findings are specific to this locale and may not be broadly applicable. San Jose, a fourth-class town in Camarines Sur, stands out for its significant rice farming and fishing activities, making it an ideal location for this study. Furthermore, the study intends to analyze the distinction and impact of financial literacy and financial inclusion on food security between the green and blue economies of San Jose, Camarines Sur. By serving as a framework for developing training programs and initiatives, it aims to enhance the financial knowledge and capabilities of farmers and fisherfolk, ultimately contributing to a more secure and sustainable future.

2. Review of related literature

The Philippines, a tropical country with diverse terrain, has a significant portion

of its population residing in rural areas and relying on agriculture for their livelihood. Approximately 25% of employed Filipinos are engaged in the agricultural sector, which includes farming, fisheries, livestock, and forestry [15]. These sectors, collectively forming the green and blue economies, are central to the rural population's sustenance. However, they face pressing challenges such as limited financial literacy and restricted access to financial services, which significantly impact food availability, access, stability, and utilization.

Financial literacy and financial inclusion are critical tools in addressing these challenges. Financial literacy is not a lack of finances, but rather a collection of information, skills, attitudes, and behaviors that enable individuals to better manage their resources. An inability to manage these resources frequently results in greater environmental shocks, lower savings, and poor economic management, making the people susceptible [7]. Financial inclusion, on the other hand, aims to improve the well-being of diabetes patients by promoting equal access to and use of financial services among disadvantaged populations [9]. It is clear that in areas where financial inclusion is fully integrated, the population is both economically stable and resilient.

Food security at the population level as a situation where most of the individuals are healthy and active, as it is easy for them to get enough nutritious food. It is examined within four dimensions: availability, access, utilization, and stability [16]. While there has been research looking at the connections between financial literacy and food security and food security and financial inclusion, more nuanced studies of these relationships in the green and blue economies and especially the local settings like San Jose, Camarines Sur, are few.

2.1. Financial literacy

Financial literacy is a combination of attitudes, skills and behaviors that give an individual the capability to make sound financial decisions so as to satisfy one's economic needs [7]. It requires acquiring the knowledge and skills that are needed for making good choices, such as the optimum of borrowed funds and the distribution of resources [17,18]. The research demonstrates that financially literate people have a propensity to behave better in decision-making in finance; otherwise, they do not engage in borrowing from costly lenders or do not leave funds idle. One can assert that these features in total mitigate the risk of loan default [19,20]. Since financial literacy brings awareness to the benefits of finances, it goes a long way in meeting the overall satisfaction levels and aids in meeting the requirements for effective economic management skills in budgeting and saving [21].

In addition to personal finance, financial literacy helps people understand the complexities of financial markets, evaluate investment alternatives, and make informed choices about retirement, insurance, and estate planning [21]. This knowledge is essential for long-term financial security and has a strong effect on overall well-being [22]. Additionally, financial literacy contributes to the broader economy, as individuals with better financial skills typically manage their resources better, make more informed and responsible spending decisions, and positively impact the overall economic well-being of society [7].

While financial literacy is essential, there are considerable gaps that exist—rice

farmers and fisherfolk, in particular. State of Households with Limited Financial Literacy and it indicates that households with limited financial knowledge are more likely to experience food insecurity [8]. According to Sanglay et al. [23], the distribution of income depends on educational levels and has an effect on whether someone is able to pay off debts, particularly for farmers who struggle to save money and erode it by overspending. Likewise, older male farmers may not emphasize the importance of finance management to save well since their priority is to satisfy family demand [23]. Other factors that influence financial literacy among farmers include age, education, and location relative to urban areas, income, and prior experience with financial education. Raza et al. [24] observed that, on average, financial literacy among farmers was moderate, shaped by these demographic and economic variables.

The results underscore the need for such kinds of farmer and fisherfolk-specific financial literacy programs in the Philippines. While certain economic research explores the broad impact of financial literacy on economic fragility, others zero in on the distinct struggles artisanal communities experience. Carman and Zamarro [8] explain a very simple relationship between food security and financial literacy as that the improvement in the financial literacy of farmers would help farmers secure food because the chances, they have that money to do it would improve. Similarly, Sanglay et al. [23] highlight the importance of education in debt management while implying that greater access to financial education could better equip farmers with respect to financial skills and reduce risk factors related to debt [23].

Financial literacy alone cannot play its part as the other influencer that would benefit a farmer and a fisherfolk on economic considerations of his welfare [25]. Also, provision to the aforementioned access means credit facilities and a deposit facility can greatly empower those members [26]. Moreover, it is essential to take into consideration the particular challenges they are exposed to, such as limited market access, volatile prices, and the effects of climate change, when developing programs on financial literacy and inclusion [27]. Addressing disparities in financial literacy is the only way towards achieving financial inclusion and economic improvement among farmers and fisherfolk. Investing in their financial education does, however, unlock their economic potential, thus nurturing resilience and creating a more equitable pathway to a better future.

Among farmers, sound financial knowledge enhances investment in agriculture, use of financial services, and increased productivity and food security [21]. Financial education investment maximizes the economic benefits of farmers, stabilizing food security, increasing household incomes, and reducing hunger in the communities where they live [17]. Inversely, low financial literacy increases the economic risk and puts the farmers on the back foot in responding to market shocks and coping with financial adversity [8]. A gain in financial literacy among rice farmers and fisherfolk needs to be considered for a shored-up economy of resilience and food security. The rise in financial literacy and capability will better equip them to fight against financial shocks that negatively influence anticipated life decisions [24,28].

2.2. Financial inclusion

Financial inclusion describes the effective access, usage, and various qualities of

financial services and products intended to support the progress of individuals and enterprises—including those traditionally left out of or poorly serviced by a formal financial arrangement. Such ensures that everyone, especially those considered vulnerable, can enjoy proper, high-quality financial service designed to meet needs such as savings, payments, credit, investments, and insurance [9]. Financial inclusion is the effort toward dismantling barriers that restrict access to finance so that everybody can have equal, affordable, and reliable financial products and services. This strategy enhances the access of such important services, such as savings, credit, payment, and insurance, for the people who lack collateral, stable employment, or an established credit history, hence aiding populations that have previously been excluded from the mainstream of the financial system [29].

The improvement of financial inclusion emerges as a major goal of international policy that can be accomplished through an enhancement of financial literacy. Financial literacy can enable people to make informative decisions, thereby slowly boosting their overall well-being [30]. An obvious relationship between financial literacy and financial inclusion exists since it facilitates several indirect benefits like cash management, purchasing power, account ownership, banking service access, and access to credit [31,32]. In addition, improving financial literacy is especially important for women because it enables them to use financial products and services effectively, which leads to better socio-economic outcomes [31,32].

Despite the development in financial inclusion, huge barriers remain. For example, financial inclusion can cut down the chance of insecurity about food mainly through facilities such as savings accounts. However, access to credit, which is one of the most highlighted tools in interventions targeting financial inclusion, would not be that effective to deal with food security concerns [31–33]. Moreover, food insecurity through financial services is subject to the kind of service; e.g., having an open savings account will significantly reduce the level of food insecurity, and reliance on credits is likely to increase the likelihood of developing food insecurity. The use of the formal payment service may reduce food security in a relatively marginal way [34].

To understand the connection between financial inclusion and food security in the Philippines, it's important to consider the country's unique challenges. Farmers and fisherfolk face issues like limited market access, price fluctuations, and climate change, making it hard to manage finances and ensure food security. Therefore, financial inclusion programs should be tailored to meet their specific needs, combining access to financial services with proper financial education and support [8].

Inclusive finance is about providing a wide range of affordable financial services to everyone, especially those who don't have access to formal financial systems. Financial literacy is the aspect on which the proper implementation of the services among individuals in the rural area depends. Improved financial inclusion equips disadvantaged people with adequate resources for their engagement in economic activities and contributes to upgrading living standards for further benefitting community progress. In summary, promotion of financial inclusion is significant for enabling the poor and other disadvantaged to access financial services necessary to enhance economic stability and food security [35]. However, financial inclusion in itself can do little to solve most economic and social problems; implementation requires consideration of the distinct needs of different communities so as to have a

more meaningful impact on livelihoods and food security.

2.3. Food security

Food security means that all people consistently have access to enough safe and nutritious food that meets their dietary needs for an active, healthy life [16]. Food security is evaluated across four main dimensions: Availability, access, utilization, and stability [16]. However, global hunger remains a significant issue, affecting almost 10% of the world's population. From 2019 to 2022, the number of people suffering from hunger increased by about 150 million [36]. In 2023, severe hunger levels rose to affect 282 million people in 59 countries, marking an increase of 24 million from the previous year [1]. Food price inflation also remains high, with 48.8% of 166 countries experiencing domestic food prices above the global inflation rate. The State of Food Security and Nutrition in the World 2023 report notes that while global hunger rates leveled off from 2021 to 2022, certain countries still face worsening hunger due to challenges such as post-COVID recovery, rising food and energy costs, conflicts, and adverse weather events.

In the Philippines, approximately 8.5% of the population faces undernourishment. Food insecurity can be categorized into chronic and transitory types [37,38]. Chronic food insecurity occurs when people consistently lack access to sufficient food over a long period, often due to poverty, limited resources, or underdeveloped systems. In contrast, transitory food insecurity is temporary, caused by sudden events like natural disasters, conflicts, or economic crises. While chronic insecurity requires long-term solutions like improving education and agriculture, transitory insecurity needs immediate responses such as food aid or emergency relief.

To meet global food demand, sustainable food supply chains, particularly those relying on coastal communities and environmentally friendly food production, are essential. Marine resources play a significant role in global food security, accounting for two-thirds of fishery production and 80% of aquaculture production. Additionally, the number of fish available to the population in coastal areas is 65% above the global average [39]. Agricultural sectors have a significant role in attaining SDGs by achieving food security, poverty alleviation, and nutrition enhancement, which subsequently leads to child mortality rates declining.

The concepts of financial literacy and inclusion are essential toward building food security. Financial inclusion means that people have access to savings and credits, which enables them to maximize resources and ensure stable provisions for their households in the short run. In contrast, financial literacy builds the knowledge that persons acquire in making proper choices toward improving their access and, consequently, capacity toward getting food. Savings accounts can significantly reduce food insecurity, whereas relying solely on credit would not have any similar effects [10]. Moreover, the type of financial service used matters; when discussing food security, savings accounts can significantly reduce food insecurity, whereas reliance on credit may increase it, and formal payment services have little to no effect [34].

Food security affects agricultural producers and fishery workers in distinct ways, attributable to the specific challenges inherent in their roles. Particularly for those situated in rural regions, farmers play a critical role in enhancing food security through

the cultivation of crops that are vital for local and national food supplies. For any developing country, the agriculture sector plays a very strategic role in ensuring food security. It does this either directly through income generation or through employment and nutrition, hence achieving the SDG set out by Geng et al. [40]. Challenges to farmers include, but are not limited to, climate change and volatile markets, which impact food security.

Fisherfolk form an important group in coastal regions' food supply chains. Marine resources are vital for global food security as they provide a big portion of the world's fish and aquaculture products. Coastal communities heavily dependent on these marine resources contribute enormously to the supply of the world's fishes. The communities of fisherfolk have specific challenges related to environmental degradation, overfishing, and climate change that carry risks to food availability and stability. Therefore, sustainable policies and practices that promote financial inclusion for fisherfolk are crucial to maintaining their role in food security. In conclusion, there is a need to devise strategies that cater to the needs of both farmers and fisherfolk with regard to food security. Financial literacy and inclusion will improve food security through sustainable livelihoods and long-term access to food for these communities [39,40].

2.4. Green and blue economies

The green and blue economies are crucial for promoting sustainable development in rural areas, each with distinct yet complementary roles. The green economy focuses on sectors such as agriculture, forestry, renewable energy, and waste management, promoting practices that support environmental sustainability, economic growth, and community well-being [41]. Through the green economy, agriculture is the key sector [42]. As it caters to the world by serving as a primary source of income for many individuals and provides global nutrition. Particularly the rice farmers, which yield over 200 million metric tons of rice, which is considered to be a staple food to people. Additionally, it supports GDP growth, guides the way in poverty reduction, and provides a broad range of job possibilities [42,43]. Rice farming provides a stable but modest income to farmers, contributing significantly to food security; however, these farmers face challenges such as limited capital, fluctuating productivity, and vulnerability to climate risks [44]. Agriculture remains one of the largest sources of employment worldwide, engaging approximately 37% of the global workforce, with the majority located in developing countries. This makes the agricultural sector a critical driver of economic development and poverty alleviation in rural regions [45,46].

The blue economy is a critical component in providing nutrition to billions of people [4]. The fisheries and aquaculture industry is a key driver of livelihoods, nutritious food, and economic opportunities, and it serves an essential role in addressing one of the world's major difficulties: feeding a population projected to reach 9.6 billion by 2050. Fisheries and aquaculture play an important role in stopping hunger, improving health and reducing poverty. This method is very important for improving food security along with creating income in coastal as well as rural communities [47]. Fisheries, a foundation of the blue economy, support the livelihoods

of millions of people and are very important for meeting the increasing global demand for food as populations continue to grow. Small-scale fishers are important; however, they are frequently left out of important policy discussions about the blue economy. This important absence of representation can result in the serious neglect of their large social and economic needs, despite their playing an analytically important role in supplying affordable, nutritious food to communities worldwide [48].

The green and blue economies have to respond to challenges posed by environmental and economic changes, such as climate change, depletion of natural resources, and financial instability. The agricultural sector within the green economy faces very serious climate change-related vulnerabilities that usually affect smallholder farmers who do not have adequate resources for adaptation. Such initiatives reduce the risk of climate change, and simultaneously strengthen food security. A portion of agricultural households suffer severe food insecurity, thus having to resort to coping mechanisms, such as taking credit or tapping into savings to ensure their basic needs are met [49].

Fisheries and aquaculture are vulnerable to ecosystem disruptions by which unsustainable practices have caused the reduction of marine biodiversity, food supply, and the decline in the livelihoods that depend on them. The sustainable blue economy seeks to preserve the marine environment for the long-term benefit of communities [47]. Small-scale fisher organizations argue for resilient policies, claiming that industrial activities often harm coastal communities and food security [47,48].

Fishermen face declining fish stocks and limited access to formal banking institutions, impeding progress toward sustainable investment. Likewise, rice farmers are equally enmeshed in deep financial ignorance as it relates to their ability to put savings, credit, and other safe investments into practice, hence preventing communities from cushioning themselves against economic shocks [44]. Fisherfolk use informal lending institutions as a means to obtain credit; this ultimately increases their financial vulnerability [23,44].

These ubiquitous challenges, therefore, imply the need for targeted financial education and inclusion programs. Tools such as mobile banking and financial literacy training are aimed at improving financial behaviors that would enhance economic stability and food security. Despite climate disruptions affecting rice farming, fisheries also suffer from resource depletion and inefficiencies throughout the supply chain [50,51].

Rice farmers have operational seasonal incomes that fuel predictability in contrast to fisherfolk, who often base their livelihoods on unpredictable daily catches, hence distinguishing their saving and investment behaviors. Distinguishing these characteristics signifies that present-day policies encourage community involvement, value chain strengthening, and customized financial incentives. Organizations like the World Bank have been advocating for integrated approaches toward fostering sustainable development in both green and blue economies [52].

2.5. Financial literacy, financial inclusion, and food security

A comparison of green and blue economies points out major challenges regarding the issues of financial literacy, inclusion, and food security within rural settings.

Financial literacy provides people with information and skills to enable them to make informed financial choices, access credits, and invest in sustainable practices that improve resilience. In the green economy, financially literate farmers are able to embrace technologies that raise productivity, reduce food insecurity, and ensure financial security [51–54].

In contrast, for the blue economy, financial inclusion is particularly important since small-scale fishers often lack access to formal financial services. This will help them to be financially literate and included in budgeting their earnings, borrowing to procure sustainable gear, and undertaking activities that protect marine ecosystems. Thus, such measures will stabilize the incomes of fishers and support food security by providing access to affordable and nutritious fish in coastal areas [55]. Yet more often than not, the small-scale fishers are excluded from blue economy policies, thus placing constraints on their access to much-needed finances or the ability to render support to them [48].

In both economies combined, financial literacy and inclusion involve providing better food security, resilience, and overall economic growth within rural communities. Financial literacy helps farmers and fishers with budgeting, resource-wise allocation, and viability in a way that contributes to household food security [53,54,56,57]. Financial inclusion plays a complementary role in providing access to financial services to enable them investments for productivity, accumulation of savings, and resilience to economic shocks [30,31]. Financial literacy and inclusion studies indicate that households with financial literacy and inclusion are more capable of ensuring consistent food availability, or improving diet and nutrition, and are more empowered to meet financial needs [58–61] Green and blue economies are of utmost importance to San Jose, Camarines Sur, since the livelihood of farmers and fisherfolk is very vital for the sustainability of practices. Farmers working in the green economy play a huge role in promoting sustainable agriculture practices, protecting biodiversity, and reducing carbon emissions [62]. Meanwhile, the blue economy stresses the responsible use of marine resources, with fisheries and aquaculture as key players in food supply, poverty alleviation, and job creation [47,48]. While these sectors have very different operational philosophies from each other, they, however, have similar challenges regarding food security, financial management, and adaptation to environmental changes, making financial literacy and financial inclusion an ever-greater need.

This tells where this study attempts to bridge some gaps in the literature with an assessment of financial literacy and inclusion affecting food security specifically among rice farmers and fisherfolk of San Jose, Camarines Sur. The researches before laid emphasis on these variables, yet the effect of their combination in these two sectors regarding food security has never been examined. In addition, this study will give insight into the peculiar needs and issues faced by rice farmers and fisherfolk from which identified financial interventions can be tailored to meet specific needs to improve food security under the green and blue economies. The final objective is to draw policies for financial education and inclusion that can best tackle food insecurity in rural agricultural and fisheries contexts, leading to sustainable economic development in the region.

2.6. Frameworks

The theory pertaining to the research that explains financial inclusion, financial literacy, and food security is introduced and described in **Figure 1**. Financial Literacy Theory of Financial Inclusion, Capability Theory, and Entitlement Theory were used in research.

The financial literacy theory of financial inclusion [63] points out the role of education in promoting formal financial service use. Increased financial literacy increases awareness of services and leads to account openings and access to products such as investments and mortgages. It also helps cash-strapped governments since educating citizens is a low-cost way of promoting financial inclusion. However, it focuses on increasing people's willingness to use financial services but not their capacity, the financial resources needed to actively participate in the formal financial sector.

Amartya Sen's Capability Theory gives emphasis to freedom for individuals and the capabilities that enable them to achieve a life they value [64]. In finance, it is translated to financial capability, combining internal factors like knowledge, skills, and behaviors with external opportunities in the form of access to financial systems [64,65]. This theory is closely related to financial inclusion, which provides for external opportunities in terms of credit, savings, and other financial services that support the accomplishment of goals for individuals. While financial literacy represents internal abilities, financial inclusion reflects external opportunities, and together, it empowers individuals to manage their finances effectively [66].

Entitlement Theory, which was also developed by Amartya Sen, suggests that people's capacity to acquire food is determined by their entitlements, the legal means and opportunities available to them [64]. This approach focuses on access to food rather than its availability, arguing that food security is determined by entitlements such as growing food, trading goods or services, earning wages, or receiving aid [67]. Food insecurity is the condition created by entitlement failure due to an economic shock, social inequality, or political challenge. Thus, this theory claims that food security and entitlement theory are inherently interconnected.

The qualitative relationships between financial literacy, financial inclusion, and food security are interconnected and mutually reinforcing. This relationship compels authors to conduct empirical analysis to validate these insights and intuitions. Financially literate individuals better understand the benefits of formal financial services, such as savings accounts, credit facilities, and insurance products. This knowledge encourages them to actively seek and utilize these services, increasing their level of financial inclusion. Low financial literacy often acts as a barrier to financial inclusion. Individuals lacking financial knowledge may distrust formal financial institutions, prefer informal mechanisms (cash savings or informal lenders), or make suboptimal financial decisions. By improving financial literacy, these barriers can be reduced, leading to greater financial inclusion.

Financial inclusion enables individuals like farmers and fishermen to access credit for purchasing inputs (seeds, fertilizers, fishing gear) or investing in productivity-enhancing technologies. It also provides access to insurance products that protect against risks such as crop failure, natural disasters, or health emergencies.

Access to savings accounts allows households to build financial reserves for purchasing food during scarcity or economic hardship, creating resilience particularly important for vulnerable rural populations. Financial literacy both directly and indirectly influences food security by empowering individuals to make better financial decisions that enhance economic stability and food access. Financially literate individuals can allocate resources more effectively, ensuring they can afford nutritious food even during financial strain. This literacy enables informed decisions about agricultural or fishing investments, which can increase productivity and income. Financially literate individuals are more likely to be aware of and utilize financial services supporting food security, such as microloans for small-scale farming or government subsidies for agricultural inputs. Thus, improved financial literacy leads to greater financial inclusion through increased awareness and usage of formal financial services. Financial inclusion enhances food security by providing access to credit, insurance, and savings, enabling households to invest in productive activities, manage risks, and build resilience. Households achieving food security are better positioned to invest in financial literacy programs and participate in formal financial systems, creating a positive feedback loop. Financial literacy enables farmers to adopt sustainable agricultural practices, while financial inclusion provides necessary resources (credit for organic fertilizers or irrigation systems) to implement these practices, improving agricultural productivity and food security. Similarly, financial literacy helps fishermen understand the importance of sustainable fishing practices, while financial inclusion provides access to credit for modern equipment or insurance against environmental losses, contributing to stable incomes and improved food security. These interrelatedness and complexities were illustrated by the theoretical paradigm as shown in **Figure 1** [49,68–71].

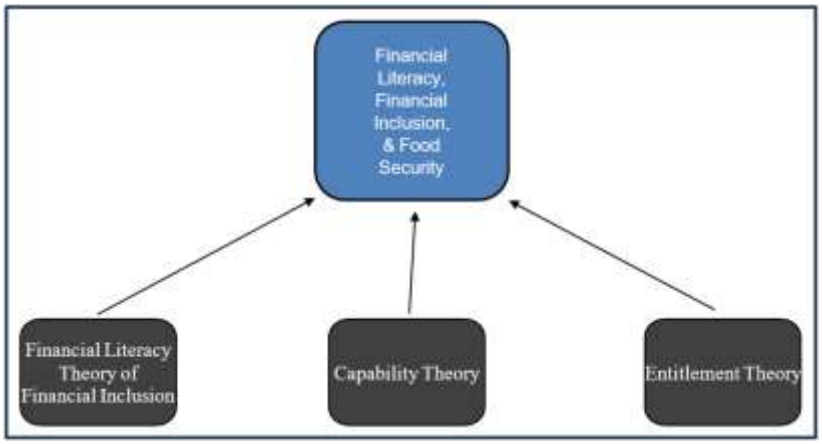

Figure 1. Theoretical paradigm.

Conceptual framework

Figure 2 shows the overall process of this study, with a specific emphasis on three variables. The first factor is financial literacy, which serves as the independent variable and consists of four indicators: knowledge, skills, attitude, and behavior. The second factor is financial inclusion, which also acts as the independent variable and also encompasses seven indicators: access, usage, quality, and welfare. The food security will serve as a dependent variable that comprises four dimensions: Availability,

access, utilization, and stability. The diagram aims to assess the impact of financial literacy and financial inclusion on food security by evaluating each of these indicators. To put it differently, the diagram illustrates the process of measuring how financial literacy and financial inclusion influence food security through an analysis of these indicators.

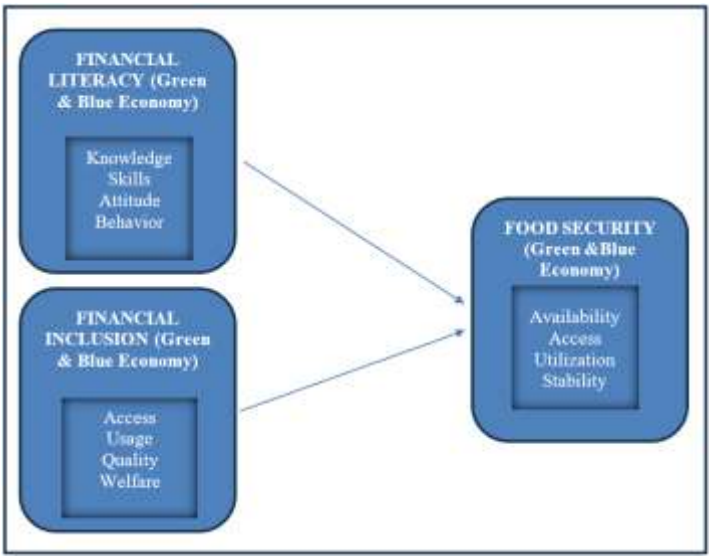

Figure 2. Conceptual paradigm.

3. Research methods

3.1. Research design

This research used a causal-comparative research design to assess the socio-demographic profile, examine the level of financial literacy, financial inclusion, and food security, evaluate the comparative differences in the level of financial literacy, financial inclusion, and food security between the green economy and blue economy, and analyze the extent of influence of financial literacy and financial inclusion on food security among rice green and blue economies in San Jose, Camarines Sur.

3.2. Sampling design

The research utilized a random sampling technique where populations will be the same as to select. The researchers utilized a stratified random sampling formula to easily get the data.

$$nh = (Nh/N) \times n,$$

where:

nh = sample size stratum, n = sample size;

N = population size;

Nh = population size stratum.

3.3. Respondents of the study

In this study, 1836 registered rice farmers and 1228 registered fisherfolk in San Jose, Camarines Sur. Using the stratified sampling formula, 180 and 120 were the

respondents in San Jose, Camarines Sur, accordingly. This entails demonstrating the purpose, procedures, and benefits to the participants in order to secure their voluntary consent to partake in the study.

3.4. Locale of the study

The town of San Jose is in Camarines Sur is shown in **Figure 3**; as of the 2020 census, it is classified as a fourth-class town. The municipality occupies 0.87% of Camarines Sur's total area, or a land area of 48.04 square kilometers. According to consensus, by 2020 the town has a population of 43,973. Moreover, based on the data from the Department of Agriculture, the locale has the most physical area of rice paddy and farmers among the municipalities of Partido. Subsequently, its rice field has an area of 2198.56 hectares with 1836 registered farmers. Additionally, 7 out of 28 barangays are living in coastal areas (Tagas, Calalahan, Telegrafo, Manzana, Dolo, Sabang, and Adiangao), consisting of 1228 registered fisherfolk, and it is the only town among Partido that is connected to the seaside area. Thus, San Jose, Camarines Sur, is the chosen locale for the study [72].

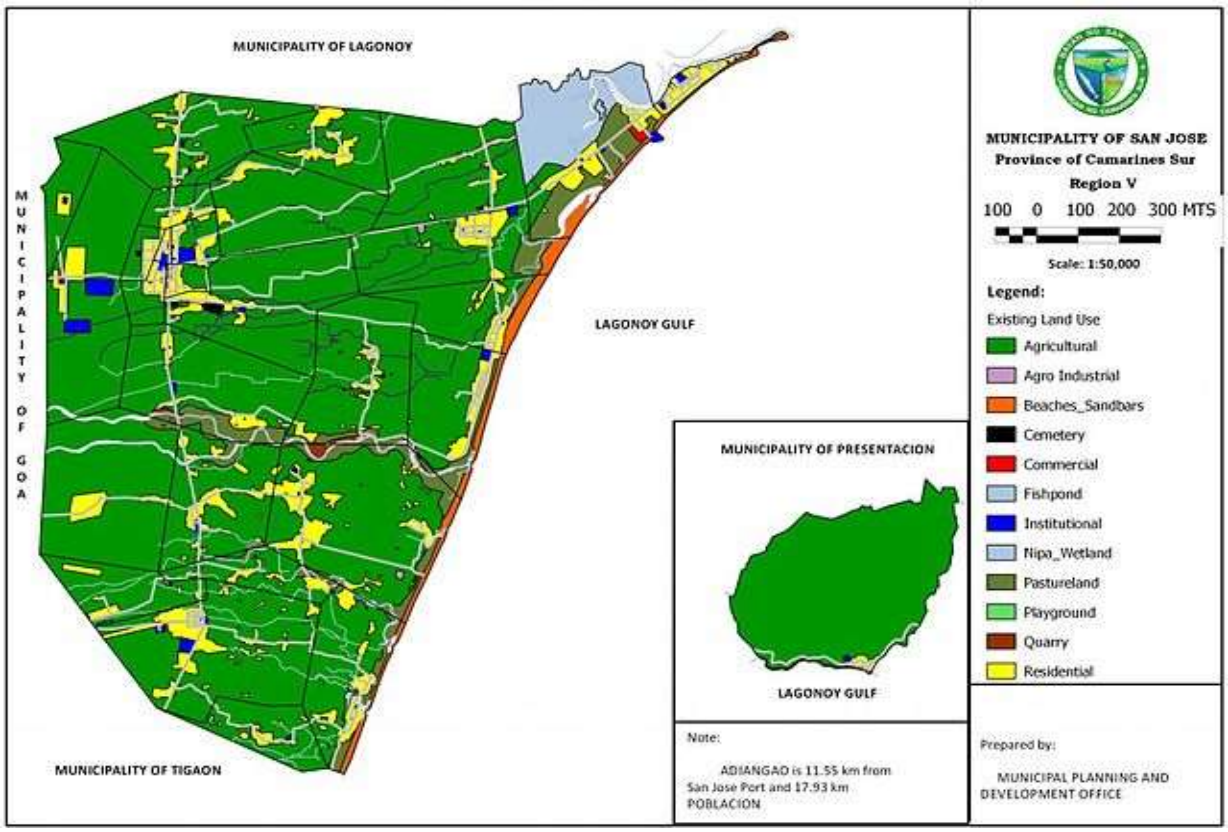

Figure 3. Map of San Jose, Camarines Sur, Philippines (LGU San José, 2024).

3.5. Data gathering procedures

The letter of request was distributed, and the questionnaire was administered in San Jose, Camarines Sur. Following a letter of approval, request permission and gather the relevant information. Prior to being distributed to the target individuals, the questionnaire will be verified for reliability and validity. The researchers administered the questionnaires during the gathering procedure. Measures were taken to ensure that

ethical norms are followed throughout the study process. The questionnaire is divided into three parts based on the participant's perception.

3.6. Data gathering tools

The researchers applied survey questionnaires in data gathering. The survey questionnaires had been validated by three credible validators. Before the actual data collection, a pilot test was first undergone in Sagñay, Camarines Sur, that has green and blue economies present. To test its reliability, Cronbach's alpha was utilized; a score of more than or equal to 0.7 indicates that the response value for each respondent across a set of questions is consistent. The result of Cronbach's alpha is 0.739; hence, the data are reliable. The first part (I) focused on obtaining the socio-demographic information of the rice farmers and fisherfolk, including age, sex, civil status, educational attainment, landholding (ha), monthly income, and years of farming/fishing. The second part determined the level of financial literacy in terms of knowledge, skills, attitude, and behavior. The third part assesses the level of financial inclusion regarding access, usage, quality, welfare, saving, credit, and insurance. The fourth part ascertains the level of food security in terms of availability, access, stability, and utilization.

3.7. Statistical/analytical tools

To answer the objectives, the following analytical tools were used (See **Table 1**).

Percentage Technique. This instrument was utilized to measure the socio-demographic of the respondents.

$$\text{Technique: } P = \frac{F}{N} \times 100,$$

where:

P = percent;

f = frequency;

N = number of cases.

Weighted Mean. This tool was used to compute the Likert scale ranging from strongly agree = 5 to strongly disagree = 1, to determine the tendency of composite scores.

$$W = \frac{\sum_i^n = 1 w_i x_i}{\sum_i^n = 1 w_i},$$

where:

W = weighted average;

n = number of terms to be averaged;

ωi = weight value;

xi = data value to be averaged.

The study employed a Likert scale, with each point corresponding to the following verbal interpretations.

Table 1. Likert scale.

Likert Scale	Verbal Interpretation
4.21–5.00	Strongly Agree
3.41–4.20	Agree
2.61–3.40	Not Sure
1.81–2.60	Disagree
1.00–1.80	Strongly Disagree

Kruskal-Wallis Test. This tool is employed to ascertain whether there exist statistically significant disparities between two or more groups of an independent variable on a continuous or ordinal dependent variable.

$$H = \frac{12}{NN+1} + \Sigma\frac{R_i^2}{n_i} - 3N + 1,$$

where:

N = Total number;

n_i = The number in the i-th group;

R_i = Total sum of the ranks in the i-th group.

Multivariate Linear Regression. This tool is utilized to examine the linear influence of multiple variables of financial literacy and financial inclusion on food security.

$$Y = b0 + b1 \times 1 + b1 + b2 \times 2 + \cdots + bp \times p,$$

where:

Y = Food Security (Availability, Access, Stability, and Utilization);

b_0 = Intercept, the expected value of Y when all independent variables are equal to zero;

b_1, b_2, ..., b_p = Coefficients (indicate the change in Y for each one-unit increase in the corresponding X-variable, holding others constant);

X_1 = Financial Literacy indicators (Knowledge, Skills, Attitude, and Behavior);

X_2 = Financial Inclusion indicators (Access, Usage, Quality, and Welfare);

X_3, ..., X_P = Control variables (e.g., income level, household size, education, or other factors that might influence food security).

4. Results and discussions

4.1. Socio- demographic of green economy and blue economy

This section presents the socio-demographic profile of the Green Economy and Blue Economy of San Jose, Camarines Sur that encompasses age, landholdings, monthly income, years of farming/fishing, household size, sex, civil status, educational attainment.

Table 2 shows the socio-demographic profile of the two groups. The blue economy has the lowest age of 21 years old, while the oldest in the green economy is 85 years old. In the land holdings, the green economy has the largest land owned of 7 hectares, while the lowest is the blue economy, which is 0. Similarly, their monthly income also has the highest amount, ranging from 1000 to 61,000. As to the blue

economy, only extend from 1000 to 20,000. In terms of years of farming/fishing and household size, the green and blue economy results are not far apart, with 60 and 58 years and 14 and 12 family members, respectively. The majority of the respondents, whether in the green and blue economy, are male, with 63.9% rice farmers and 80% fisherfolk. Most of the respondents are married, with 77.2% rice farmers and 69.2% fisherfolk; the next highest is other (live-in) with 11.7% rice farmers and, for the fisherfolk, is single with 16.7%. Moreover, a large portion of the respondents have an educational attainment of high school level, 41.7% for the rice farmers and 44.2% for the fisherfolk. However, in terms of college graduates, the green economy has a higher number of 13.9% than the blue economy of only 1.7%.

Table 2. Socio-demographic profile of green economy and blue economy.

Socio-Demographic Characteristics	**Green Economy**		**Blue Economy**	
	MIN	**MAX**	**MIN**	**MAX**
Age	25	85	21	75
Landholdings	0.25 ha	7 ha	0	1 ha
Monthly Income	1000	61,000	1000	20,000
Years of Farming/Fishing	1	60	1	58
Household Size	1	14	1	12
	Frequency	Percentage	Frequency	Percentage
Sex				
Female	65	36.1	24	20.0
Male	115	63.9	96	80.0
Civil Status				
Married	139	77.2	83	69.2
Single	20	11.1	20	16.7
Divorced	0	0	1	0.8
Others	21	11.7	16	13.3
Educational Attainment				
Elementary Level	20	11.1	18	15.0
Elementary Graduate	34	18.9	23	19.2
High School Level	75	41.7	53	44.2
High School Graduate	8	4.4	23	19.2
College Level	17	9.4	1	0.8
College Graduate	25	13.9	2	1.7
Others:	1	0.6	0	0

The Green Economy demonstrates clear advantages in socio-demographic indicators, particularly landholdings and income. Green Economy participants own larger land plots (0.25–7 hectares), enabling higher income generation (up to ₱61,000 monthly), compared to the Blue Economy, where limited or no landholdings (0–1 hectare) constrain earnings (up to ₱20,000 monthly). Both groups have similar household sizes and years of experience in farming or fishing, yet gender roles reflect cultural norms. Men dominate labor-intensive activities, while women contribute to

post-harvest work and household food security [73].

Educational attainment differs significantly, with only 1.7% of Blue Economy participants being college graduates compared to 13.9% in the Green Economy. The Green Economy's higher income is primarily attributed to larger landholdings and higher educational attainment. Individuals earning ₱60,000 to ₱61,000 monthly typically own at least 2 hectares of land and earn additional income from other sources, supported by their higher rate of college education. In contrast, the Blue Economy's smaller landholdings, lower income, and limited education exacerbate poverty risks, aligning with national statistics showing fisherfolk have the highest poverty incidence among rural workers [5,74,75].

4.2. Level of financial literacy of green economy and blue economy in San Jose, Camarines Sur

This section assesses the level of financial literacy among the Green Economy and Blue Economy in San Jose, Camarines Sur, based on their knowledge, skills, attitude, and behavior.

Table 3 presents the average weighted mean of the four indicators of financial literacy. The average weighted mean regarding knowledge for green economy is 4.00 that interpret to agree and for blue economy is 4.13 that is equivalent to agree. With regards to skills, the average weighted mean for green economy is 3.46 indicating an agree interpretation, meanwhile for blue economy is 3.35 that shows a not sure interpretation. As to attitude, the average weighted mean is 3.35 for the green economy and 3.38 for the blue economy, which both result in a not-sure interpretation. Moreover, the behavior of the green and blue groups resulted in an agreement interpretation with values of 3.53 and 3.45, respectively.

Table 3. Level of financial literacy (in terms of knowledge, skills, attitude, and behavior) between green and blue economies.

Knowledge	**Green Economy**		**Blue Economy**	
	Weighted Mean	**Verbal Interpretation**	**Weighted Mean**	**Verbal Interpretation**
Knowledge on interest rates.	3.67	Agree	3.73	Agree
Knowledge on inflation.	3.75	Agree	3.98	Agree
Knowledge on time value of money.	3.92	Agree	4.11	Agree
Knowledge on income and expenditure.	4.47	Strongly Agree	4.58	Strongly Agree
Knowledge on Risk and Return.	4.21	Strongly Agree	4.26	Strongly Agree
Average Weighted Mean	4.00	Agree	4.13	Agree
Skills				
Skills to regularly track its income and expenses.	4.22	Strongly Agree	4.28	Strongly Agree
Skills to have an emergency fund that can cover 3–6 months of expenses.	2.78	Not Sure	2.85	Not Sure
Skills to recognize a good financial investment.	4.09	Agree	4.05	Agree
Skills to make good decisions involving money.	3.08	Not Sure	2.57	Disagree
Skills to understand financial information.	3.12	Not Sure	3.01	Not Sure
Average Weighted Mean	3.46	Agree	3.35	Not Sure

Table 3. (*Continued*).

Knowledge	Green Economy		Blue Economy	
	Weighted Mean	**Verbal Interpretation**	**Weighted Mean**	**Verbal Interpretation**
Attitude				
Attitude that setting financial goals for the future is important.	4.67	Strongly Agree	4.68	Strongly Agree
Attitude that managing their money affects the future.	4.24	Strongly Agree	4.28	Strongly Agree
Attitude that saving money is more satisfying than spending.	3.17	Not Sure	3.34	Not Sure
Attitude that money is not made to be spent.	1.54	Strongly Disagree	1.23	Strongly Disagree
Attitude that saving is possible for their family.	3.12	Not Sure	3.35	Not Sure
Average Weighted Mean	3.35	Not Sure	3.38	Not Sure
Behavior				
Behavior of making notes and controlling their spending.	4.24	Strongly Agree	4.58	Strongly Agree
Behavior of not asking family or friends to borrow money to pay bills.	2.22	Disagree	1.79	Strongly Disagree
Behavior of not spending more money than they earn.	1.79	Strongly Disagree	1.32	Strongly Disagree
Behavior of analyzing bills before making a large purchase.	4.62	Strongly Agree	4.82	Strongly Agree
Behavior of comparing prices when making a purchase.	4.80	Strongly Agree	4.75	Strongly Agree
Average Weighted Mean	3.53	Agree	3.45	Agree

Financial literacy in the Green Economy appears to be slightly stronger overall, particularly in terms of skills and knowledge. This advantage aligns with their more predictable income cycles and larger educational attainment compared to the Blue Economy. The Blue Economy, however, lags behind in skills, interpreted as not sure, likely reflecting the income variability caused by seasonal and weather-dependent fishing activities.

The similarities in attitudes across both groups suggest shared beliefs about financial management, including the importance of setting financial goals. However, there is a notable division in their ability to save money, with some individuals prioritizing spending for immediate satisfaction over saving for the future.

Both groups showed positive behavior, like spending control, tracking expenses, and comparing prices before purchasing. However, despite having this behavior, they demonstrate a harmful behavior of spending above their income, which is due to their irregular income patterns.

The results demonstrate that financial literacy in both economies is determined by their socioeconomic context. Higher education and predictable cycles of agricultural income towards the Green Economy also help, promoting financial literacy. Farmers can organize the spending of their income around harvest seasons and develop better financial judgment and budgeting habits [23,76,77].

On the other hand, the Blue Economy encounters problems like irregular and seasonal income based on weather and daily catches. The reduced confidence in financial skills indicates the challenges of fisherfolk in managing fluctuations in their income. Nevertheless, in a study, those with higher financial literacy are well equipped to plan saving strategies and utilize credit services to settle these challenges [5,78,79]

The result showed that both groups lack emergency funds, which emphasizes

their vulnerability to financial shocks. Individuals with limited or unstable income rely on meeting day-to-day requirements rather than building up any kind of protective buffer [48,76,77].

Older male farmers tend to address first their family needs, which results in prioritizing spending over saving, which describes this continual behavior of both economies [23,78–80].

The results are similar to the studies on financial literacy and income stability in rural economies. Recent studies highlight that a person with financial knowledge is decisive, utilizing loans, investments, and savings, which are components in managing risks. Evidently, the green and blue economies do not possess these financial practices and lack the ability to make a well-decided loan [23,81].

Moreover, seasonal income variability amongst fisherfolk can be managed through financial literacy [5]. Increased financial literacy enables fisherfolk to save, borrow and adjust to inflationary impacts on the costs of production [82,83]

4.3. Level of financial inclusion of green economy and blue economy in San Jose, Camarines Sur

This section assesses the level of financial inclusion among the Green Economy and Blue Economy in San Jose, Camarines Sur, based on their access, usage, quality, and welfare.

Table 4 exhibits the average weighted mean of the level of financial inclusion with its four indicators. In terms of access, the green economy has an average of 3.25 and the blue economy has an average of 2.65, which both indicate a not-sure interpretation. Regarding usage, both groups have the same verbal interpretation of not, but the different value for the green economy is 3.38 and for the blue economy is 3.07. The quality for green economy results is 3.78, which is agreeable, and for blue economy results, it is 3.61, which is also agreeable. For the welfare, both have a verbal interpretation of strongly agree, with a value of 4.55 for the green economy and 4.63 for the blue economy.

Table 4. Level of financial inclusion (in terms of access, usage, quality and welfare) between green and blue economies.

Financial Inclusion	**Green Economy**		**Blue Economy**	
Access	**Weighted Mean**	**Verbal Interpretation**	**Weighted Mean**	**Verbal Interpretation**
Access to banks is easy.	2.92	Not Sure	1.80	Strongly Disagree
Access to microfinance is easy.	3.39	Not Sure	2.86	Not Sure
Access to applying for insurance is easy.	3.62	Agree	2.87	Not Sure
Access to financial products designed specifically for Green/Blue Economy is available.	3.23	Not Sure	2.91	Not Sure
Access to mobile banking or e-wallets (e.g., GCash, Paymaya) is easy.	3.09	Not Sure	2.83	Not Sure
Average Weighted Mean	3.25	Not Sure	2.65	Not Sure

Table 4. (*Continued*).

Financial Inclusion	**Green Economy**		**Blue Economy**	
Access	**Weighted Mean**	**Verbal Interpretation**	**Weighted Mean**	**Verbal Interpretation**
Usage				
Usage of financial institutions like banks, pawnshops, or remittance centers is common.	3.33	Not Sure	3.00	Not Sure
Usage of savings accounts in the bank is practiced.	1.99	Disagree	1.41	Strongly Disagree
Usage of loans from financial institutions is preferred over Five-six moneylenders.	4.25	Strongly Agree	4.03	Agree
Usage of financial services for sending or receiving remittances is evident.	3.63	Agree	3.38	Not Sure
Usage of insurance (health, life, accident, or non-life) is evident.	3.69	Agree	3.53	Agree
Average Weighted Mean	3.38	Not Sure	3.07	Not Sure
Quality				
Quality of the transaction process in banks is satisfactory.	3.45	Agree	3.36	Not Sure
Quality of information about financial transaction fees comes from notices, flyers, brochures, bank staff, or word of mouth.	3.56	Agree	3.27	Not Sure
Quality of transactional fees is considered fair.	4.18	Agree	4.15	Agree
Quality of loan interest rates in financial institutions is acceptable.	4.37	Strongly Agree	4.26	Strongly Agree
Quality of service includes offerings of financial products like insurance, savings, or loans.	3.34	Not Sure	3.03	Not Sure
Average Weighted Mean	3.78	Agree	3.61	Agree
Welfare				
Welfare is enhanced by access to financial services and products, which is considered important.	4.54	Strongly Agree	4.78	Strongly Agree
Welfare is supported by the belief that saving is important.	4.82	Strongly Agree	4.91	Strongly Agree
Welfare is linked to the importance of opening savings accounts.	4.68	Strongly Agree	4.72	Strongly Agree
Welfare is significantly impacted by borrowing money, which is considered essential.	4.15	Agree	4.06	Agree
Welfare does rely on insurance, as it is viewed as necessary.	4.55	Strongly Agree	4.69	Strongly Agree
Average Weighted Mean	4.55	Strongly Agree	4.63	Strongly Agree

Both the Green Economy and Blue Economy face challenges in accessing formal financial services, primarily due to geographical constraints [48]. Small-scale fishers, particularly in remote coastal areas, experience greater difficulties compared to rice farmers. While the Green Economy has better insurance coverage, often through bundled loans offered by lending institutions, the Blue Economy remains hesitant about insurance due to affordability concerns linked to their unpredictable income cycles [23,76].

Neither group maintains savings in banks, which can be attributed to limited financial literacy, lack of trust in formal systems, and perceptions of high costs or inaccessibility [30,35]. Both groups avoid predatory five-six moneylenders and prefer microfinance services instead, reflecting a cautious approach toward borrowing [29]. However, insurance coverage across both economies is not out of personal choice, but as a mandatory inclusion by the lending companies they depend on for loans. This

indicates a lack of active engagement or interest in insurance itself, as it is viewed more as a default feature rather than a valued financial tool.

Satisfaction with financial services also varies. The Green Economy reports greater satisfaction due to better familiarity and access, while the Blue Economy cites slow processes, excessive requirements, and geographic isolation as key barriers. Both groups find interest rates burdensome, though manageable, due to their irregular income patterns, seasonal for rice farmers and unstable for fisherfolk [10,30,76].

Despite these challenges, both economies recognize the value of financial services for stability and security. They recognize the significance of savings, insurance and availing on loans during financial emergencies. However, their dependence on credit emphasizes their financial vulnerability.

The data shows both the green and blue economies have financial inclusion issues, especially when it comes to accessing and using formal financial services. Although the green economy has better access and quality, they are not susceptible to financial literacy gaps that are not equipped for making savings, investment, and loan decision-making. In contrast, the blue economy faces more obstacles to access and usage, which are driven by geographic isolation and irregular income.

Both economies demonstrate a financial vulnerability, as they don't have savings and active insurance engagement. Thus, it suggests that even if financial products and services exist, there are still hindrances, such as affordability, accessibility, and trust, that prevent both groups from having active participation.

Furthermore, both groups showed a dependence on loans, most especially in times of financial distress. This highlights their reliance on credit rather than proactive financial planning. The dissatisfaction expressed by the Blue Economy highlights systemic inefficiencies that need addressing to improve access and trust in formal banking systems.

4.4. Level of food security of green economy and blue economy in San Jose, Camarines Sur

This section assesses the level of food security among the Green Economy and Blue Economy in San Jose, Camarines Sur based on their availability, access, stability and utilization.

Table 5 reveals the average weighted mean of the four indicators of food security. The food availability for the green economy is 3.46, and for the blue economy, it is 3.41, which both equal to agree. The food access for the green economy is 3.26, and for the blue economy is 2.74, which both indicate not sure. The food stability of both groups has the same verbal interpretation of not sure, with a value of 3.23 for the green economy and 3.40 for the blue economy. The food utilization both have a strongly agree interpretation with a result of 4.30 for the green economy and 4.23 for the blue economy.

Table 5. Level of food security (in terms of availability, access, stability and utilization) between green and blue economies.

Food Security	**Green Economy**		**Blue Economy**	
Availability	**Weighted Mean**	**Verbal Interpretation**	**Weighted Mean**	**Verbal Interpretation**
Availability of food is sufficient to meet the needs of the family.	4.73	Strongly Agree	4.67	Strongly Agree
Availability of balanced meals, including meat, fish, vegetables, and rice, is within the household's means.	4.59	Strongly Agree	4.68	Strongly Agree
Availability of food is not a concern, as the household didn't worry about not having enough to eat.	2.23	Disagree	1.84	Disagree
Availability of food is adequate, and always the types the household prefers.	2.27	Disagree	2.47	Disagree
Average Weighted Mean	3.46	Agree	3.41	Agree
Access				
Access to the market to purchase food is easy.	4.67	Strongly Agree	3.91	Agree
Access to various foods, including fruits, vegetables, grains, and proteins are available.	4.40	Strongly Agree	3.85	Agree
Access to buy food now with payment to be made later is a not an option.	2.31	Disagree	1.75	Strongly Disagree
Access to buy food with designated money for it.	1.66	Strongly Disagree	1.44	Strongly Disagree
Average Weighted Mean	3.26	Not Sure	2.74	Not Sure
Stability				
Stability in food intake is reflected in the household eating the right amount of food.	3.32	Not Sure	3.43	Agree
Stability in food security is present as the household eats when they feel hungry.	3.26	Not Sure	3.83	Agree
Stability in food access is ensured as the household feels confident about not losing access to food due to natural disasters.	2.43	Disagree	2.18	Disagree
Stability in diet is shown as the household enjoys eating a variety of foods throughout the day.	3.93	Agree	4.17	Agree
Average Weighted Mean	3.23	Not Sure	3.40	Not Sure
Utilization				
Utilization of safe food free from contaminants, such as clean water, is practiced by the household.	4.90	Strongly Agree	4.43	Strongly Agree
Utilization of a variety of foods that meet the household's nutritional needs is common.	4.42	Strongly Agree	4.43	Strongly Agree
Utilization of proper food storage techniques ensures the household can store food without spoilage or contamination.	4.44	Strongly Agree	4.36	Strongly Agree
Utilization of proper nutrition helps the household maintain good health.	3.43	Agree	3.69	Agree
Average Weighted Mean	4.30	Strongly Agree	4.23	Strongly Agree

The results indicate that both groups generally maintain food availability and effectively utilize food resources. However, food access and stability remain significant challenges, particularly for the Blue Economy, which faces greater uncertainty due to income unpredictability tied to fishing seasonality. The Green Economy fares slightly better in food access, yet some households still struggle during lean periods caused by agricultural cycles and seasonal harvests.

Access to clean water and nutritious food supports the overall health and nutrition of both groups. However, the reliance on borrowing money to meet food needs

highlights underlying financial instability, which exacerbates vulnerabilities during times of income scarcity. While food availability and utilization are relatively stable for both groups, food access and stability are undermined by irregular income patterns. The Blue Economy's lower food access reflects the volatility of fishing livelihoods, while disparities within the Green Economy point to financial pressures linked to seasonal farming. Borrowing to purchase food further underscores limited savings and financial resources, increasing both groups' exposure to financial shocks.

These results align with studies emphasizing the role of financial capacity in food security. Food access and stability depend on consistent income and financial inclusion [16]. This division may point to vulnerabilities in food access or financial instability within the rice farming community, where certain individuals may face difficulty obtaining enough food due to irregular income, seasonal variations, or limited access to resources [10,30,40,84]. In conclusion, agriculture's dependence on seasonal cycles makes it more unstable. This resilience gives the blue economy an edge in ensuring stable food security.

Difference on the level of financial literacy, financial inclusion and food security between green economy and blue economy in San Jose, Camarines Sur

This section evaluates the difference in the level of financial literacy (knowledge, skills, attitude and behavior), financial inclusion (access, usage, quality, and welfare) and food security (availability, access, stability and utilization) between the green and blue economies in San Jose, Camarines Sur.

Table 6 illustrates a Kruskal-Wallis test, performed to assess differences in scores between the Green Economy and Blue Economy. The analysis revealed significant differences in financial literacy (behavior and attitude), financial inclusion (access, usage, quality, and welfare), and food security (availability, access, and stability). However, no significant differences were found in knowledge, skills, and utilization.

Table 6. Difference in the level of financial literacy, financial inclusion, and food security of the green economy and blue economy.

Financial Literacy	**Rank Sum**	***P*-value**	***P*-value with ties**
Knowledge			
0 = Green Economy	26,255	0.2399	0.1758
1 = Blue Economy	18,925		
Skills			
0 = Green Economy	25,986	0.1337	0.1195
1 = Blue Economy	19,164		
Attitude			
0 = Green Economy	25,695.5	0.0582	0.0099
1 = Blue Economy	19,454.5		
Behavior			
0 = Green Economy	25,192	0.0099	0.0027
1 = Blue Economy	19,958		
Financial Inclusion			

Table 6. (*Continued*).

Financial Literacy	Rank Sum	*P*-value	*P*-value with ties
Access			
0 = Green Economy	31,512.0	0.0001	0.0001
1 = Blue Economy	13,638.0		
Usage			
0 = Green Economy	29,635.5	0.0005	0.0001
1 = Blue Economy	15,514.5		
Quality			
0 = Green Economy	28,494	0.0565	0.0475
1 = Blue Economy	16,656		
Welfare			
0 = Green Economy	24,911.5	0.0031	0.002
1 = Blue Economy	20,238.5		
Food Security			
Availability			
0 = Green Economy	24,861	0.0025	0.0011
1 = Blue Economy	20,289		
Access			
0 = Green Economy	29,676	0.0004	0.0001
1 = Blue Economy	15,474		
Stability			
0 = Green Economy	29,313.5	0.0025	0.0016
1 = Blue Economy	15,836.5		
Utilization			
0 = Green Economy	28,260	0.1119	0.0967
1 = Blue Economy	16,890		

Both economies encounter similar issues in financial literacy because of limited education and exposure to financial systems [24]. Age, income, and education are some factors that affect their financial behavior. Moreover, farmers tend to have cautious attitudes and structured saving practices that are suitable to seasonal income cycles [24,75]. Due to unstable income, fisherfolk depend on informal credit and short-term strategies [48,76].

Even though they possess the basic financial understanding and skills, they still struggle to apply them in their daily life effectively. This is apparent due to the inability to supply emergency funds. As farmers tend to prioritize seasonal needs, fisherfolk's fluctuating income makes saving particularly challenging. Hence, this situates them to be vulnerable to economic shocks, indicating a need for tailored financial education and aid to enhance resilience [48,78].

The green economy illustrates better financial inclusion, shown by easy access to financial services and products such as insurance. Meanwhile, the blue economy showcased a difficulty in accessing financial services and products due to geographical isolation in coastal areas and limited utilization of financial tools. In addition, the

reason for limited utilization is that in some cases there are too many documentary requirements, the perception of unaffordable financial services, a lack of financial literacy, and a lack of trust in formal institutions.

In terms of food security, the green economy benefits from their own produce of storable grain, such as rice, providing steady food availability. In contrast, there is a struggle for the blue economy due to the perishable nature of their catches and also their unpredictable harvest. Rice farmers are nearer to markets of a town center compared to fisherfolk as they are in coastal areas; thus, farmers have more access to purchasing food. Even so, the blue economy contributes to more steady food security through their narrow reliance on seasonal cycles and resilience, compared to rice farmers that are prone to climate risk and dependence on periodic harvest. Regardless of the disparities of the green and blue economies, their food utilization has comparable outcomes, as both groups utilized the foods to be clean and safe for consumption.

4.5. Influence of financial literacy and financial inclusion on food security between the green and blue economies

This section analyzes the influence of financial literacy and financial inclusion on food security between the green and blue economies.

Table 7. Influence of financial literacy and financial inclusion on food security between green economy and blue economy.

	Food security (green economy)								**Food security (blue economy)**							
	Availability		**Access**		**Stability**		**Utilization**		**Availability**		**Access**		**Stability**		**Utilization**	
	Beta	***P*-value**	**Beta**	***P*-value**	**Beta**	***P*-value**	**Beta**	***P*-value**	**Beta**	***P*-value**	**Beta**	***P*-value**	**Beta**	***P*-value**	**Beta**	***P*-value**
Financial literacy																
Knowledge	0.1875	0.012	−0.0336	0.663	0.006	0.949	0.0936	0.138	0.0708	0.517	−0.2364	0.075	−0.0397	0.743	0.2831	0.001
Skills	−0.0308	0.688	0.03	0.709	0.0102	0.917	0.0696	0.288	−0.0264	0.791	−0.1738	0.151	0.0979	0.376	0.2505	0.001
Attitude	0.0572	0.432	0.1051	0.169	0.0042	0.964	0.0514	0.407	0.2225	0.043	0.2175	0.101	0.1187	0.326	0.1294	0.109
Behavior	0.2644	0.001	0.2607	0.001	−0.0303	0.75	0.1172	0.067	0.0324	0.795	0.1864	0.218	−0.206	0.138	0.0644	0.483
Financial inclusion																
Access	−0.0851	0.117	0.1414	0.013	0.039	0.57	0.1029	0.027	0.0711	0.456	0.2403	0.039	0.2017	0.058	0.1314	0.063
Usage	−0.1145	0.069	−0.1103	0.094	−0.0486	0.542	−0.0831	0.121	−0.2251	0.014	0.209	0.058	0.0471	0.639	−0.0837	0.211
Quality	0.0909	0.27	0.0889	0.303	−0.0887	0.398	0.1057	0.133	0.1041	0.403	−0.0628	0.677	0.0694	0.615	0.0374	0.683
Welfare	0.1316	0.217	0.166	0.138	0.2951	0.03	0.1273	0.162	−0.0137	0.924	0.2122	0.225	0.0088	0.956	0.0411	0.699

Table 7 presents the result of multivariate linear regression on the influence of

financial literacy and financial inclusion on food security. It shows that in terms of availability, the knowledge and behavior have a significant influence on food availability for the green economy, while for the blue economy, it is the attitude. However, the usage for the blue economy has a negative sign beta, indicating its inverse effect. With regards to food access, for the green economy, behavior and access have the influence, while for the blue economy, access and usage have the influence. Pertaining to food stability, for the green economy, welfare is the only variable that has the influence; meanwhile, for the blue economy, access has solely the influence. Concerning food utilization, for the green economy, access is merely having an influence. As to the blue economy, knowledge and skills have an influence on food utilization.

The Green Economy shows that financial literacy (particularly knowledge and behavior) and financial inclusion (specifically behavior and access) significantly influence food security. Farmers in the Green Economy with better financial behaviors and access to financial resources are more able to manage food availability and purchase nutritious food, which positively impacts their food security. Welfare is a key factor in improving food stability, while access to financial resources also plays a significant role in food utilization, ensuring food is well-preserved and used efficiently.

In contrast, the Blue Economy faces unique challenges. The financial literacy in terms of attitudes has an influence on food availability, whereas there is an inverse effect regarding the impact of financial usage. This is likely to a large portion of their income money being directed to the contribution on savings, insurance premiums, and payment on credit, instead of allocating it on food. Which leads to a decrease in food availability. Moreover, this is amplified by the reliance on the informal financial system, where access to tailored financial services stimulates more food security challenges.

Access to financial inclusion positively influences food access, allowing fisherfolks to buy varieties of foods. This variable plays a critical role in food stability, as it aids to alleviate vulnerabilities during environmental or economic disturbance. Moreover, financial knowledge and skills provide improvement in food utilization by enabling better management of food preservation technologies.

Based on the result, a well-established financial behavior and access to financial resources are vital for attaining food availability and utilization for the green economy. Thus, proficient behavior and access lead to betterment of food security outcomes by the farmers, especially during non-harvest periods and climatic disruption.

Regarding the blue economy, financial attitude has a significant influence on food availability, indicating that fisherfolk's short-term financial decision-making affects their ability to guarantee food availability supply. However, in terms of financial usage, it provides a negative influence on food availability, which signifies its inverse effect. This underlines the significance of enhancing access to formal financial services and proper usage and planning of financial products and services. Financial knowledge and skills provide a better food utilization outcome, which is vital for long-term food sustainability.

From previous studies highlighting the significance of financial literacy and inclusion in solving food insecurity, these findings aligned with them. Having financial access and well-established financial behaviors improves food security [24]. While

part of financial knowledge in providing better management of resources and acquisition of nutritious food is important [35]. For the Blue Economy, fisherfolk's attitudes and financial skills impact food availability and utilization, while the vulnerabilities are caused by poor financial access and usage [10,48,55].

Table 8 exhibits the multivariate linear regression result for the influence of financial literacy and financial inclusion on food security. In terms of food availability, knowledge and behavior have an effect. Additionally, usage has an impact on food availability, however inversely. Regarding food access, the attitude, behavior, and access have the significant influence. For the food stability, the welfare has only the significant influence. Moreover, with regards to food utilization, there are four variables that have a significant impact, which are knowledge, skills, behavior, and access.

Table 8. Influence of financial literacy and financial inclusion on food security.

	Food security							
	Availability		**Access**		**Stability**		**Utilization**	
	Beta	***P*-value**	**Beta**	***P*-value**	**Beta**	***P*-value**	**Beta**	***P*-value**
Financial literacy								
Knowledge	0.1555	0.0100	−0.0666	0.3260	−0.0180	0.8030	0.1552	0.0020
Skills	−0.0534	0.3490	−0.0482	0.4530	0.0209	0.7610	0.1557	0.0010
Attitude	0.0917	0.1180	0.1406	0.0340	0.0358	0.6120	0.0842	0.0810
Behavior	0.2050	0.0010	0.2328	0.0010	−0.0625	0.4070	0.1001	0.0530
Financial inclusion								
Access	−0.0411	0.3660	0.1795	0.0010	0.0653	0.2330	0.0973	0.0100
Usage	−0.1462	0.0030	−0.0143	0.7980	0.0092	0.8770	−0.0596	0.1430
Quality	0.0638	0.3340	0.0682	0.3600	−0.0733	0.3570	0.0380	0.4840
Welfare	0.1139	0.1750	0.1537	0.1050	0.2188	0.0310	0.1125	0.1030

The findings emphasize the different influence that financial literacy and financial inclusion have on food security. Financial literacy, particularly knowledge and behavior, affects attaining food availability. However, in terms of financial usage, it has a negative effect on food availability. Indicating that the more an individual uses financial services or products, the lessens the food availability, such as payment for past credits, putting on savings, or contributing to insurances. Which reduces the resources in purchasing food. Moreover, having a positive attitude, responsible financial behavior, and access to financial systems leads to proper food access, where individuals secure varieties of nutritious foods.

For food stability, only the financial welfare has a significant influence. This indicates safety nets, including insurance and savings, cater to a vital but narrow part in stabilizing food access during economic or environmental disruption.

There are four significant factors that influence food utilization, which are knowledge, skills, behavior, and access. This suggests that through decisive financial measures, practical skills, financially appropriate behavior, and access to financial services and products, we can collectively improve the capacity to store, preserve, and consume safe and clean foods, resulting in a better nutritional outcome.

Furthermore, the results highlight the significance of financial literacy and inclusion in building food security. Thus, as individuals have financial literacy, especially knowledge, skills and behavior that is essential in managing resources effectively, at the same time, financial inclusion provides access to services and products that help households to navigate economic challenges. However, through this individual should be aware of proper usage of financial products as it reduces the food availability, when not properly manage.

These findings align with the studies that focus on the interconnectedness of financial literacy, inclusion, and food security. The importance of financial knowledge must be emphasized and access to financial products and services that empower households to address the challenges in attaining food security must be promoted, for instance, availing loans for agricultural production or managing income variability to minimize the constraints and promote development [24,35,77,78,84].

5. Conclusion and recommendation

This study provides a comparative analysis of the green and blue economies, which has not been extensively explored in the context of financial literacy, inclusion, and food security. It offers empirical evidence on the role of financial literacy and inclusion in enhancing food security among vulnerable populations in a developing country context. The findings have practical implications for policymakers and stakeholders in designing targeted interventions to improve financial literacy and inclusion in both sectors.

The study was conducted to determine the difference and impact of financial literacy and financial inclusion on food security, as well as its level between the Green and Blue Economies in San Jose, Camarines Sur. Based on the study, it was discovered that both green and blue economies are financially illiterate, as they were unable to employ their positive attitudes and behavior despite having the financial knowledge and skills. Furthermore, the majority of the rice farmers and fisherfolk are situated away from the town center. Thus, they encounter difficulties in acquiring financial products and services; at the same time, they are unable to utilize them properly. Furthermore, due to their informal income status, they present transitory food insecurity.

The relatively low financial literacy levels among rice farmers and fishermen in the study area are precisely why this research is significant. By examining these groups, we aim to highlight the critical need for targeted interventions to improve financial literacy and inclusion, which can have a direct impact on food security. While we recognize the value of studying other subjects, we have chosen these groups because they are central to the green and blue economies in the region and are among the most vulnerable to food insecurity.

Utilizing the Kruskal-Wallis test, it was revealed that the two groups differ significantly in terms of financial literacy, particularly in behavior and attitude, due to differences in income patterns. Specifically, the Green Economy relies on seasonal income, while the Blue Economy depends on daily catches. Despite both groups demonstrating knowledge and skills indicative of financial literacy, they lack the corresponding attitude and behavior necessary to apply these effectively. Their

mindset aligns with that of financially literate individuals, but they fail to translate this into action, largely due to the unpredictability and variability of their incomes.

The study also found significant differences in financial inclusion between the two groups concerning access, usage, quality, and welfare. These disparities are attributed to geographical and systemic challenges, such as the coastal isolation of the Blue Economy and institutional barriers faced by both groups. The Green Economy demonstrates greater advantages compared to the Blue Economy. While both face location-related challenges, the Green Economy benefits from easier access to banks and financial tools, such as insurance. Although both groups possess insurance, it is typically bundled with loans obtained from microfinance institutions rather than being actively sought. Despite its necessity, insurance is not prioritized as a financial product by either group. Improved access to financial services facilitates the utilization of financial products, increases awareness of their quality, and enhances overall welfare.

In terms of food security, the Green and Blue Economies exhibit distinct differences. For availability and access, the Green Economy has an advantage due to their location and reliance on stored resources such as rice, leaving them to focus primarily on securing daily viands. In contrast, the Blue Economy, situated in coastal areas, depends heavily on daily fish catches, making their food supply more variable. However, in terms of stability, the Blue Economy surpasses the Green Economy due to their resilience and adaptability, as they are less reliant on seasonal cycles.

Furthermore, it is concluded that financial literacy and financial inclusion significantly influence food security. However, their effects vary depending on the specific dimensions of each variable. To wit, it was revealed that knowledge and behavior are critical in ensuring food availability. Though, in terms of usage, there is a negative influence that suggests funds intended for savings, insurance, or credit payment may reduce the immediate resources available for food. Regarding access, having positive attitudes, responsible financial behaviors, and access to financial systems caters to a better attainment of food access. For stability, welfare is the sole variable that has influence, which demonstrates that safety nets, such as insurance and savings, are critical in attaining food stability. Moreover, food utilization has four key variables that influence utilization, which are knowledge, skills, behavior, and access. Suggesting that with financial decision-making, practical skills, and access to financial services, it collectively leads to clean and safe food consumption.

Addressing the gaps in attitude and behavior, alongside improving access to financial tools and resources, is crucial for enhancing food security outcomes for both groups. Considering that the Green and Blue Economies are part of the poverty line, this results in limited financial literacy and financial inclusion, which can adversely affect their food security. Hence, policymakers should collaborate with financial institutions to establish mobile banking services and community-based financial hubs in remote coastal and rural areas. These initiatives would help mitigate geographic challenges and promote financial inclusion. Additionally, lending institutions, particularly microfinance organizations, should integrate financial literacy training into their loan processes to help beneficiaries understand the importance of insurance and other financial tools. Certain aspects of financial inclusion, particularly in terms of usage, have been found to negatively influence food security, indicating an inverse relationship. To address this, programs such as budgeting and saving workshops,

microfinance and credit education, and seminars must be implemented to improve these aspects, ultimately enhancing food security outcomes. Future researchers are encouraged to develop or adopt standardized assessment tools that comprehensively measure financial literacy. Such tools will ensure accurate evaluation of respondents' financial literacy levels, providing a more reliable basis for future studies and interventions.

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References

1. World Bank. Food security update: rising hunger amidst global challenges. World Bank Group; 2023.
2. Statista. Global husked rice production volume from 2008/09 to 2023/24. Statista; 2024.
3. Sadiku MN, Musa SM, Chukwu UC. Artificial Intelligence in Education. Iuniverse; 2022.
4. Tigchelaar M, Leape J, Micheli F, et al. The vital roles of blue foods in the global food system. Global Food Security. 2022; 33: 100637. doi: 10.1016/j.gfs.2022.100637
5. Philippine Statistics Authority. Philippine Statistics Authority. 2021. Available online: https://rsso05.psa.gov.ph/statistics/poverty/node/1684057548 (accessed on 2 December 2024).
6. Cruz MW. WFP Philippines - food security monitoring - October 2022. World Food Programme. 2022. Available online: https://www.wfp.org/publications/wfp-philippines-food-security-monitoring-october-2022 (accessed on 2 December 2024).
7. Organisation for Economic Co-operation and Development. OECD/INFE international survey of adult financial literacy competencies. OECD; 2016.
8. Carman KG, Zamarro G. Does financial literacy contribute to food security? International Journal of Food and Agricultural Economics. 2016; 4(1): 1.
9. Bangko Sentral ng Pilipinas. Financial inclusion in the Philippines. Available online: https://www.bsp.gov.ph/SitePages/InclusiveFinance/InclusiveFinance.aspx (accessed on 2 December 2024).
10. Nepal AK, Neupane N. Living in the flood plain: can financial inclusion, productive assets and coping mechanism help reduce food insecurity? Environ Challenges. 2022; 6: 100437. doi: 10.1016/j.envc.2021.100437
11. Fitria RR, Rahayu DP, Septiana M, et al. Unraveling the Link between Financial Literacy and Financial Capability among Java's Students. JBMP (Jurnal Bisnis, Manajemen dan Perbankan). 2023; 9(2): 190-209. doi: 10.21070/jbmp.v9i2.1699
12. Kasradze T. Financial Inclusion and Financial Education - An Effective Tool for Poverty Reduction (Georgia's example). Uluslararası Sosyal Siyasal ve Mali Araştırmalar Dergisi. 2024; 4(2): 146-155. doi: 10.70101/ussmad.1445124
13. Suryavanshi U, Chaudhry R, Mishra AK, et al. Mapping the intellectual landscape of financial inclusion and sustainable development: a bibliometric analysis. Competitiveness Review: An International Business Journal; 2024.
14. Prabhakar R. What is financial inclusion? In: Financial Inclusion. Agenda Publishing; 2021.
15. Statista Research Department. Share of employment in the agriculture sector in the Philippines from 2013 to 2022. Available online: https://www.statista.com/statistics/578788/employment-by-economic-sector-in-philippines/ (accessed on 2 December 2024).
16. Food and Agriculture Organization (FAO). Food security: policy brief. Available online: https://www.fao.org/3/a-al936e.pdf

(accessed on 2 December 2024).
17. Kumar P, Pillai R, Kumar N, et al. The interplay of skills, digital financial literacy, capability, and autonomy in financial decision making and well-being. Borsa Istanbul Review. 2023; 23(1): 169-183.
18. Aggarwal N, Gupta M, Singh S. Financial literacy among farmers: empirical evidence from Punjab. Pacific Business Review International. 2014; 6(7).
19. Kidwell B, Turrisi R. An examination of college student money management tendencies. Journal of Economic Psychology. 2004; 25(5): 601-616. doi: 10.1016/S0167-4870(03)00073-4
20. Korutaro Nkundabanyanga SK, Kasozi D, Nalukenge I, Tauringana V. Lending terms, financial literacy and formal credit accessibility. International Journal of Social Economics. 2014; 41(5): 342-361. doi: 10.1108/IJSE-03-2013-0075
21. Farida MN, Soesatyo Y, Aji TS. Influence of Financial Literacy and Use of Financial Technology on Financial Satisfaction through Financial Behavior. International Journal of Education and Literacy Studies. 2021; 9(1): 86. doi: 10.7575/aiac.ijels.v.9n.1p.86
22. Lusardi A, Mitchell OS. The Economic Importance of Financial Literacy: Theory and Evidence. Journal of Economic Literature. 2014; 52(1): 5-44. doi: 10.1257/jel.52.1.5
23. Sanglay PM, Apat EJ, Sumague J, et al. Financial Literacy and Income Distribution of Rice Farmers. International Journal of Accounting, Finance and Education. 2021; 2(3): 1-21. doi: 10.53378/348732
24. Raza A, Tong G, Sikandar F, et al. Financial Literacy and Credit Accessibility of Rice Farmers in Pakistan: Analysis for Central Punjab and Khyber Pakhtunkhwa Regions. Sustainability. 2023; 15(4): 2963. doi: 10.3390/su15042963
25. Melendres J. Proposed Financial Education Program for Selected Rice Farmers in The Municipality of Bongabong. ADPEBI International Journal of Business and Social Science. 2024; 4(1): 33-44. doi: 10.54099/aijbs.v4i1.838
26. Badiola JAR, Guinto EJ. Financing Small-Scale Fisheries in the Philippines: A Policy Brief. Food & Agriculture Org; 2021.
27. Pomeroy R, Arango C, Lomboy CG, et al. Financial inclusion to build economic resilience in small-scale fisheries. Marine Policy. 2020; 118: 103982. doi: 10.1016/j.marpol.2020.103982
28. Ansar S, Klapper L, Singer D. The importance of financial education for the effective use of formal financial services. J Financ Lit Wellbeing. 2023; 1(1): 28-46.
29. Lumenta UZ, Worang FG. The influence of financial inclusion on the performance of micro small and medium enterprises in North Sulawesi. J EMBA J Riset Ekon Manaj Bisnis Akunt. 2019; 7(3).
30. Khan F, Siddiqui MA, Imtiaz S. Role of financial literacy in achieving financial inclusion: A review, synthesis and research agenda. Cogent Business & Management. 2022; 9(1). doi: 10.1080/23311975.2022.2034236
31. Arshad A. Impact of financial inclusion on food security: evidence from developing countries. International Journal of Social Economics. 2022; 49(3): 336-355. doi: 10.1108/IJSE-08-2021-0462
32. Yahaya SU. Socio-economic effects of financial literacy on financial inclusion of women in Niger state, Nigeria. Gusau journal of economics and development studies. 2023; 3(1): 11. doi: 10.57233/gujeds.v3i1.19
33. Karki TB, Neupane R, Bhattarai RK, et al. Bridging the Yield Gaps of Major Cereals through Agronomic Interventions in Nepal. Agronomy Journal of Nepal. 2022; 6. doi: 10.3126/ajn.v6i1.47952
34. Baborska R, Hernandez E, Magrini E, et al. The impact of financial inclusion on rural food security experience: a perspective from low- and middle-income countries. Rev Dev Finance. 2020; 10(2): 1-18.
35. Hasan M, Le T, Hoque A. How does financial literacy impact on inclusive finance? Financial Innovation. 2021; 7(1). doi: 10.1186/s40854-021-00259-9
36. Beltran R. Food security. Visayan Daily Star. Available online: https://visayandailystar.com/food-security/ (accessed on 2 December 2024).
37. Food and Agriculture Organization (FAO). Hunger map 2022. FAO; 2022.
38. Food and Agriculture Organization (FAO). An introduction to the basic concepts of food security. FAO; 2008.
39. Olatidoye OP. Blue Economy, Food Security, and Food Sustainability. In: Implications for Entrepreneurship and Enterprise Development in the Blue Economy. Business Science Reference; 2022.
40. Geng B, Wu D, Zhang C, et al. How Can the Blue Economy Contribute to Inclusive Growth and Ecosystem Resources in Asia? A Comparative Analysis. Sustainability. 2024; 16(1): 429. doi: 10.3390/su16010429
41. United Nations Environment Programme (UNEP). Inclusive Green Economy: Policies and Practices. Nairobi: UNEP; 2018.
42. Musvoto C, Nortje K, Nahman A, et al. Agriculture in a green economy. In: Green Economy Implementation in the Agriculture Sector: Moving from Theory to Practice. Springer; 2018.

43. Statista. Global rice production volume from 2008/2009 to 2024/2025. Available online: https://www.statista.com/statistics/271972/world-husked-rice-production-volume-since-2008/ (accessed on 2 December 2024).
44. Atkinson A, Messy FA. Measuring financial literacy. Journal of Consumer Affairs. 2012; 44(2): 296-316.
45. Food and Agriculture Organization (FAO). FAO Statistical Yearbook 2024: Insights on Agriculture, Food Security, and Employment. Rome: FAO; 2024.
46. Farming First. 2024 GAP report: slowdown in agricultural productivity threatens global food and nutrition security. Farming First; 2024.
47. Ababouch L, Fipi F. Fisheries and aquaculture in the context of blue economy. Feeding Africa. 2015; 2(21-23): 13.
48. Cohen PJ, Allison EH, Andrew NL, et al. Securing a Just Space for Small-Scale Fisheries in the Blue Economy. Frontiers in Marine Science. 2019; 6. doi: 10.3389/fmars.2019.00171
49. Arce-Cruz GO, Valencia-Mayuri JC, Jimenez-Rivera WO, et al. Financial Literacy and its Relationship to the Indebtedness of a Bank's Customers. European Conference on Knowledge Management. 2023; 24(1): 67-73. doi: 10.34190/eckm.24.1.1564
50. Stuecker MF, Tigchelaar M, Kantar MB. Climate variability impacts on rice production in the Philippines. PLOS ONE. 2018; 13(8): e0201426. doi: 10.1371/journal.pone.0201426
51. Blanco M, Sotelo CG, Chapela MJ, Pérez-Martín RI. Towards sustainable and efficient use of fishery resources: present and future trends. Trends Food Sci Technol. 2007; 18(1): 29-36.
52. World Bank. Oceans, Fisheries, and Coastal Economies: Sustainable Development in Green and Blue Economies. World Bank Group; 2021.
53. Millimet DL, McDonough IK, Fomby TB. Financial capability and food security in extremely vulnerable households. American Journal of Agricultural Economics. 2018; 100(4): 1224-1249.
54. Millimet DL, McDonough I, Fomby TB. Financial Literacy and Food Security in Extremely Vulnerable Households. IZA Discussion Papers; 2015.
55. Twumasi MA, Jiang Y, Ding Z, et al. The Mediating Role of Access to Financial Services in the Effect of Financial Literacy on Household Income: The Case of Rural Ghana. Sage Open. 2022; 12(1). doi: 10.1177/21582440221079921
56. Appavoo M. Financial inclusion for climate resilience in rural South Africa: a qualitative analysis of opportunities and barriers. In: Financial Inclusion: In Pursuit of UN Sustainable Development Goal 8.10. Springer Nature Switzerland; 2024.
57. Pienaah CKA, Luginaah I. The Impact of Village Savings and Loan Associations as a Financial and Climate Resilience Strategy for Mitigating Food Insecurity in Northern Ghana. Risks. 2024; 12(4): 58. doi: 10.3390/risks12040058
58. Ahsan N, Ahmed M. Empowering Communities: Enhancing Financial Literacy and Inclusion Across Asia. Financial Inclusion Across Asia: Bringing Opportunities for Businesses; 2023.
59. Khuan H. Financial Inclusion and Economic Empowerment. Accounting Studies and Tax Journal (COUNT). 2024; 1(2): 178-181. doi: 10.62207/qh1pmg78
60. Sakshi Kumari, Dr. Kumari Veena. Financial literacy and financial inclusion for women empowerment. International Education and Research Journal. 2024; 10(7). doi: 10.21276/ierj24730231849558
61. Manickam V, Udhayaraj G, Sangeetha R. Unlocking financial literacy: confronting challenges, embracing strategies, and harnessing instruments. Indian scientific journal of research in engineering and management. 2025; 9(3).
62. Omia IR. Contribution of agriculture to the green economy. Available online: https://www.linkedin.com/pulse/contribution-agriculture-green-economy-omia-razak-iganachi (accessed on 2 December 2024).
63. Ozili PK. Theories of Financial Inclusion. SSRN; 2020.
64. Sen A. Famines. World Development. 1980; 8(9): 613-621. doi: 10.1016/0305-750X(80)90053-4
65. Johnson E, Sherraden MS. From Financial Literacy to Financial Capability Among Youth. The Journal of Sociology & Social Welfare. 2007; 34(3). doi: 10.15453/0191-5096.3276
66. Sherraden MS. Building blocks of financial capability. In: Financial Education and Capability: Research, Education, Policy, and Practice. Oxford University Press; 2013.
67. Fine B. Entitlement failure? Dev Change. 1997; 28(4): 617-647.
68. Addo SD, Asantey J, Awadzie DM. The impact of financial literacy on risk propensity mediated by access to finance. PressAcademia. 2022; 11. doi: 10.17261/pressacademia.2022.1647
69. Mathan SJ, Sunderaraj R. Role of self-help groups (SHGs) in promoting financial inclusion in Virudhunagar District. Lib

Prog Inf. 2024; 44(1): 282-287.
70. Nyambane D, Bakunzibake T. Enhancing Socio-Economic Empowerment through Financial Inclusion Initiatives: A Case Study of Rwanda Union of the Blind. IDOSR journal of current issues in arts and humanities. 2023; 9(2): 57-74. doi: 10.59298/idosrjciah/2023/4.3.3300
71. Velasco JM. Management Practices And Technical Efficiency of MASIPAG Rice Farmers in Isabela, Philippines. European Journal of Agriculture and Food Sciences. 2019; 1(2). doi: 10.24018/ejfood.2019.1.2.9
72. Onsay EA, Bulao RJG, Rabajante JF. Bagyong Kristine (TS Trami) in Bicol, Philippines: Flood Risk Forecasting, Disaster Risk Preparedness Predictions and Lived Experiences through Machine Learning (ML), Econometrics, and Hermeneutic Analysis. Natural Hazards Research; 2025.
73. Food and Agriculture Organization (FAO). Gender Equality and Women's Empowerment in Agriculture. Rome: FAO; 2020.
74. Onsay EA, Rabajante JF. When machine learning meets econometrics: Can it build a better measure to predict multidimensional poverty and examine unmeasurable economic conditions? Science Talks. 2024; 11: 100387. doi: 10.1016/j.sctalk.2024.100387
75. Onsay EA, Rabajante JF. Do indigenous people get left behind? An innovative methodology for measuring the unmeasurable economic conditions and poverty from the poorest region of Luzon, Philippines. Heliyon. 2025; 11(3). doi: 10.1016/j.heliyon.2024.e41076
76. Onsay E, Kevin C. Baltar, Karlo Pedro L. Medroso II, Ivan Ruzzel C. Pesino. Economic Behavior of Fisherfolks that Govern their Decisions to Practice Accounting: Evidence from Probit Models. Journal of Mathematics Instruction, Social Research and Opinion. 2022; 1(3): 163-174. doi: 10.58421/misro.v1i3.42
77. Bon MJL, Villaralbo NB, Beltran DR, et al. Factors influencing agricultural insurance acceptance among rice farmers in the poorest Region of Luzon, Philippines: A multinomial model analysis. Development and Sustainability in Economics and Finance. 2025; 6: 100044. doi: 10.1016/j.dsef.2025.100044
78. Pagador RJ, Peñas A, et al. Impact of agricultural intervention on socio-economic development of farmers: Evidence from regression discontinuity design. International Journal of Academe and Industry Research. 2024; 5(3): 125-153. doi: 10.53378/ijair.353101
79. De Luna RR, Sierva DMC, Atole RA Jr, et al. Does economic development influence environmental quality in the Asia-Pacific region? A panel regression analysis. Sustain Econ. 2025; 3(1): 1243. doi: 10.62617/se1243
80. Flojo MM, Reyes JMD, Onsay EA. Determinants of willingness to adopt zero plastic policy of the MSMEs in the central business district of Goa, Camarines Sur, Philippines. Res Probe. 2024; 4(1): 56-64.
81. Karunathilaka KTS. A study on financial literacy of rural community in Sri Lanka: with special reference to Kurunegala District. Sri Lanka Journal of Economic Research. 2016; 4(1): 1-15.
82. Banerjee T, Roy M. Financial literacy: an intra-household case study from West Bengal, India. Stud Microecon. 2020; 8(2): 170-193. doi:10.1177/2321022220916081
83. Banerjee-Chatterjee T, Roy M, Raychaudhuri A. Financial inclusiveness and mobilization of household savings in rural area: are they related? Journal of Quantitative Economics. 2021; 19: 223-249.
84. Barbado S, Credo A, Espiritu D, et al. The impact of conditional cash transfer (CCT) on health and education in a coastal community: A randomized control trial (RCT) and regression discontinuity design (RDD). Development and Sustainability in Economics and Finance. 2024; 2-4: 100026. doi: 10.1016/j.dsef.2024.100026