



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

Subsidy System with Integrated Farmer Profiling and Municipal Analytics

A Capstone Project Presented to
The Faculty of the Information and Technology Department
St. Anthony's College

In Partial Fulfillment
Of the Requirements for the Degree
Bachelor of Science in Information Technology

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October 2025



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Chapter 1
INTRODUCTION

1.1 Background of the Study

Agriculture greatly affects the economy of the Philippines by being its backbone. Not only in the economy, but in society and food security as well. Agriculture is a source of livelihood, especially in rural areas. It is one of the major source of employment in the country. Its importance lies in the fact that it ensures the livelihood of the farmers, the nation's food security, environmental sustainability and most of all the country's economic needs.

One of the imperative problems in the Agricultural sector is that even though ~~they~~ act as the backbone of the country, ~~they~~ are still often neglected. This applies to the situation of the farmers, Farmers are often at the end of the barrel by facing low wages, minimal government support, and limited access to the technology that could greatly improve their productivity and quality of life as a farmer. Rice farmers in the **Philippine** are also one of the greatly affected sector, due to imports of rice causing for there low marketability of locally produced rice and reduces their income.

Technology continually intertwines itself between the grasp of **Agriculture**. As time passes by the advancement of technology continues to bring more modern tools in order to enhance the farming experience of the agricultural sectors, tools like automated machinery, **CRISPR** technology, precision agriculture, automated irrigation system, mobile technology in agriculture and many more. Its integration provides more opportunities in the improvement of crop yields, reducing labor costs and the promotion of sustainable farming.

Several systems exist to gather information of the farmer's data. However, these systems are only limited to that pure reason. It only tracks the information of farmers in the Philippines and not the programs orchestrated by governments that greatly help the farmers. Mobile apps, websites, and several e-commerce platforms are provided to the ever-changing world. However, its limits lies in the fact that there are farmers who often lack smartphones, stable internet connections and the digital literacy in order to maximize the use of digital tools. There are cases in which existing technologies are usually too manual or outdated. Leaving the process with much delays and minimal solutions.

Furthermore, during the times of disaster, the government often rushes the distribution of subsidies, such as seeds, fuels and financial aids in order to provide an immediate relief to



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

those affected. However, since these processes are done manually, it usually takes a long time, so its effect would be that it is difficult to track the records based on when and how much farms, crops or farmers are affected. But this gap can be bridged by the integration of modern technologies like the QR Technology. It can easily validate farm activities and monitor the distribution of resources with the use of QR technology. Natural Language Processing can help by identifying eligible beneficiaries based on the guidelines set by the government. Easily finding duplicate entries, reducing fraudulent claims.

Considering the circumstances provided, a digital subsidy system needs to be established. It aims to become more than merely an information system of farmer's data but to be an improvement in delivering government support efficiently in the aftermaths of disasters as well as in regular agricultural programs. The integration of the aforementioned aims to provide ease in delivering support for smallholder farmers and Municipal Agriculturist alike by fostering efficiency, accountability and inclusivity in the provision of subsidies, ensuring that it benefits not only the farmers but in the advancement of environmental sustainability, digital growth and development of rural areas.

The researchers designed a solution entitled "Subsidy System with Integrated Farmer Profiling and Municipal Analytics" which allows the tracking and management of government assistance as well as its distribution. The platform can greatly improve the process of claiming assistance provided by the government, by providing them with one-time QR code that ensures secure, efficient and transparent subsidy transactions. With tracking of land data of the farmers as well, immediate reports can be sent for immediate compensation and relief when disaster strikes.

Farmers who are already registered and enrolled in the Registry System for Basic Sectors in Agriculture (RSBSA) are automatically eligible to use the system provided. Since instead of having to re-enter the farmer's data in the system. It will make use of the already existing records garnered by the existing system. Farmers can easily create an account to access the platform by using their basic information that is linked from the RSBSA. The Registry is responsible in gathering data of the farmers throughout the Philippines, so as long as the farmer is enrolled as a farmer through the RSBSA, they are able to track their eligibility status based on the guidelines provided by the government, view available assistance, and securely claim subsidies using their one-time QR codes. Natural Language Processing-driven verification



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INFORMATION TECHNOLOGY DEPARTMENT

San Jose, Antique

also adds an extra layer of security by identifying duplicate or fake claims and ensuring government assistance only reaches eligible beneficiaries.

Municipal and provincial farmers' agriculturists can use the system to create analytics of subsidy distribution, monitor which farmers have already been provided with the assistance, and create reports that show the effect of government programs in their locality. Since the municipal and provincial level cannot make changes or modify farmer records, However, they are authorized to monitor progress, ensure field activities, and suggest reports based on the data captured by DA encoders. This enables them to execute their function effectively while ensuring consistency within the RSBSA database.

The platform also offers transparency by giving farmers a notification system for subsidy releases and a dashboard on which government administrators can access real-time reports. During disasters, the system can prioritize the release of assistance according to verified farmer profiles, minimizing delays due to manual validation.

The system would be a great assistance, particularly to farmers and government offices. For the farmers, it guarantees a timely delivery of support and as well as safeguard against fraudulent claims that cut into their share of subsidies. For local farmers, it facilitates easy monitoring of farm programs without undermining the control of the Department of Agriculture over official records.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

1.2 Project Context

The project entitled, "*Subsidy System with Integrated Farmer Profiling and Municipal Analytics*" is a website catering to provincial and municipal farmers and RSBSA-registered farmers. The project proposes an innovative approach to resolving delays, inconsistencies in data, and tracking limitations in the release of government agricultural supports especially in subsidies under RCEF and calamity support by facilitating organized, QR-based claims, municipal-level verification, and analytics.

The project is intended to be used mainly by the Municipal Agriculturist, Provincial Agriculturist and smallholder Farmers in the Province of Antique. The main stakeholders of the project would be from the Office of the Provincial Agriculturist, municipal agriculturists, and coordinating agencies such as the DA (Department of Agriculture) and PCIC (Philippine Crop Insurance Corporation). The development of the system started last June 2025, in which it was proposed as a solution during the Midyear period of the 3rd year students, Academic Year 2024-2025, with an anticipated completion date in December, year 2025, coinciding with the end of the semester with a duration of a 6-month work.

The development is done through UI designing and implementation by the means of HTML and CSS, a responsive frontend in JavaScript, and a server-side stack in PHP with MySQL for the database. The system supports QR code generation for verification of the beneficiary, role-based access for provincial and municipal users. Natural Language Processing are integrated as well in order to verify eligible farmers for specific subsidies and of tracking duplicate entries.





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San Jose, Antique

1.3 Objectives of the Study

The general objective of the study entitled "*Subsidy System with Integrated Farmer Profiling and Municipal Analytics*" is to create a platform that centralizes subsidy distribution, unifies farmer profiling with RSBSA data, and facilitates municipal-level agricultural analytics.

Specifically, the project aims to:

1. Design a web-based application that allows stakeholders to manage subsidy distribution, farmer profiling, and casualties reporting.
2. Create a farmer profiling with existing records to ensure accurate verification of subsidy beneficiaries and minimize duplicate or outdated entries.
3. Develop a subsidy management feature with QR-code validation.
4. Evaluate the system performance and quality in accordance with ISO 25010 standards.



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San Jose, Antique

1.4 Significance of the Study

The proponents intend to develop a website for the use of government agencies, local government units, and Antique Province farmers. The project seeks to automate the release of government assistance in the form of RCEF assistance, calamity subsidy, and insurance claims.

The study is significant and useful for the following:

← **Smallholder Farmers.** The project will give farmers a streamlined and transparent subsidy claiming process under a unique QR code system in order to reduce long queues and delays and ensure that only legitimate beneficiaries get the support needed.

← **Municipal Agriculture Offices.** The system will enhance the ability of MAOs to accurately keep farmer records, monitor in real time the distribution of assistance, as well as farmer activity, and generate data-based reports for municipal decision-making.

The Provincial Agriculture Office. The project will allow the Provincial Agriculture Office to form the information from different municipalities, track distribution efficiency, and pinpoint irregularities or discrepancies that may impede the fair distribution of government assistance for the farmers.

Local Government Units. The system will make the government agencies more transparent and accountable, lessening fraudulent claims through AI verification and linked profiling, and giving analytics to gauge the effectiveness of subsidy programs.

The Researchers. The project will be a training ground for the researchers to acquire advanced technical skills in web development, database management, and integrating cutting-edge technologies like QR Technology and Natural Language Processing into practical agricultural systems.

Future Researchers. This research can be used as a reference and basis for future studies on digital governance, e-agriculture, or subsidy management systems, with conclusions and an example of scaling similar initiatives in other provinces or industries.



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

1.5 Scope and Limitations

The capstone project titled *"Subsidy System with Integrated Farmer Profiling and Municipal Analytics"* is about creating a web-based system that will help in digitalizing and automating the process of the distribution of agricultural subsidies and farm assistance programs for farmers in the Antique Province. The system combines farmer profiling with municipal-level analysis to offer a lean and transparent process for documenting information of the farmers, verifying their eligibility in government aid programs based on the guidelines the government also provides, and tracking the disbursement of the subsidies. In addition to this, the system offers a one-time QR code system through which farmers can safely claim support, cutting down errors and especially fraudulent claims.

The subsidy system will be useful to the stakeholders. The farmers, being the main beneficiaries, will have a quicker and more streamlined claiming of subsidy, since their profiles and subsidy history are centralized and are readily accessible by the MAO. The municipal agriculture offices will have enhanced capacities in tracking and assessing information of the farmers, creating analytics reports, and ensuring that the disbursements of the subsidy meets local agricultural requirements. Local Government Units (LGUs) will also gain through increased transparency and accountability in the granting of subsidies, assuring the proper allocation of resources.

The limitations of the system is limited to the use of selected municipalities in the province of Antique and does not extend to a national level. Based on the guidelines of the MAO as well, registered farmers under the RSBSA are able to access the system, which means that unregistered farmers may not be accommodated. Furthermore, the system needs constant internet connection for real-time updates, which will be difficult to achieve in the remote areas with weak connection.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

1.6 Definition of Terms

The following key concepts are described formally and operationally for ease of understanding:

Subsidy: Financial assistance granted by the government to support specific sectors or groups, usually to reduce costs and promote economic stability. (Investopedia.com).

In this study, the subsidy refers to the government's assistance, such as seeds, fertilizers, fuels and other farm inputs, which are tracked and managed through the Subsidy System to ensure equal distribution to the registered farmers.

Farmer: An individual who engages in activities such as cultivating land and producing crops for livelihood and food supply. (Merriam-Webster.com).

In this study, the farmer refers to the individuals who are the target individuals of the government for aids in the event disaster happens. They primarily engage in the cultivation of land and production of crops as well as livestock.

Registry System for Basic Sectors in Agriculture(RSBSA): it is a nationwide database for farmers, fisherfolk and farm laborers that serves as a target mechanism for the identification of beneficiaries for different agriculture-related programs and services of the government (capastarlac.gov.ph)

In the study, the RSBSA refers to the database that serves as a source of verified farmers that is linked to the system for eligibility in subsidies, profiling and monitoring.

QR Code (Quick Response Code): A type of matrix barcode that can be scanned to quickly access information. (Merriam-Webster.com).

In this study, a QR code serves as the unique identifier for each registered farmer along with their RSBSA ID number, enabling quick verification during the subsidy claims and preventing duplication or fraudulent transactions.

PCIC (Philippine Crop Insurance Corporation): A government-owned and controlled corporation that provides insurance protection to farmers against losses arising from natural calamities, pests, and diseases. (PCIC.gov.ph).



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

In this study, the PCIC is integrated into the subsidy system to validate crop insurance coverage, ensuring that registered farmers are properly insured and eligible for government assistance.

Beneficiary: An individual who receives advantages, rights, or benefits from a program or service. (Merriam-Webster.com).

In this study, a beneficiary refers to a registered farmer who qualifies to receive government subsidies, crop insurance coverage, and other forms of agricultural support through the system.

Local Government Unit (LGU): A political subdivision of the Philippines that is composed of provinces, municipalities, cities, and barangays, with authority to govern within its area. (DILG.gov.ph).

In this study, LGUs serve as the implementing body that manages farmer registration, oversees subsidy distribution, and utilizes municipal analytics provided by the system to make data-driven agricultural policies.

Natural Language Processing(NLP): a subfield of computer science and artificial intelligence (AI) that uses machine learning to enable computers to understand and communicate with human language. (ibm.com).

In this study, NLP refers to the verification of the eligibility of farmers for certain subsidies on the basis of the guidelines provided by the government.

Crop Insurance: an insurance protection to farmers against losses that came from natural disasters, plant diseases or pest infestations to the crops that farmers planted (farm-d.org).

In this study, the Crop Insurance refers to the help provided by the PCIC when farmers are affected by disasters. As long as they are a registered farmer under the RSBSA, and have ensured their crops, they are able to receive compensation.



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

Department of Agriculture(DA): is a government agency under the Philippines that is responsible for promoting the development of the Agricultural sector, ensuring food security and implementing of farmer support programs.

In the study, the DA serves as the primary authority of subsidy policies, they provide the masterlist of farmers eligible for subsidy programs, they are also responsible in encoding and updating data of the farmers in the RSBSA and they usually coordinate with the Local government units for dissemination of information related to the aid program of the government.

Municipal Agricultural Office: is a local government unit that is responsible for promoting and developing agriculture and fisheries within the municipality.

In the study, MAO serves as the office that assists in the distribution of subsidies, and ensures that government support reaches eligible farmers in their respective municipalities.

Guidelines: information intended to advise people on how something should be done or what something should be (dictionary.cambridge.org) .

In the study, it is the basis of the DA, MAO and OPA in order to locate eligible beneficiaries for the subsidy provided by the government. An example would be the 7,000 pesos subsidy for the rice farmers in which they should be planting rice crops and only has a maximum of 2 hectares under their name as a farmer.



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique


Chapter 2

Review of Related Literature and Systems

Discuss what is this chapter.

2.1 Review of Related Foreign Literature

2.1.1 Analysis Effectiveness Policy Subsidy to Income Farmers in Indonesia

 A case study was conducted by Sherina Prajtaningtyas and Timilehin Olasoji about the effectiveness of agricultural subsidy policies in farmers' income. The study reveals that while subsidies do reduce a portion of production costs, their overall impact on significantly increasing farmers' incomes remains limited. A major reason behind this is the uneven distribution of subsidies, particularly affecting farmers in remote or less-accessible areas. This inequity in access undermines the intended benefits of the policy, suggesting that the current subsidy mechanism does not fully achieve its goal of improving farmers' well-being.

The study emphasizes the need to improve the subsidy distribution system and tailor policy approaches to the specific needs of different regions. This directly relates to the study's aim of identifying obstacles in the implementation process. The recommendation to adopt more targeted and efficient mechanisms reflects the research's broader objective of optimizing agricultural subsidy policies to better support national food security and farmer welfare. Thus, the findings not only validate the study's objectives but also provide concrete pathways for policy enhancement.

In relation to the study, the findings indicate the need for improvement in subsidy distribution mechanisms and the development of region-specific approaches. By basing the needs of each municipalities based on their needs, allocation of resources will be equalized.



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

2.1.2 Optimizing Agricultural Supply Chain Subsidy Strategies Incorporating Farm Size and Budgetary Constraints

This study explores how different government subsidy strategies affect the agricultural supply chain, considering farm size, budget limits, and farmer risk aversion. It compares two approaches: giving subsidies directly to farmers based on land size (SF) and giving subsidies to retailers based on output volume (SR). The results show that when farms are large but the government has limited funds, SF works better. When budgets are little, SR performs better with large farms. If the farm size is average and budgets are unlimited, both strategies have similar effects. When farms are too small, subsidies have little to no impact. Also, as farmers become more risk-averse, overall social welfare drops under both strategies. SF is more resilient to uncertainty, making it more effective when resources are limited.

Moreover, the findings about subsidy strategies' impact on social welfare and risk aversion emphasize the need for a transparent and secure platform, such as the one envisioned with QR-code validation and municipal-level analytics. Incorporating these insights can improve subsidy transparency, adaptability, and resilience, helping administrators and municipal agriculturists manage subsidies more effectively while addressing risks and uncertainties inherent in agriculture.

In relation to the study, it highlights the importance of considering farm size, budget constraints, and farmer behavior in designing effective subsidy programs. By understanding how subsidies perform differently based on these factors, the system you're building can better tailor subsidy distribution to the real needs of farmers, ensuring resources are used efficiently and beneficiaries are accurately targeted. This aligns with the goal of using reliable data, like RSBSA records, to minimize errors and duplication in farmer profiling.



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

2.1.3 Research on the Optimization of Supply Chain Decisions for Green Agricultural Products based on Farmers' Risk Preferences and Disaster year subsidies

A study was conducted on "Research on the Optimization of Supply Chain Decisions for Green Agricultural Products Based on Farmers' Risk Preferences and Disaster Year Subsidies" to explore how farmers, distributors, and insurance companies can make better decisions when facing risks such as natural disasters. The study focused on a supply chain model involving three key players which are the farmers who grow green agricultural products, distributors who buy and sell them, and insurance companies offering protection against disaster-related losses. The researchers analyzed two key factors: the level of government subsidies given during disaster years and the different risk preferences among farmers.

Using a three-stage game model, the study determined the best decisions for each party: how much farmers should plant, the best price for distributors to offer, and the ideal premium rate for insurers. The results showed that government subsidies during disaster years help increase farmers' financial stability, as measured by Conditional Value-at-Risk (CVaR), although there is a limit to how much subsidy can be given fairly. Making agricultural practices greener also encourages more production. As the chance of disasters increases, loan guarantee insurance is more helpful in encouraging farmers to expand planting, while yield guarantee insurance is more effective at protecting their income (CVaR). The study provides a useful decision-making framework for farmers, helping them calculate potential profits and risks under different disaster scenarios and insurance options.

In relation to the study, its approach to helping farmers make smarter, risk-informed decisions in a changing climate. By showing how different insurance options and government subsidies affect farmers' behavior and income, it offers valuable insights for policy design, especially in regions prone to disasters. It emphasizes that both government support and the "greenness" of agriculture play a role in increasing farmer welfare and encouraging sustainable practices. The study also highlights the



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

importance of tailoring strategies to individual farmer risk preferences, promoting more resilient and efficient supply chains. Ultimately, it contributes to improving farmers' livelihoods while supporting long-term sustainability in agriculture.

2.1.4 Examining Factors Influencing Youth Farmers' Involvement in Crop and Animal Self-Projects in Rural Areas of Akwa Ibom State, Nigeria

The study entitled "Examining Factors Influencing Youth Farmers' Involvement in Crop and Animal Self-Projects in Rural Areas of Akwa Ibom State, Nigeria" looks into what encourages or discourages young people from participating in farming activities in rural communities. The research focused on both crop and animal farming and involved 300 young farmers selected from different parts of Akwa Ibom State. Using descriptive statistics and Poisson regression analysis, the study found that several factors positively influenced the number of crops and animals the youth farmers managed. These include the number of years they have been involved in social or farming groups, how often they access government agricultural programs, the frequency of visits from agricultural extension officers, their level of formal education, and their personal reasons for going into farming. However, the cost of hiring labor was found to negatively affect the number of farming activities young farmers could take on, making it harder for them to expand. Based on these results, the study recommends strengthening agricultural extension services, creating more youth-targeted farming programs, supporting farmer networks, improving rural education, and setting up systems that reduce input and labor costs, such as machinery rental centers.

In relation to the study, it shows what drives or limits young people's involvement in farming, especially in rural areas where youth unemployment is a concern. It highlights that when young farmers have access to education, support programs, farming inputs, and affordable services, they are more likely to stay engaged in agriculture and succeed. On the other hand, high farming costs—especially for labor—can discourage them from fully participating. The findings of this study provide valuable insights for policymakers, agricultural planners, and development organizations working to increase youth participation in farming. By understanding the real challenges youth farmers face and what motivates them, better-targeted programs and policies can



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

be designed to support their growth, improve food production, and boost rural development.

2.1.5 Impact of Fuel Subsidy Removal Policy on Fish Farmers' Input Utilization in Yenagoa Agricultural Zone, Bayelsa State, Nigeria.

A case study was conducted on "Impact of Fuel Subsidy Removal Policy on Fish Farmers' Input Utilization in Yenagoa Agricultural Zone, Bayelsa State, Nigeria" to examine how the federal government's fuel subsidy removal policy has affected fish farmers in the region. The policy, aimed at reducing Nigeria's reliance on imported fuel, boosting local production, and redirecting funds to other sectors, has had unintended consequences for rural agricultural communities. Using a multi-stage sampling method, data were collected from 80 fish farmers across eight communities in Yenagoa Local Government Area. Both primary and secondary data sources were used in the study. A 3-point Likert scale was applied to measure the awareness level of the farmers and the impact on their operations.

The findings revealed that most fish farmers were aware of the fuel subsidy removal, with mean scores of 2.30 for awareness and 2.29 for its effect on fish farming. Regarding the impact on profitability, the results showed increased input costs, higher transportation expenses, reduced household income, inflation, and lower purchasing power—reflected in mean scores ranging from 2.16 to 2.45. A simple regression analysis showed a clear inverse relationship between the fuel subsidy removal and input utilization among fish farmers, meaning that as fuel prices rose, farmers reduced the use of necessary inputs due to cost. Consequently, the study rejected the null hypothesis and confirmed that fuel subsidy removal has a significant negative effect on the use of agricultural inputs in fish farming.

The study recommends increasing the number of agricultural extension agents to raise awareness and provide support to rural fish farmers. It also suggests promoting integrated commercial fish farming systems to cut down costs and increase profits. Furthermore, it advises the government to invest in alternative energy sources and improve local refinery capacities to reduce the negative impact of fuel subsidy removal on agricultural production.



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

In relation to the study, the system shows its clear demonstration of how national economic policies, such as the removal of fuel subsidies, can deeply affect small-scale farmers, especially in rural areas. In this case, the policy led to higher production costs for fish farmers, reduced access to vital farming inputs, and ultimately lowered their profitability. This highlights the need for targeted support and intervention when implementing broad economic reforms. By drawing attention to the challenges faced by fish farmers in Bayelsa State, the study provides valuable insights for policymakers to balance national fiscal goals with the realities of local agricultural livelihoods. The findings underline the importance of including rural agricultural voices in policy decisions and ensuring that support systems—such as extension services and affordable alternatives—are in place to cushion the impact of such changes.

2.1.6 Levels of Crop Diversification and Its Impact on Poor Farmers: A Case Study of Jashpur District, Chhattisgarh State, India

The study entitled "Levels of Crop Diversification and Its Impact on Poor Farmers" focuses on the Jashpur district in Chhattisgarh, India—a tribal-dominated area. It looks at how growing different types of crops (instead of just one or two) affects poor farmers. The researchers used both new data (from field surveys) and existing data to understand changes in farmers' income, cost of farming, food security, and overall well-being.

The study found that farmers in the area choose to grow a variety of crops to protect themselves from problems like changing weather, market price drops, and pest attacks. Crop diversification helps them earn more, eat better, and feel more secure. It also makes them less dependent on just one crop or source of income, which is especially important in difficult farming conditions.

The relevance of this study is that it shows how growing different crops can really help poor farmers, especially in tribal and rural areas. For farmers who often face challenges like climate change and unstable markets, crop diversification is a smart way to reduce risks and improve their lives.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

This study gives useful ideas for government programs and farming policies. It suggests that instead of focusing only on growing more of a single crop, helping farmers grow a mix of crops can lead to better income, food security, and resilience. The findings can guide efforts to support small farmers in other similar regions too, making farming more sustainable and helping reduce poverty.

2.1.7 Agricultural Subsidy Programs

Economists have raised several criticisms against farm subsidies. They argue that these subsidies often transfer money to relatively wealthy farmland owners and operators rather than helping small, struggling farmers. Economists also point out that subsidies create a net loss for society and harm the global economy by disrupting international trade. Supporters, on the other hand, claim that subsidies stabilize markets, help low-income farmers, support rural development, ensure national food security, and counter subsidies from other countries. However, economists who have tried to prove these benefits have largely been unsuccessful.

The United States heavily subsidizes certain crops like grains, oilseeds, cotton, and dairy, while others like beef, poultry, and fruits receive minimal support. The cost to the U.S. government has been around \$20 billion per year, but this doesn't fully capture the cost to consumers through higher prices. Globally, countries like Norway, Switzerland, Iceland, Japan, and Korea have some of the highest subsidy rates in the world, while Australia and New Zealand have the lowest. The debate over these subsidies has become a major issue in international trade negotiations, with many developing countries arguing that rich nations' subsidies hurt their farmers and prevent fair competition.

Economists have criticized farm subsidies for several reasons. They argue that the money often goes to wealthy farmland owners instead of low-income farmers. They also say that subsidies create a net loss for society and disrupt international trade, making it harder for countries to trade freely. On the other hand, supporters of subsidies argue that they stabilize markets, help rural economies, ensure national food security, and offset subsidies from other countries. However, economists have found little



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

evidence to support these claims.

In relation to the study, it provides important context for the "Farmer Profiling" document because it explains the purpose and criticism behind the very programs that the document's subject—farmer profiling—is designed to improve. The article details how subsidies have been used to support farmers, from early price controls to modern direct payments. It also highlights a key criticism: that subsidies often fail to help the small farmers who need them most and instead benefit large landowners.

This is where the "Farmer Profiling" document becomes so relevant. It directly addresses this problem by explaining how accurate data on smallholder farmers can be used to make sure subsidies and other aid programs reach the right people. While the article describes the "what" and "why" of subsidies, the document offers a practical solution—using data and technology to create systems that can manage farmer information. This ensures that aid is distributed more fairly and effectively, directly tackling one of the main criticisms mentioned in the article.

2.1.8 Farm Subsidy Tradition and Modern Agricultural Realities

The paper, written by Daniel A. Sumner, reviewed the history of U.S. farm subsidy programs from the New Deal era to the 2002 Farm Bill. It explained that these programs became very complex and that, despite their longevity, the rationales used to justify them were often inconsistent with the realities of modern agriculture. The paper noted that direct payments replaced traditional methods like land set-asides and government stockholding to raise prices, and that most of the subsidy money went to large, successful farms. The paper also reviewed thirteen common arguments for farm subsidies, such as stabilizing markets and aiding low-income farmers, and concluded that most of these rationales did not hold up to economic analysis.

The paper described how farm policy changed over time, especially with the 1985 Food Security Act, which lowered price supports and relaxed planting requirements. The 1996 FAIR Act was a significant change because it replaced price-tied payments with "contract" payments that farmers received even when prices were high.



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

However, these fixed payments proved politically unstable, and when prices dropped, extra "ad hoc" legislation was passed to increase subsidies. This led to a large increase in government spending on subsidies, and the 2002 Farm Bill made these additional payments permanent with the creation of the countercyclical program.

In relation to the study, the paper's discussion of why farm subsidies are so resistant to change—because they are politically entrenched and their benefits often fail to reach those who need them most—underscores the importance of the study's third objective. Designing a system with QR-code validation would directly address this issue by introducing a clear and transparent method for subsidy distribution. This would improve both efficiency and accountability, tackling the very lack of transparency and economic inefficiency that the paper criticizes in traditional subsidy programs. The historical context provided by the document proves that a new approach is needed, and the study's objectives offer a tangible solution to these long-standing problems.

2.1.9 The Impact of Fertilizer Subsidy Policies on the Profits and Welfare of Rice Farmers: Lessons from Sumbawa West District

A study was conducted on "The Impact of Fertilizer Subsidy Policies on the Profits and Welfare of Rice Farmers: Lessons from Sumbawa West District" to examine how government fertilizer subsidies affect rice farmers' production, profits, and overall welfare. The study took place in Brang Rea District, West Sumbawa Regency, and involved 60 rice farmers—30 who received fertilizer subsidies and 30 who did not. Data were collected through observations, surveys, and in-depth interviews, and analyzed using Cobb-Douglas production and profit function models.

The results showed that fertilizer subsidies had a positive and significant effect on rice production, meaning that subsidized farmers produced more rice. However, the impact on profits was positive but not statistically significant, indicating that while profits slightly increased, the difference wasn't strong enough to be considered a major change. Farmers who received subsidies had higher productivity and lower costs for capital and farm inputs compared to those who did not receive subsidies. However, differences in labor costs and profits between the two groups were small and not significant. In terms



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

of welfare, the study found that farmers who received subsidies had a better standard of living than those without subsidies.

In relation to the study, it presents the ability to provide real-world insights into the effectiveness of fertilizer subsidy policies in improving the lives of small-scale farmers. While the subsidies clearly helped increase rice production and reduce input costs, the limited effect on profits suggests that subsidies alone may not be enough to significantly boost farmers' income. However, the overall improvement in welfare among subsidized farmers shows that such policies still play a meaningful role in supporting rural livelihoods. This study highlights the need for better-designed support systems that not only improve production but also help farmers earn more and live better. It offers important lessons for policymakers aiming to balance food production goals with economic support for farmers, especially in regions where agriculture remains a key source of income.

2.1.10 Evaluating Agricultural Subsidy Reforms and Their Effects on Smallholder Farmer Income and Efficiency

A study was conducted on "Evaluating Agricultural Subsidy Reforms and Their Effects on Smallholder Farmer Income and Efficiency" to explore how changes in subsidy policies impact the income and productivity of smallholder farmers. Traditional agricultural subsidies have helped increase food production and support rural development, but they are also criticized for being inefficient and financially burdensome. This study focuses on how reforms—such as shifting from universal input subsidies to more targeted, market-based approaches—affect farmer decision-making, input use, and production outcomes. It draws on examples from countries like Malawi, Nigeria, and Zambia, where governments have introduced new models such as electronic voucher systems, public-private partnerships, and conditional subsidies based on performance or environmental goals.

Using a combination of data analysis and field interviews, the study found that targeted subsidies, when supported by access to credit and agricultural extension services, significantly improved both income and production efficiency for smallholder



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

farmers. These reforms helped farmers make better decisions, adopt improved inputs, and reduce wasteful spending. However, challenges remain. The benefits of subsidy reforms are often uneven, limited by weak infrastructure, poor administration, and the influence of elites who sometimes divert the benefits away from the intended recipients.

In relation to the study, it shows its insights into how smarter, more targeted subsidy reforms can better support smallholder farmers. By showing that well-designed subsidy systems—linked with services like credit, training, and market access—can raise incomes and efficiency, the study makes a strong case for moving away from one-size-fits-all subsidy models. It also highlights the importance of strong institutions, transparent systems, and supporting infrastructure to ensure that reforms reach the farmers who need them most. For policymakers, this research offers a roadmap for creating more effective agricultural support programs that improve farmer livelihoods while reducing waste and fiscal pressure. It emphasizes that subsidies should not operate in isolation but be part of a broader rural development strategy.

2.2 Review of Related Foreign System

2.2.1 Digital Farmer's Profiling System for Decision Support Towards E-Governance

A case study was conducted on the "Digital Farmer's Profiling System for Decision Support in E-Governance Research," which looked at how digital tools can improve both farming and government services. The goal of the project was to build a system that collects and organizes important information about farmers—such as their personal details, land, animals, fish farming, income sources, and production costs. It also included details about service providers and featured tools for creating useful reports, like lists of farmers and land data predictions.

The study found that the system successfully met all the goals. It helped collect organized data and provided a strong reporting tool that can support better decisions for both farmers and agriculture offices. This shows that digital tools like this can really help



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

in planning, giving the right support, and making smarter choices in agriculture. The results of the study highlight the value of using digital systems to manage farming data more effectively. By putting everything in one place and making it easier to access and understand, the system helps improve how services are given to farmers and how decisions are made at the local and national levels.

In relation to the study, it lies in its ability to support fair and efficient delivery of government support, such as agricultural subsidies. By creating a digital profiling system that gathers complete and accurate data about farmers—including their land, livestock, income sources, and farming activities—the study provides a strong foundation for making informed decisions.

2.2.2 An Adaptive Deep Learning Approach For Identification of Crop-types From Remote Sensing Images

A study was conducted for improving the early detection and mapping of crop types using satellite data. Accurate and timely crop-type maps are essential for effective agricultural planning and decision-making. With the growing availability of high-resolution remote sensing data from satellites like Sentinel-1A and Sentinel-2, there is an increasing need for advanced methods to analyze this data quickly and accurately.

In this study, researchers developed an Adaptive Convolutional Neural Network with Incremental Training (ACNN-IT), designed to identify crop types in near real-time. The model includes three main steps: image pre-processing, feature extraction, and classification. Its key feature is the use of incremental training, which allows the system to adapt and learn from newly available data throughout the growing season. This helps in improving early-season crop classification. The model was tested and compared with other classification techniques such as Support Vector Machine (SVM), Random Forest (RF), and SoftMax classifiers. Results showed that ACNN-IT increased crop identification accuracy by 3.56% and reduced computational load by 7.23%, making it more efficient than existing methods.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

In relation to the study, it shows the ability to support timely and informed decision-making in agriculture through the use of smart technologies. Early and accurate crop identification helps farmers and agricultural planners take quick action on irrigation, fertilizer use, and pest control, leading to better yields and resource management. By using satellite images and adaptive deep learning, the ACNN-IT model offers a reliable way to handle large amounts of data with improved accuracy and lower computational costs. This approach is especially valuable in the context of climate change and food security, where fast, data-driven decisions are critical. The case study shows how technology can enhance agricultural monitoring and support sustainable farming practices at a large scale.

2.2.3 Designing a Customer-Centred Government Subsidy System

In the study conducted by Ninja Fedy about "Designing a customer-centred government subsidy system", it indicates that it explored the redesigning of the government subsidy systems through a customer centered approach. Lacking of efficiency and inclusivity was one of the highlights in the traditional approach of the government. Because rather than the view of the users it was designed in the perspective of the institutions in charge instead. So Fedy implemented the concepts such as the Customer-Dominant Logic or CDL, co-creation, design thinking and an agile development approach in order to create a more responsive and collaborative model for the system.

Fedy's research applied a qualitative approach, this techniques included Theme interviews and Design sprints, enabling an active engagement of various stakeholders within the process of subsidies. And it showed that results indicated that communication was the most essential requirement of stakeholders, with unclear procedures, information delays, and absence of feedback mechanisms being the key challenges. And by engaging the stakeholders in the co-creation processes, the research was able to come up with solution ideas that focused on transparency, accessibility, and real-time communication in government services.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

In relation to the study, Fedy's research is clear evidence of the need for a customer-centric subsidy system. Her work highlights the necessity of platforms that transcend bureaucratic processes by embracing user engagement, digital technologies, and design approaches. The proposed project is supported by this study in illustrating how government subsidy schemes can become more efficient when they focus on beneficiaries' experiences and needs, thus delivering improved trust, accountability, and service.

2.2.4 Knowledge-Based Decision Support System for Determining Types of Agricultural Crops

The system addresses the challenge of selecting appropriate crops based on varying land characteristics. It emphasizes that mismatches between crop types and soil conditions can lead to reduced yields, resource waste, and financial losses for farmers. To mitigate these risks, the researchers developed a knowledge-based decision support system that utilizes machine learning algorithms to analyze the relationship between environmental factors—such as soil type, pH level, temperature, humidity, and rainfall—and crop suitability. The goal was to assist in identifying the best crops for specific soil conditions through predictive modeling.

To determine the most effective model, the study tested four machine learning algorithms: Decision Tree, Random Forest, Support Vector Machine (SVM), and k-Nearest Neighbor (k-NN). A total of 30 experiments were conducted to evaluate the stability and accuracy of each model. Among the tested algorithms, the Support Vector Machine (SVM) demonstrated the highest performance, achieving a mean accuracy of 1 and a standard deviation of 0. This result suggests that SVM offers superior stability and reliability in determining suitable crop types based on soil conditions.

In relation to the study, it aligns with the goal of integrating municipal-level agricultural analytics by demonstrating how data-driven tools can support informed decision-making in crop planning. By incorporating similar decision support mechanisms, the proposed subsidy system can enhance its ability to recommend crop types suitable to land conditions, thereby increasing the effectiveness of subsidy allocation. Moreover,



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

this approach can improve the accuracy of farmer profiling and ensure that support is tailored not only to the farmer but also to the agricultural potential of their land.

2.2.5 A Students Attendance System Using QR Code

A system developed by Fadi Msalha and Nael Hirzallah with the title "A Students Attendance System Using QR Code". In which it focused on the efficiency of the usual traditional method of attendance tracking methods which is considered to be time consuming. In order to ensure accuracy and reliability by streamlining and automating the attendance process, their study incorporated the use of Quick Response Codes or what is known as QR Codes as its main digital tool.

In the study, it works by assigning a specific or unique QR COde to every students, which is readable when scanned during classroom sessions. With this method it eliminated human error, decreasing the likelihood of fake attendance, and saves time for both students and teachers. The research highlighted the integrations of mobile technology and database systems to allow real-time updating and automatic storage of attendance records. This is one example of how current digital technology can enhance administrative processes in educational institutions.

In relation with the study, the research identifies just how important transparency and efficiency by automating processes. Since QR codes were designed to enhance the student attendance tracking, the same digital tool can also be applied to the system to be developed for the Government subsidy. It allows for the system to track beneficiary claims correctly and provides transparency not only for the farmers but for the Government as well. The research justifies that the incorporation of new technologies enhances the traditional methods done before by being more user-friendly and dependable.

2.2.6 Utilizing Blockchain Technology for Farmer Identity Management and Land Registry Systems in Agriculture

The study on "Utilizing Blockchain Technology for Farmer Identity Management and Land Registry Systems in Agriculture" focuses on how blockchain can improve trust,



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

transparency, and efficiency in handling farmer records and land-related information. It reviews the current challenges in identity verification and land registration, such as outdated records, lack of transparency, and issues in data security. The research also discusses different blockchain-based solutions, weighing their benefits, limitations, and strategies for practical use in the agricultural sector.

By adopting blockchain, the agriculture industry could streamline administrative processes, secure data sharing, and provide accurate and transparent land transaction records. The study highlights how blockchain's decentralized and tamper-proof nature can enhance the credibility of farmer identities, reduce fraud, and ensure fair resource distribution. It further emphasizes how these improvements could help farmers, policymakers, and local governments build stronger systems for agricultural management.

In relation to the study, this system is significant because both highlight the importance of secure, transparent, and accurate farmer data management. While blockchain technology focuses on identity verification and land registry, the subsidy system aims to centralize subsidy distribution, ensure proper profiling, and provide analytics for decision-making at the municipal level. The blockchain study supports the objectives of minimizing duplicate or outdated records, strengthening security, and promoting transparency, which align with the project's goals of creating a reliable subsidy management platform with QR code verification and system evaluation using ISO 25010 standards.

2.2.7 FarmTechAI: Artificial Intelligence-Based Modern Farmer Management System

The study introduces an AI and machine learning-powered platform designed to improve the efficiency and sustainability of farming practices. Traditional farm management systems often fail to respond quickly to unpredictable changes in weather, crop health, and market conditions, leaving farmers vulnerable to losses. FarmTechAI addresses these challenges by providing a centralized dashboard where farmers can access real-time meteorological, financial, and agricultural data, along with insights



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

generated from machine learning models.

This AI-based system supports decision-making by delivering timely and accurate information on crop yields, weather fluctuations, and resource allocation. By promoting collaboration and information exchange among farmers, FarmTechAI fosters a more connected agricultural community. Ultimately, it aims to revolutionize precision farming by making modern technologies accessible and understandable, ensuring that farmers at all levels can make informed, data-driven decisions that improve productivity and long-term sustainability.

In relation to the study, both focus on integrating technology to enhance agricultural management and decision-making. While FarmTechAI emphasizes AI and machine learning for real-time insights into farming conditions, the system highlights centralized profiling, subsidy distribution, and municipal analytics. Both share the goal of empowering farmers and administrators with accurate, accessible, and secure data that leads to better outcomes. The AI-based system reinforces the objectives of improving transparency, ensuring accurate farmer records, and enabling data-driven management, aligning with the vision of creating efficient and sustainable agricultural support platforms.

2.2.8 Developing a Registration System for Farmers' Varieties

The study addresses the challenges faced by farmers whose crop varieties remain excluded from the formal seed market due to strict requirements such as distinctness, uniformity, stability, and performance standards. Because of these limitations, many farmer-developed varieties are confined to the informal sector, where their production, exchange, and trade remain largely unsupported and undervalued. The research highlights the importance of creating a registration system that acknowledges the unique characteristics of farmers' varieties while providing them with a pathway toward formal recognition.

The article follows the seed regulatory value chain to propose strategies for adapting current systems to accommodate farmers' varieties. It examines critical issues



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

such as defining what qualifies as a farmers' variety, determining the rights of registrants, and balancing these rights with those of other stakeholders. Drawing insights from case studies, literature reviews, and stakeholder workshops, the study presents a guided approach for designing and implementing a registration framework that integrates farmers' varieties into the broader seed system while maintaining their distinct qualities.

In relation to the study, both emphasizes proper farmer recognition and fair inclusion in formal agricultural systems. While the registration system focuses on legally acknowledging farmers' seed varieties, the subsidy system aims to centralize profiling, prevent duplication, and ensure transparent subsidy distribution. Both studies highlight the importance of building reliable platforms that support farmers, validate their contributions, and ensure equal access to agricultural programs. The guided approach to farmer variety registration aligns with the objectives of accurate profiling and secure management, reinforcing the need for systems that are inclusive, transparent, and supportive of farmers at different levels.

2.2.9 SATHI: The Digital Ecosystem Driving Quality Assurance in Indian Agriculture

The study highlights the Government of India's Seed Traceability Project, a centralized online system developed by the Department of Agriculture and Farmers Welfare (DA&FW). Its main goal is to ensure quality assurance, transparency, and traceability throughout the seed production and distribution chain. The system integrates multiple aspects of the seed industry, including research, certification, licensing, inventory management, sales, and subsidy disbursement. Through QR codes and barcodes printed on seed packets, farmers and regulators can access details about seed origin, production, grower information, and compliance records.

A key feature of the system is the use of blockchain technology to store data securely and prevent tampering, ensuring uniformity across states and maintaining trust in the system. Only seeds with valid certification can be sold by licensed dealers, while registered farmers receive subsidies directly in their verified bank accounts through



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

Direct Benefit Transfer (DBT). Real-time monitoring, automation, and seamless integration across the seed supply chain make the SATHI portal a transformative tool in ensuring transparency, accountability, and efficiency in Indian agriculture.

In relation to the study, this research is closely aligned as both focus on building secure, transparent, and centralized platforms for agricultural support systems. The SATHI system uses QR codes, blockchain, and direct subsidy transfers to ensure accountability and prevent fraud, which mirrors the subsidy system's objective of using QR-code validation, accurate farmer profiling, and municipal-level analytics. Both initiatives highlight the importance of digital platforms in reducing inefficiencies, enhancing trust, and ensuring that benefits reach the rightful farmers. This connection reinforces the study's goal of designing a reliable, transparent, and efficient subsidy management platform that supports both farmers and agricultural administrators.

2.2.10 Subsidy Policy Interactions in Agricultural Supply Chains: An Interdepartmental Coordination Perspective

The study examines how government subsidy programs can be weakened by conflicts between different departments with varying objectives. Focusing on China's agricultural policy environment, the research uses a game-theoretic model to analyze the strategic interactions between the Agriculture and Rural Affairs Department (ARAD) and the Development and Reform Commission (DRC). These departments manage different subsidy types, including production, cold-chain, platform operation, and blockchain subsidies, each targeting specific goals.

The findings show that while individual subsidies can meet departmental performance indicators, their combined effects are often inefficient or suboptimal due to a lack of coordination. The study highlights that when subsidies are strategically combined—particularly production and platform operation subsidies—they produce stronger outcomes in improving overall social welfare. By providing a framework for interdepartmental cooperation, the research offers practical insights for designing more effective and unified agricultural subsidy policies.



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San Jose, Antique

In relation to the study, both focus on improving the efficiency and effectiveness of subsidy distribution. While the China-based study emphasizes interdepartmental coordination to prevent conflicts and ensure optimal subsidy outcomes, the subsidy system aims to centralize data, enhance transparency, and provide accurate farmer profiling with municipal-level analytics. Both highlight the need for integrated, well-coordinated approaches in subsidy management to reduce inefficiencies and improve the impact of government programs. This reinforces the project's objective of creating a secure and reliable platform that ensures subsidies reach the right beneficiaries in an organized and transparent way.

2.3 Review of Related Local Literature

2.3.1 Omnibus Guidelines in the implementation of the emergency subsidy program of the Department of Social Welfare and Development

A study on the Omnibus Guidelines in the implementation of the emergency subsidy program of the Department of Social Welfare and Development highlights how the government's effort to harmonize social improvement initiatives during the Covid-19 pandemic. The guidelines were designed in order to strengthen the memorandum circulars in response to the requirements of the RA. No 11469 or the "Bayanihan to Heal as One Act". The program was designed to provide financial assistance to the low-income households in the Philippines as well as other vulnerable groups, especially those affected by strict community quarantines.

The study shows that the Emergency Subsidy Program was not intended to provide immediate relief but also that it ensures the livelihood of those affected by the pandemic. Aside from this, the aid does not entirely focus on monetary help but also in the form of food and non-food items for the stranded workers and homeless individuals, making sure that no one is left behind during the quarantine restrictions by the government. However, the study indicated that even though it was a comprehensive program, delays in the distribution of goods occurred and most especially the verification of individual that are eligible for the said aid had difficulties as well due to overlapping data across different government agencies.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

In relation to the study, it serves as a reference as an importance in improving the subsidy distribution not only in agriculture but also in other related programs as well. Like the ESP (Emergency Subsidy Program), the agricultural subsidy scheme should also guarantee inclusivity, efficiency, and transparency in the selection of and assistance to deserving farmers. The guidelines also highlights the need for harmonized policies, efficient verification, and an effective collaboration between national agencies and local government units. For this project, the same principles can be used to create a system of subsidy design where farmers can readily confirm their eligibility, safely claim the assistance, and prevent overlapping claims thus the related program offers useful learnings on how to create a more efficient, transparent, and fairer distribution mechanism for agricultural subsidies.

2.3.2 Review of Design and Implementation of the Agricultural Insurance Programs of the Philippine Crop Insurance Corporation

The study of "Review of Design and Implementation of the Agricultural Insurance Programs of the Philippine Crop Insurance Corporation (PCIC)" looked into the impact of agricultural insurance programs in ensuring damage protection for the Filipino farmers. The study highlighted that the agricultural activity in the Philippines is very exposed to many natural calamities such as typhoons, floods, and droughts, thereby making agricultural insurance an relevant and important safety net. By its insurance schemes, PCIC seeks to protect farmers' livelihoods by providing cover against crop destruction and farm damage, thus stemming financial insecurity in agriculture.

The study examined the institution's setup, policy design, as well as implementation challenges that the PCIC faced. The findings were that even though the insurance programs are critical to the farmers, limitations such as limited coverage, and awareness on the farmers' side, as well as lengthy delays in the processing of claims hinders its overall effectiveness. Moreover, the research indicated that the mechanism of subsidy on insurance premiums needs to be more efficient and inclusive to allow marginalized farmers to reap the full benefit of government assistance. This gap establishes the necessity of innovation in the governance of agricultural insurance



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

schemes.

Its relevance to the study highlights the significance of efficient delivery methods in these programs by the government. In the same way that PCIC's insurance programs demand better accessibility and claim handling, the new end user-oriented subsidy system aims to minimize such inefficiencies in government aid.

2.3.3 Evaluation of the Impact of Agricultural Insurance Program of the Philippine Crop Insurance Corporation on Agricultural Producers in Region IV-A (CALABARZON)

The study show how the government-sponsored insurance affects the farmers socio-economic status. The study emphasized that CALABARZON's agricultural producers are exposed to repetitive risks that are brought about by climate variability, pests, and market volatility, thus rendering insurance a vital instrument to help reduce agricultural losses. Through financial protection in the form of crop insurance, the PCIC seeks to stabilize farmers' incomes and promote farmers to carry on producing in spite of the environmental and economic uncertainties.

The result of the study shows that the insurance helps promote the resilience of the farmer in a positive manner by lessening their exposure to crop loss as well as financial loss. However the research also shows drawbacks in poor awareness among the farmers about the benefits of the insurance, red-tapes in claim payments, and minimal coverage of the program. These problems discards the complete potential of the insurance program, demonstrating that while the policy environment is good, its administration still has room for improvement to better meet the needs of the farmers.

In relation to the current study, the research highlights the position of the government subsidy programs in benefitting farming communities. The resulting inefficiencies found in claim processing, accessibility, and farmer participation are reflective of those also found in the distribution of subsidies. Learning from these results, the envisioned government subsidy system aims to maximize transparency, responsiveness, and inclusivity so that support reaches the recipients more efficiently and improves agricultural productivity and livelihood security.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

2.3.4 Challenges to Climate Change Resilience and Financial Support for Commercial Farmers in the Philippines: Implications for Sustainable Agricultural Production

The study in "Challenges to Climate Change Resilience and Financial Support for Commercial Farmers in the Philippines: Implications for Sustainable Agricultural Production" shows the increasing vulnerability from climate-related risks of commercial farmers and their access to financial support systems. It emphasized that extreme weather events, the rising of heat temperatures and now unpredictable rainfall patterns greatly and negatively affected the productivity of the agricultural sector, causing it to become a threat to the food security and livelihood of the farmers in the Philippines. So Financial aids likes subsidies, loans and insurances, are seen as an essentiality in enhancing the resilience and ensuring that the farmers ability to maintain their operations or activities during unfavorable conditions such as drought, typhoons and many more.

The research results indicated that even with the presence of government programs, farmers continue to have problems with limited access to credit, delays in subsidies disbursement, and poor coverage under insurance. The absence of climate-resilient financial assistance was found to diminish farmers' adaptive capacity, hence increasing their exposure to frequent agricultural losses. The research pointed out the need to come up with subsidy systems not just in terms of accessibility but specifically formulated to meet farmers' needs facing climate change impacts.

In relation to the current study, the literature underlines the necessity of integrating climate resilience into subsidy systems. The difficulties encountered by the farmers mirror the systemic failures in providing monetary assistance for which a people oriented government subsidy system seeks to take care. By embracing digital platforms, real-time communication, and clear mechanisms, the system developed can assist in guaranteeing subsidies and monetary aid are channeled effectively, fairly, and in such a manner that improves farmers' long-term viability in the context of said climate threats.



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San Jose, Antique

2.3.5 Who Reaps the Benefits? A Review of the Rice Tariffication Law (RA 11203) and Its Impact on Food Security and Sustainable Agriculture in the Philippines

The study by Jayson Diaz examines how the effects of liberalization of rice imports on local farmers, consumers and the agricultural sector affect the food security and agricultural sector of the Philippines. The Rice Tariffication Law was created in order to stabilize the rice supply on the imports of rice and replace them with tariffs instead. The earnings from the tariffs is then designated to be provided for the RCEF or the Rice Competitiveness Enhancement Fund, which aims to provide a mechanization, training and credit funding for the farmers in the Philippines.

However, the findings of the study provided mixed results. While the consumers of the rice enjoyed lower rice prices and increased in availability. However, this is the opposite for the smallholder farmer themselves as they get lowballed into also pricing their rice lower in order to compete with the low priced imported rice. Furthermore, the allocation of RCEF support was also said to have been uneven, with inefficiencies and delays in reaching the target beneficiaries. The research shows that while the law aimed at balancing farmer assistance and food security, its enactment exposed large loopholes that discredited its objective of facilitating sustainable growth in the agricultural sector.

In the relevance of the current study, the literature indicates that the need for effective support and subsidy systems in ensuring that government policies really benefit their targeted stakeholders. Just like the problems of the Rice Tariffication Law, in which farmers were not entirely able to enjoy the promised aids through the lack of strong implementation structures, the government subsidy system for the farmers will prioritize transparency, effective delivery, and direct engagement of beneficiaries. Utilizing digital platforms, the system can assist in making sure that government assistance effectively reaches farmers, and in doing so, enhancing the food security and sustainability of the system.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

2.3.6 Revised Implementing Guidelines on the Utilization of Government Premium Subsidy (GPS) to the Philippine Crop Insurance Corporation under FY 2017 General Appropriations Act, RA 10924

The Revised Implementing Guidelines on the Utilization of Government Premium Subsidy (GPS) to the Philippine Crop Insurance Corporation under FY 2017 General Appropriations Act (RA 10924) sets the policy framework for the use of government funds to be subsidized for the producers in the agricultural sector through the insurance premium provided by the PCIC. The objective of the guidelines would be to increase the availability of crop insurance among the smallholder farmers and fisherfolk alike in which many of whom cannot afford the full cost of the premiums provided by the PCIC.

So by institutionalizing government premium subsidies, the program has as its overall objective to enhance agricultural risk protection and protect producers' livelihoods against crop damage from natural calamities, pests, and diseases. The policy prescribed beneficiary eligibility, prioritization, and fund release procedures while focusing on those registered under the Registry System for Basic Sectors in Agriculture (RSBSA). Although GPS enhanced insurance access by reducing financial impediments, its distribution experienced issues like delayed release of funds, challenges in verifying eligible farmers, and poor communication of program advantages. These gaps lowered the value of subsidy distribution and confined the program's general effectiveness in targeting marginalized farmers in need of quick support.

Its relevance to the study mainly highlights the needed guidelines in order to be eligible for the Philippine Crop Insurance Corporation. It becomes a crucial reference point not only for the system but for the knowledge of the farmers as well. The inefficiencies of financial aid disbursement greatly affects the individuals involved. So proposing a system built on the lesson by leveraging digital platforms for real-time beneficiary-tracking ensures that deliverables are met for the farmers.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

2.3.7 Implementing Guidelines of the Rice Farmer Financial Assistance (RFFA)

The Department of Agriculture released the Implementing Guidelines for the Rice Farmer Financial Assistance or the RFFA as the direct cash subsidy to the rice farmers who were negatively impacted by the approval of the Rice Tariffication Law (RA 11203). The program made tariff revenues on rice imports to ensure that smallholder rice farmers with two hectares or less of land were given cash assistance in order to mitigate the effect of farmgate prices falling. The main goal of the RFFA is to ensure that farmers maintain their production while also adapting to a more competitive and sustainable approach under a liberalized rice trade era.

The policy outlines the eligibility criteria, fund distribution process, and fund implementation mechanisms of the cash assistance program. Beneficiaries are authenticated by Registry System for Basic Sectors in Agriculture (RSBSA) to ensure transparency and appropriateness in fund allocation. Although the program effectively disbursed much-needed cash aid, some challenges were mentioned, such as fund disbursement delays, low awareness among farmers of their eligibility, and technical problems in accessing far-flung farming areas.

In relation to the research, the RFFA guidelines provide a useful basis for determining the areas of for the existing government support programs. Similar to that of the guidelines provided of the PCIC, However, the RFFA is similar to the Presidential aid of President Marcos. The RFFA is included as one of the subsidy programs of the Philippine government, therefore the need for transparency in a subsidy program is a need.

2.3.8 Impacts of Natural Disasters on Agriculture, Food Security, and Natural Resources and Environment in the Philippines

The study of the Impacts on Natural Disasters on Agriculture, Food Security and Natural resources and environment in the Philippines examined the vulnerability of the agricultural sector to natural disasters like typhoons, floods, droughts, and volcanic eruptions. The sector itself is highly sensitive to the climate changes of the world. IT



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

continues to suffer substantial loss in production especially during calamities. It greatly affects and jeopardizes the food security of the Philippines and not only that it also affects the livelihood of the farmers. The research highlighted that disaster-inflicted damages not just pose an impact on crop yields but also long-term effects on natural resources and environmental sustainability.

The study revealed that the agricultural sector of the Philippines loses billions of pesos every year due to repetitive natural disasters and Farmers are usually the one to experience low incomes, increased in debts, and lower ability to recover from the said calamities, even more so when support systems and safety nets are weak. Aside from that, supply chains of food are interrupted, inducing a domino effect that extends to the consumer access and pricing of crucial commodities. These issues highlight the need for government-sponsored interventions, including subsidies, insurance schemes, and disaster-resistant technologies, aimed at reducing the socio-economic effects of natural disasters.

It's relation to the study mainly highlights that the urgency of strengthening government subsidy system as part of a disaster response and recovery mechanism. It helps in identifying the gaps needed to be addressed by the said system.

2.3.9 Impact of Subsidies on Market Competition in the Philippine Agriculture and Manufacturing Sectors

The study examined how government-provided subsidies shape competition, efficiency and sustainability within the country's critical industries. It is indicated that in the finding, subsidies usually provide an immediate relief to the producers by lowering production costs, as well as stabilizing supply and enhancing the market participation. Meanwhile, the research also highlights how subsidy mechanisms are poorly designed and can easily distort competition in the market by favoring the large-scale players causing the smallholders at a disadvantage resulting in an imbalance that can undermine the growth of subsidy programs provided by the government.

Additionally, the research shows that subsidies can enhance short-term



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

productivity, they can also lower the incentives in innovation and efficiency if not closely monitored on it. In the agricultural sector, many are over dependent over the subsidies provided to them, so at times these subsidies are abused due to inefficiency in allocating the resources to the actual intended recipient. The study greatly highlights that the need for an open and focused systems of subsidy so that not only are the farmers able to benefit from it, other industries can as well.

In relation to the study, it underlines the necessity of a farmer-oriented government subsidy scheme that not only responds to the farmer's immediate concerns but to prevent market distortions as well. And with the use of digital platforms, advancement in transparency is established. This also makes the distribution of subsidies fair to the farmers, empowering the smallholders farmers instead of having the large market players hog it all.

2.3.10 Impact Assessment of the Agricultural Production Support Services of the Department of Agriculture on the Income of Poor Farmers/Fisherfolk: Review of the Evidence

The study Impact Assessment of the Agricultural Production Support Services of the Department of Agriculture on the Income of Poor Farmers/Fisherfolk: Review of the Evidence examined the effectiveness support programs that are led by the DA or Department of Agriculture in ending income inequality and enhancing the livelihoods of poor agricultural producers. The findings shown that although production support services like input provision, farm mechanization, and extension programs have greatly contributed to the increase of yield and reduce of cost in the production, the impact on the farmer's and fisherfolks income remain uneven or unequal. This is because it mostly due to the structural challenges like unstable access to the markets, limited infrastructures and financial literacy among the farmers and fisherfolk.

In addition, the study highlights that the production support of governments tends to favor the farmers and fisherfolk who are already organized in cooperatives or officially registered, and leaves behind those who work in relatively distant or informal areas. So it occurs that limited outreach of services creates gaps in inclusion and does



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

not fully respond to the poverty in the rural areas. Furthermore, support services at times affected by delayed in fund disbursement, fragmented implementation, and inadequate monitoring and evaluation systems, which reduce the longer-term impact on enhancing the incomes of the farmers and fisherfolks.

In relation to the study, the observation greatly strengthens the case for a customer-oriented subsidy system that provides for equitable access to all agricultural stakeholders. By combining online platforms for efficient beneficiary distribution, open subsidy tracking, and real-time monitoring, the system developed can correct inefficiencies of those conventional support programs.

2.4 Review of Related Local System

2.4.1 DA Harnesses Digital Platform to Connect to Its Stakeholders through FARM App

The Department of Agriculture introduced the Farmers and Fisherfolk Access to Resources for More Productivity or FARM application under its drive to digitalize farm services and enhance its link with stakeholders. The app is a centralized system where the farmer and fisherfolk can register, access government programs, and be given information about financial support, production support, and market linkages. The project captures the DA's understanding of the significance of digital platforms in enhancing the provision of agricultural services and ensuring government programs directly reach beneficiaries.

Based on the article, The FARM app provides real-time access to information and services, enabling farmers to lower the hurdles usually created by processes that are administrative. By its design, the farmers are able to easily submit their requests for aid, check the status of the requests, and get updates on their mobiles. Nevertheless, issues like digital literacy, inconsistent internet coverage in rural settings, and a requirement for greater tailoring of the program at the local level were identified as such limitations on full use of the system. These issues point to the need for developing digital platforms



ST. ANTHONY'S COLLEGE
INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

that are inclusive and flexible to different needs of farming communities.

Its relevance in the study relates to how the FARM app is an example of how digital platforms can revolutionize the dynamic between the government agencies and farmers. Its emphasis on accessibility, transparency, and ease of communication aligns with the vision of a customer-centric subsidy system. Through absorbing the FARM app's advantages and overcoming its weaknesses, the system presented here can complement government support distribution further in terms of inclusivity, effective service delivery, and improved trust between the beneficiaries and the government.

2.4.2 Development of Employee Attendance and Management System Using Quick Response (QR) Code in Sorsogon State University, Castilla Campus, Philippines

The research Development of Employee Attendance and Management System Using Quick Response (QR) Code in Sorsogon State University, Castilla Campus, Philippines investigated the application of QR technology in simplifying employee attendance monitoring and management. The system has remedied the inefficiencies of the traditional manual log-in methods that were usually prone to human error, delays, and even fraudulent time recording. Through the automation process with QR code scanning, the system guaranteed accuracy, it also lessened administrative burden, and offered a real-time monitoring of employee attendance.

Additionally, the researchers stated that the digitalized attendance systems has increased their organizational efficiency and transparency. Because systems based on QR codes not only increase accountability but also enable a centralized data storage of employee records, rendering access to data and reports quicker and even more trustworthy. It pointed out how the implementation of these digital tools increases good decision-making and allocation of resource in the institutions, as well as fostering a culture of punctuality and professionalism among the workers.

In relation to the study, since the system would utilize the QR-code tracking system, it becomes an essential counterpart in making sure that farmers received their



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San Jose, Antique

aids without issues as well as ensuring that records are well kept and organized.

2.4.3 Evaluation of the Registry System for Basic Sectors in Agriculture

The evaluation of The Registry System for Basic Sectors in Agriculture (RSBSA), focused on assessing the effectiveness of the national registry and managing the farmers, fisherfolk and other agricultural sector stakeholders profiles. The system, RSBSA was envisioned to be the core database of the government that would be used as the basis in identifying the beneficiaries of programs including said subsidies, insurance, and financial support. The findings from the assessment pointed to enhanced coverage and targeting of beneficiaries but it also still has its challenges in which in the terms of data entries accuracy, updation of farmer record and the verification of land ownership and farming details as well.

It emphasized how its effectiveness of the RSBSA depended on the coordination of the aforementioned agencies and the application of efficient digital system tools to address the issues of duplication, exclusion and fake claims. It especially emphasized the necessity of ongoing validation on the level of the local government units so that only the qualified and eligible farmers are included in the subsidy programs of the government. In addition, the assessment also suggested incorporating technological advances like biometrics, mobile apps, and geotagging to improve the certainty and accessibility of the registry.

In relation to the study, the RSBSA is the database to be used for the subsidy system, with having been registered to the RSBSA, and as long as they qualified for the specific subsidy programs based on the guideline provided by the government as well. It ensures that transparency and accountability is maintained in the system. It also ensures how the system only allows farmers that are registered under the RSBSA making the security stronger than it is.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

2.4.4 Development of Agriculture Office Farmers' Record Management System for the Municipality of Mangaldan

The study on the Development of Agriculture Office Farmers' Record Management System for the Municipality of Mangaldan focused in addressing the inefficiencies of the traditional way of record keeping in the local agriculture office. Records of the farmers were kept through paper-based systems, in which this type of systems are prone to errors, damages, duplications, and loss. It introduced a system that especially aimed in streamlining the registration process, monitoring and updating of farmer profiles as well in order to enhance service delivery and to further improve the government support programs.

Findings of the study indicated that the system successfully minimized delays in accessing and updating farmer data, enhanced the data precision, and created a more organized repository for the records. To also add, it facilitated the agriculture office to produce reports at a much more faster pace, which aided in the decision-making and allocation of their resources. The use of the system also improved the transparency in service delivery and minimized the possibility of missing out on qualified farmer beneficiaries because of incomplete or outdated records.

In relation to the study, this type of system shows how tracking systems and record keeping systems address inefficiencies in keeping track of the information provided. Incorporating such digital record management solutions into broader platforms like subsidy distribution and crop insurance registration guarantees that aid is distributed fairly.

2.4.5 GoFarmers: A Mobile and Web Application for Post-disaster Agricultural Rehabilitation Process of Crops in San Miguel, Bulacan

The study proposed the design and development of a web and mobile application to help farmers and agricultural stakeholders cope with the post-disaster rehabilitation of crops. Agricultural production is severely impacted by typhoons and floods, and recovery from such is mostly hindered by the lag in reporting damage and accessing support



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

services. GoFarmers met the challenges by establishing a digital platform through which farmers could report damages in crops, monitor rehabilitation activities, and access assistance from local government units (LGUs) and concerned agencies on a timely basis.

Results showed that the platform facilitated easier communication between farmers and agricultural offices, enabling a quicker validation of damage reports and more effective mobilization of resources. The app also had data centralization, which enabled tracking of rehabilitation programs and offered LGUs real-time, accurate information for their decision-making. GoFarmers helped lessen the delay between the occurrence of disasters and the release of relief aid, thus enhancing farmers' disaster resilience.

In relation to this study, GoFarmers emphasized the use of digital tools or technologies in creating a responsive and farmer-oriented systems. Through the inclusion of web and mobile applications in agricultural activities, there are improved transparency and effectiveness in the provision of government assistance.

2.4.6 Integration of Quick Response (QR) Code for Agricultural Product Tariff Collection and Virtual Payment Transactions

The study of the Integration of QR Code for Agricultural Product Tariff Collection and Virtual Payment Transactions explains how digital payment system can improve efficiency, transparency and convenience in the agricultural trade. The research identifies how QR codes can exchange manual or paperwork systems by allowing farmers and traders to pay and confirm tariffs online by merely scanning a code using their smartphones or mobile devices. This innovation not only reduces transaction time and human mistakes but also enhances the visibility and tracing of payments.

Additionally, the research highlights that not only did the QR codes significantly made payment process simpler, it also strengthened the accountability especially in financial matters by generating accurate records. It also enable stakeholders to track payments in a real time setup, essentially minimizing fraudulent practices and



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

improvement on the collection of revenue in the LGUs. It's integration of digital payments provided a more inclusive financial environment, making smallholder farmers and traders access to secure and traceable transactions.

In relation to the study, the integration of the QR code-based payment further solidifies just how efficient the use of QR COdes are. So by adopting digital tools in the subsidy distribution system it provides the transparency and accountability when these subsidies are provided similar to that of the tariff collection.

2.4.7 Development of an Automated Ticketing and Tracking System for the Monitoring of Surface Mine Hauling Operations

The research on the design of an automated ticketing and tracking system for hauling activities in surface mines aimed at enhancing monitoring efficiency, accuracy of data, and accountability in resource transport activity. The manual ticketing in mining activities is vulnerable to errors, lag time, and corruption, thus challenging the effective tracing of hauling activities. Through ticketing automation and the incorporation of tracking technologies, the system facilitated real-time monitoring of truck movement, load confirmation, and ticketing, thus minimizing discrepancies and guaranteeing the accuracy and reliability of operational information.

Findings indicated that the automated system expedited logistics through the availability of a centralized database that managers had access to in order to track hauling performance and correct anomalies. The combination of tracking devices and automated ticketing raised the transparency level in operations, reduced revenue losses, and improved compliance with regulatory demands. In addition, automation minimized the level of human intervention in monitoring, thereby not only enhancing efficiency but also minimizing the likelihood of manipulation and corruption of the hauling process.

In relation to the study, the automation of ticketing similar to providing QR codes for claiming of subsidies of the farmers and tracking of subsidy distribution creates an ease in record keeping.



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INFORMATION TECHNOLOGY DEPARTMENT
San Jose, Antique

2.4.8 Utilizing QR Codes for Smart and Low-cost Student Attendance Acquisition and Monitoring System in Eastern Visayas State University, Philippines

The research that was done at Eastern Visayas State University examining the use of QR codes in creating a smart and affordable student attendance acquisition and monitoring system. The major objective was to get rid of the manual checking of attendance, which frequently utilized important class time and was prone to errors and fake logs. Through the creation and scanning of distinct QR codes, the system offered a quick, precise, and efficient way to validate student attendance, promoting transparency and efficiency in managing academic records.

The results showed that the QR code-based system greatly enhanced the speed and accuracy of attendance tracking against manual methods. The cost-effectiveness of QR code technology also made it an affordable option for budget-strapped schools, as it involved little investment in hardware and could be supported by already-owned devices like smartphones. Moreover, the system ensured accountability on the part of students and cut down on inconsistency in attendance records, which are essential in assessing academic performance and adherence to institutional guidelines.

In the context of this current study, this work illustrates how QR codes can be utilized to develop affordable, effective, and easy-to-use digital systems. Just as attendance tracking was enhanced through automated QR-based verification, agricultural subsidy disbursement and beneficiary registration can also be optimized using such technologies.

2.4.9 Development of Records Tracking Management System with QR Code

The study on the Development of a Records Tracking Management System with QR Code focused on addressing the inefficiencies in manual document tracking and management processes within the organizations. Like the usual paper based systems, they are bound to be misplaced, retrieving the records would also take a long time. There are also situations where monitoring documents by office can be a difficulty for



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San Jose, Antique

many. So by integrating a QR technology, it enable each document to be assigned a unique QR Code to be scanned and track the status, its location and handler in real time.

Results showed that the system improved organizational performance through the simplification of record management, minimizing errors, and guaranteeing accountability in handling documents. QR codes offered an efficient yet inexpensive method for traceability of records, without having to install costly hardware and intricate infrastructure. The system also facilitated transparency through digital recording of each transaction and movement, enabling administrators to effectively track processes and keep exact historical information.

In relation to the study, the QR Code as well as the tracking system, relates to how farmers use their QR code to be scanned by MAO's workers and then all data is submitted to the system.

2.4.10 AlertQC: A Web and Mobile Disaster Utility and Incident Report Management System for Quezon City Disaster Risk Reduction and Management Office

The AlertQC study developed a web and mobile Disaster utility and incident report management system for the Quezon City Disaster Risk Reduction and Management Office (DRRMO). The primary aim was to enhance disaster response through a centralized system where citizens can report incidents in real time, and the DRRMO can track, verify, and respond effectively to emergencies. The platform had features like real-time reporting, geotagging, and notification alerts which were meant to improve the communication process between the public and disaster management officials.

Outcomes showed that the system greatly enhanced emergency response operations efficiency by reducing reporting delays and enabling instant decision-making. Through its mobile platform, citizens were actively engaged in reporting disasters, while



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San Jose, Antique

its web dashboard enabled the authorities to rapidly evaluate, classify, and respond to emergencies. The presence of digital tools, specifically real-time monitoring and reporting capabilities, added transparency, accountability, and enhanced coordination between disparate response units.

In relation to the study, casualties in the agricultural sector are data that needed to be reported in limited time in order to provide relief as soon as possible based on the loss indicated on the request of the farmer and after verification of the field worker. So therefore, data available in the system and reports on the casualties that occur can be salvage in minimal time