

# Ethical Concerns on Digital Innovations of the Philippine Carabao Center in Region III: Basis for an Ethical and Inclusive Digital Governance Framework for Farmers' Cooperative and Association

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## ABSTRACT

This study investigated the ethical concerns on digital innovation of the Philippine Carabao Center and anchored on the Ethical Framework for Public Sector Innovation (OECD, 2019), it examined how technology-driven service delivery aligns with the ethical principles of fairness, accountability, and inclusivity. By using a descriptive quantitative research design, data were collected from 118 farmer-members representing five farmers' cooperatives and associations. Findings revealed that respondents perceived PCC's digital initiatives, particularly the iREB Dashboard as highly accessible, transparent, and accountable. Ethical considerations such as data privacy, digital equity, and informed consent were generally upheld, reflecting that PCC adheres to responsible data management and promotes inclusivity among its users. However, issues related to connectivity and varying digital literacy levels among marginalized groups remain barriers to full participation in digital governance. This study concludes that while digital transformation enhances efficiency and transparency in public administration, equitable access and ethical safeguards are vital to achieving sustainable and inclusive governance. Recommendations were proposed to strengthen ethical policies, expanding capacity-building programs, and digital literacy programs to bridge the remaining gaps in accessibility and participation among farmers' cooperatives and associations.

**Keywords:** accessibility, data privacy, digital innovation, ethical concerns, farmers' cooperatives and associations

## INTRODUCTION

How governments work and serve their people has dramatically changed since the rise of new digital technologies. To make the government of the Philippines more efficient, open, and effective in providing public services, they have implemented many digital tools and platforms, such as e-governance systems, biometric-based identification, artificial intelligence (AI), and blockchain-based transactions (Berenjestanaki et al., 2023). These technological advances have made it much easier for the government to do its job. There is now less paperwork, fewer chances for mistakes, and better service delivery. These new technologies, however, may raise significant ethical questions: accessibility, privacy, and justice (Dhirani et al., 2023).

New moral worries about digital surveillance, algorithmic biases, and data privacy exist. People worry about data security and possible abuse because government systems store much personal information (Atske & Atske, 2024). Due to algorithmic biases, some AI-powered decision-making technologies, like governments aid delivery systems, can worsen social problems. In public-private partnerships (PPPs), where government departments and private tech companies work together to make digital solutions, there are ethical questions about who is responsible and who owns the data. If private companies that watch over public records put money ahead of doing what's best for the public, it could raise questions about openness and ethics in data use.

The UN's 2030 Sustainable Development Goals (SDGs) must be met, especially Goal 10: Reduced Inequalities and Goal 16: Peace, Justice, and Strong Institutions. In this age of the Fourth Industrial Revolution, public services must become more digital in order to meet these goals. Even though digital governance is used by many, there is still a big digital gap. This is especially true for rural and marginalized communities, making it less likely

for them to have access to important government services (United Nations E-Government Survey, 2022). The UN Development Program (2022) stresses the need for fair and inclusive governance systems to make sure that digital technologies are used to empower people instead of excluding them.

The Philippine Development Plan (PDP) 2023–2028 sees digital change as a way to promote fairness in society and economic growth. This is because e-governance is now part of the country's development goals. But, as of the National Economic and Development Authority's most recent Voluntary National Review on SDG implementation (2022), only 32% of rural families can connect to the internet regularly, even though this is a national priority. This inequality is made worse by people not knowing how to use technology and not having the right infrastructure, especially in poor and rural places. Because of this, it is still very hard to provide digital public services in a fair way.

The Commission on Higher Education's National Higher Education Research Agenda (NHERA) 2022–2028 is mostly about the major issues brought up by the difference between better technology and fair access to services. The agenda's study requests are mostly about ethical leadership, new ideas in the public sector, and development that benefits everyone. A similar goal for institutional study at the Polytechnic University of the Philippines (2021) is to find out how science and technology can be used to better govern rural development in a way that is fair and includes everyone. These worries make it very important to find out if digital innovations in the public sector are reaching and helping underserved groups.

This research aligns closely with the PUP (Polytechnic University of the Philippines) research agenda that focuses on the Social, Political, and Cultural Dimensions, particularly concerning on the three subthemes of the agenda. First, Good Governance, as it addresses key principles such as transparency, accountability, and fairness and how PCC integrate these digital tools. It also investigates the influence of digital innovation on the quality of governance, inclusivity, and responsiveness toward marginalized communities, stating whether it undermines ethical standards in public service delivery.

This is what the Philippine Carabao Center, an organization that works with the Department of Agriculture has been doing with digital innovations: the iREB (Intensified research-based enterprise build-up) dashboard.

A database digitalized extension services and tools for measuring productivity and profitability of the carabao-based enterprises. The system is about the information generation on creating important business decisions and planning for the agency's targets.

Calendar Year (CY) 2017 marked the realization for the need to create a tool that will provide ease and readily available business analysis amongst carapreneurs. It was inspired by the business portfolio research a year before that aimed to empirically capture the viability and investment potential of existing business modalities in Nueva Ecija and nearby provinces. This business performance was called the iREB Client Dashboard.

Given these concerns, it is necessary to study the ethical implications of the iREB dashboard to ensure that the Philippine Carabao Center's digital innovations are not only efficient but also ethical, inclusive, and responsive to the needs of farmers' cooperatives and associations.

Despite the advantages of the iREB dashboard in improving efficiency and decision-making, its use also raises important ethical concerns that require careful examination. The iREB system contains sensitive and confidential data related to farmers' farm operations, including milk production, expenses, income, and enterprise performance. These data can be access by the designated encoders, which highlights concerns related to data privacy, confidentiality, and accountability.

Moreover, differences in digital literacy and access to technology among farmers may affect their understanding and control over their own data. Some farmer-members rely on others for data encoding and system use, raising ethical concerns related to informed consent, fairness, and digital equity. These conditions emphasize the need to assess whether digital innovations such as the iREB dashboard protect farmers' rights while promoting inclusive and ethical digital governance.

Given these concerns, it is necessary to study the ethical implications of the iREB dashboard to ensure that the Philippine Carabao Center's digital innovations are not only efficient but also ethical, inclusive, and responsive to the needs of farmers' cooperatives and associations.

Even though these projects are in line with national innovation goals, there isn't enough empirical study that looks into the moral aspects of these technologies and how they affect disadvantaged groups like indigenous communities, landless rural workers, and smallholder farmers.

The objective of this study is to examine the impact of the Philippine Carabao Center's implementation of new digital technologies on the capacity of impoverished communities in selected city and municipalities of Region III to access government livestock services, along with the ethical dilemmas that arise from these technologies.

This study aims to examine how digital innovation has affected groups that aren't well-represented in the Philippines' public administration and to conclude about the moral problems that this trend brings up. This study aims to add to the current discussion about digital governance by bringing these moral problems and their real-world effects to light. Its main goal is to develop ways to ensure that digital government changes are fair, ethical, and open to everyone.

## **METHODOLOGY**

The main points of this descriptive quantitative research design study were ethical issues and how digital innovations affected the ability of underserved groups in the Philippines to use public services. Surveys with representatives were used as part of the project to look into the problems and ethical issues of going digital in public administration (Onwuegbuzie et al., 2009).

### **Population, Sample Size, and Sampling Technique**

The respondents of the study were members of farmers' cooperatives and associations located in selected cities and municipalities of Region III, specifically Balanga City in Bataan, the Municipality of Masinloc in Zambales, the Municipality of Castillejos in Zambales, the Municipality of Lubao in Pampanga, and the Municipality of San Miguel in Bulacan, who received support from the government.

Additionally, the study included 118 farmer-members of the cooperative and associations including all the members of each cooperative. These groups were selected to have a complementary perspective on the accessibility, ethical implications, and effectiveness of digital innovations in the service delivery in government. From the given respondents, the researcher had 118 respondents in total. A complete enumeration was used in this study also known as census sampling.

### **Research Instrument**

A structured survey questionnaire was used to collect data in the study to get information about the ethical issues of using new technology in public administration. The questionnaire included a cover letter to inform the respondents of what the study was all about and to give them a choice whether to participate or not.

### **Data-Gathering Procedure**

There were several steps in collecting data, such as getting ready and getting permission, and sending out surveys.

All the participants involved in the study were protected and cared for. Strict ethical guidelines were also followed to ensure the integrity process of the research study. As a descriptive quantitative study, the researcher looked into ethical considerations primarily on the aspects of informed participation, data confidentiality, and the responsible handling of numerical data. Before the start of the study, participants were subject to consent before participating in the study. Participants were provided with clear, written information about the purpose of the study. An informed consent form was indicated before answering this survey and they could back out anytime if they felt any harm or offensive acts at any part.

## Statistical Treatment of Data

A wide range of statistical methods were used in this study to look at large amounts of data about how underrepresented groups use digital government services. Descriptive statistics was the main type of statistics that was used.

Descriptive statistics summarized the answers people gave, general trends, patterns, and key tendencies in the data (Hayes, 2024). The use of this method was to organize and describe datasets in a clear and understandable way. Some examples were finding the frequency, percentage, and weighted mean to gather the dataset average of scores, figuring out rates and percentages.

## RESULTS

This chapter presents, analyzes, and interprets the data gathered for the study. The analysis is structured to address the study's main problem, which is to determine how ethical concerns in digital innovations particularly those implemented by the Philippine Carabao Center (PCC) affect Farmers' Cooperatives and Associations (FCAs) with government services. The results are organized based on the major variables of the study, including system bias, trust in digital platforms, responsible data management, and the respondents' suggested measures for improving digital inclusivity. Each table is accompanied by its corresponding narrative interpretation to provide a comprehensive understanding of the trends, patterns, and implications emerging from the data.

Table 1 Mean Score on Accessibility in Digital Innovation

| Indicators   | Weighted Mean | Verbal Interpretation                   |
|--|---------------|---|
| 1. Mas madaling ma-access ng mga FCAs ang mga digital platform. (The digital platforms are easy to access by the FCAs)   | 3.59          | Lubos na Sumasang-ayon (Strongly Agree) |
| 2. Madaling makuha ang mga impormasyon at serbisyo online. (The services and information are available online without difficulty)  | 3.58          | Lubos na Sumasang-ayon (Strongly Agree) |
| 3. Sapat ang impormasyon na ibinibigay ng PCC tungkol sa paggamit ng digital innovations. (PCC provides enough information regarding the digital innovations)                              | 3.64          | Lubos na Sumasang-ayon (Strongly Agree) |
| 4. Naisasaalang-alang ng PCC ang mga mahihinang sektor o may limitadong kakayahan sa paggamit ng digital services. (PCC considers persons with disabilities in accessing digital services) | 3.65          | Lubos na Sumasang-ayon (Strongly Agree) |
| OVERALL WEIGHTED MEAN  | 3.62          | Lubos na Sumasang-ayon (Strongly Agree) |

Table 1 presents the respondents' perception of digital innovation in terms of accessibility. The weighted mean scores of all four indicators fall within the range interpreted as "Lubos na Sumasang-ayon (Strongly Agree)", indicating a highly positive assessment of the accessibility of PCC's digital services. The first two indicators, regarding the ease of accessing digital platforms and obtaining online services, obtained weighted means of 3.59 and 3.58, respectively. Furthermore, the adequacy of information provided by the Philippine Carabao Center through its digital innovations also received a strong level of agreement, reflected by a weighted mean of 3.64. This implies that respondents perceive the information disseminated through digital platforms as sufficient and useful for their needs. In addition, the indicator focusing on the inclusivity of digital services particularly for sectors with limited digital capacity recorded the highest weighted mean at 3.65, also verbally interpreted as "Lubos na Sumasang-ayon (Strongly Agree)." This demonstrates that respondents believe PCC considers vulnerable or digitally disadvantaged groups in the development and implementation of its digital services.

**Table 2 Mean Score on Transparency in Digital Innovation**

| Indicators  | Weighted Mean | Verbal Interpretation                   |
|---|---------------|---|
| 1. Kumpleto ang mga impormasyon ng mga digital system at nagbibigay ng malinaw na detalye sa mga gumagamit. (The digital system is clear and gives complete information to the users)             | 3.60          | Lubos na Sumasang-ayon (Strongly Agree) |
| 2. Ang mga nagiging pagbabago sa system ay naipapaalam sa mga gumagamit. (The changes and updates in the system are being conveyed to the users)  | 3.57          | Lubos na Sumasang-ayon (Strongly Agree) |
| 3. Malinaw na nilalahad ng PCC ang layunin at resulta ng digital innovations. (PCC clearly communicates the goals and results of digital innovations)   | 3.62          | Lubos na Sumasang-ayon (Strongly Agree) |
| 4. Nagpapakita ng malinaw na impormasyon ang digital platforms ng PCC ukol sa kanilang serbisyo. (PCC clearly communicates the goals and results of digital innovations)                          | 3.54          | Lubos na Sumasang-ayon (Strongly Agree) |
| 5. May tiwala ako na ang PCC ay walang tinatago sa paggamit ng digital technology para sa mga gumagamit nito. (I trust that PCC do not hide anything regarding its use of the digital technology) | 3.53          | Lubos na Sumasang-ayon (Strongly Agree) |
| 6. Malinaw na ipinapaliwanag ng PCC ang layunin nila sa pangangalap ng datos. (The PCC is clear on informing the users behind the data they collect)  | 3.47          | Sumasang-ayon (Agree)                   |
| 7. Bukas ang PCC sa mga katanungan at puna tungkol sa digital innovations. (The PCC is open to questions and feedback regarding its digital innovations.)   | 3.48          | Sumasang-ayon (Agree)                   |
| 8. Isinusulong ng PCC ang bukas at tapat na komunikasyon sa paggamit ng digital innovations. (PCCs digital services promotes open and honest communication with the users)                        | 3.53          | Lubos na Sumasang-ayon (Strongly Agree) |
| 9. Walang nakatagong kondisyon o malabong termino sa paggamit ng digital services. (There are no hidden conditions and unclear statements in navigating the digital platform of the PCC)          | 3.54          | Lubos na Sumasang-ayon (Strongly Agree) |
| 10. Malinaw na ipinapaliwanag ng PCC kung paano ginagamit ang digital tools sa paggawa ng desisyon. (The PCC is clear on how digital tools are used in decision-making)                           | 3.59          | Lubos na Sumasang-ayon (Strongly Agree) |
| 11. Alam ko kung sino ang responsable sa pamamahala ng digital system ng PCC. (I know who is responsible for managing the digital system of the PCC)  | 3.56          | Lubos na Sumasang-ayon (Strongly Agree) |
| 12. Ang mga nagiging pagbabago sa system ay naipapaalam sa mga gumagamit. (The changes and updates in the system are being conveyed to the users)   | 3.61          | Lubos na Sumasang-ayon (Strongly Agree) |
| 13. Nauunawaan ko kung paano ginagamit ang aking impormasyon sa digital system ng PCC. (I understand how my information is  | 3.63          | Lubos na Sumasang-ayon (Strongly Agree) |



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| being used in PCC's digital system).   |      |   |
| 14. Ipinapaalam ng PCC ang mga pagbabago at updates sa mga gumagamit sa kanilang digital platforms. (PCC regularly informs users about updates or changes in the digital platforms). | 3.58 | Lubos na Sumasang-ayon (Strongly Agree) |
| <b>OVERALL WEIGHTED MEAN</b>   | 3.56 | Lubos na Sumasang-ayon (Strongly Agree) |

Table 2 presents the respondents' perception of digital innovation in terms of transparency at the Philippine Carabao Center. The results demonstrate that respondents hold a highly positive perception of PCC's transparency, as reflected by the consistently high weighted mean values across all indicators. Most indicators fall under the verbal interpretation "Lubos na Sumasang-ayon (Strongly Agree)", indicating strong confidence in the PCC's communication practices, clarity of information, and openness in its digital operations.

The first indicator, with a weighted mean of 3.60, shows that respondents strongly agree that the digital system provides complete and clear information to its users. For the second indicator, the weighted mean of 3.57 reflects strong agreement that system changes and updates are properly communicated to users. This indicates that PCC maintains consistent transparency in informing stakeholders about any revisions made within the system.

The third indicator received a weighted mean of 3.62, showing a very strong agreement that PCC clearly communicates the goals and results of its digital innovations. This further supports the perception that PCC is open about the purpose and outcomes of its digital efforts.

Similarly, the fourth and fifth indicators, with weighted mean values of 3.54 and 3.53, respectively, reinforce the belief that PCC maintains clear, transparent, and honest information across its digital platforms. These results show that the users trust the integrity of PCC's digital communication.

The sixth and seventh indicators, with weighted mean values of 3.47 and 3.48, fall under the verbal interpretation "Sumasang-ayon (Agree)". Although slightly lower than the others, these still indicate that respondents generally perceive PCC as transparent in explaining data collection practices and receptive to feedback from users. The results suggest room for improvement but still confirm overall agreement.

The following indicators including indicators eight through fourteen also fall under "Lubos na Sumasang-ayon (Strongly Agree)", with weighted mean values ranging from 3.53 to 3.63. This consistently high level of agreement demonstrates that respondents find PCC's communication honest, accessible, and reliable. In particular, the highest weighted mean, 3.63, reflects that users understand how their information is being used within the digital system.

Table 3 Mean Score on Accountability in Digital Innovation

| Indicators  | Weighted Mean | Verbal Interpretation                   |
|---|---------------|---|
| 1. Tumutugon at kinikilala ng mga implementers ang mga isyu at reklamo. (Complaints and concerns raised are acknowledged by the implementers).  | 3.73          | Lubos na Sumasang-ayon (Strongly Agree) |
| 2. Tinitiyak ng mga implementers na ang digital innovations ay nakapaghahatid ng tamang serbisyo. (The digital innovations ensure that services are delivered and monitored properly) | 3.70          | Lubos na Sumasang-ayon (Strongly Agree) |
| 3. May pananagutan ang mga empleyado ng PCC sa kanilang mga gawain patungkol sa digital innovations. PCC employees held   | 3.64          | Lubos na Sumasang-ayon (Strongly Agree) |

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| accountable about their actions regarding digital innovations)  |      |   |
| 4. Ang digital system ng PCC ay naghihikayat ng accountability sa loob ng organisasyon (PCC's digital systems strengthen accountability inside the organization). | 3.63 | Lubos na Sumasang-ayon (Strongly Agree) |
| <b>OVERALL WEIGHTED MEAN</b>  | 3.68 | Lubos na Sumasang-ayon (Strongly Agree) |

Table 3 presents the respondents' perception of digital innovations in terms of accountability at the Philippine Carabao Center (PCC). The results, based on the weighted mean of each indicator, show that respondents hold a highly positive view of PCC's accountability practices in implementing digital systems.

The first indicator obtained a weighted mean of 3.73, interpreted as Lubos na Sumasang-ayon (Strongly Agree), which reflects that respondents perceive implementers as responsive and acknowledging user concerns effectively.

The second indicator recorded a weighted mean of 3.70, also interpreted as Lubos na Sumasang-ayon (Strongly Agree). For the third indicator, the weighted mean of 3.64 indicates Lubos na Sumasang-ayon (Strongly Agree). Lastly, the fourth indicator yielded a weighted mean of 3.63, interpreted as Lubos na Sumasang-ayon (Strongly Agree). This result reflects that PCC's digital systems foster accountability within the organization by promoting ethical conduct, proper documentation, and responsible service delivery.

Table 4 Mean Score on Data Privacy in Digital Innovation

| Indicators  | Weighted Mean | Verbal Interpretation                   |
|---|---------------|---|
| 1. Ang digital system ng PCC ay nangongolekta lamang ng mga kinakailangang personal na impormasyon. (The PCCs digital system only collects needed personal information)                                   | 3.68          | Lubos na Sumasang-ayon (Strongly Agree) |
| 2. May tiwala ako na ang aking personal na impormasyon ay protektado kapag ginagamit ko ang digital service ng PCC. (I am confident that my personal data is protected when using PCCs digital services)  | 3.61          | Lubos na Sumasang-ayon (Strongly Agree) |
| 3. Malinaw ang polisiya ng PCC ukol sa pagkuha at paggamit ng datos ng mga gumagamit nito. (PCC's policy is clear on how the data will be collected and use)  | 3.64          | Lubos na Sumasang-ayon (Strongly Agree) |
| 4. Responsable ang PCC sa paghawak ng aking digital records. (PCC is responsible in handling my digital records)  | 3.64          | Lubos na Sumasang-ayon (Strongly Agree) |
| 5. Nangongolekta lamang ang digital system ng PCC ng mga personal na impormasyong kailangan para sa dashboard. (The PCC only collects personal information that are necessary for the dashboard)          | 3.59          | Lubos na Sumasang-ayon (Strongly Agree) |
| 6. Sa paggamit ng digital services na ito, ipinagbibigay-alam muna sa akin ang paggamit ng aking datos. (I am informed about the use of my personal data before using any PCC's digital services)         | 3.61          | Lubos na Sumasang-ayon (Strongly Agree) |
| 7. Pinapayagan ng digital services ng PCC ang mga gumagamit na tumanggi sa pagbibigay ng datos nang hindi nawawala ang access sa serbisyo. (The digital services of PCC allow users to decline on sharing | 3.56          | Lubos na Sumasang-ayon (Strongly Agree) |

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| their data without losing their access to PCCs services.)  |      |   |
| 8. Naniniwala ako na hindi ginagamit ng PCC ang aking datos sa ibang layunin nang walang pahintulot. (I believe that PCC does not use my data for any purpose without my permission)   | 3.56 | Lubos na Sumasang-ayon (Strongly Agree) |
| 9. Bilang gumagamit ng digital services ng PCC, ramdam ko na ito ay alinsunod sa pamantayang etikal gaya ng pagiging patas. (As a user of the digital services, I feel that PCC uphold ethical standards such as data consent and fairness.) | 3.55 | Lubos na Sumasang-ayon (Strongly Agree) |
| 10. Panatag ako na hindi inaabuso ng digital systems ng PCC ang aking personal na datos. (I feel assured that PCCs digital systems do not misused my personal data).   | 3.57 | Lubos na Sumasang-ayon (Strongly Agree) |
| 11. Kampante ako na tanging awtorisadong tao lamang ang may access sa aking personal na impormasyon. (I am confident that only authorized personnel can access my personal information)  | 3.60 | Lubos na Sumasang-ayon (Strongly Agree) |
| 12. Nirerespeto ng PCC ang aking karapatan sa data privacy at tinitiyak ang pagiging kumpidensyal ng aking datos. (PCC respect my right to confidentiality of my personal information)   | 3.58 | Lubos na Sumasang-ayon (Strongly Agree) |
| 13. Naipaliwanag sa akin kung ano ang maaaring gawin sakaling malantad o maabuso ang aking datos. (I am informed on what to do if my data is exposed or compromised.)  | 3.52 | Lubos na Sumasang-ayon (Strongly Agree) |
| <b>OVERALL WEIGHTED MEAN</b>   | 3.59 | Lubos na Sumasang-ayon (Strongly Agree) |

Table 4 presents the weighted mean and verbal interpretation of the respondents' perception of digital innovations in terms of data privacy. The results show a consistently very positive perception of the Philippine Carabao Center's (PCC) data privacy practices, as reflected by all indicators receiving weighted mean scores ranging from 3.52 to 3.68, all interpreted as "Lubos na Sumasang-ayon (Strongly Agree)."

For the first indicator, the weighted mean of 3.68, interpreted as Lubos na Sumasang-ayon (Strongly Agree), signifies that respondents believe that the PCC's digital system collects only necessary personal information. The second indicator obtained a weighted mean of 3.61, also interpreted as Lubos na Sumasang-ayon (Strongly Agree), showing that respondents trust PCC in protecting their personal data when accessing digital services.

The third indicator has a weighted mean of 3.64, interpreted as Lubos na Sumasang-ayon (Strongly Agree), suggesting that respondents perceive the PCC's policies on data collection and use as clear, transparent, and consistently applied.

Similarly, the fourth indicator, with a weighted mean of 3.64 and the same verbal interpretation, reflects that respondents view PCC as highly responsible in handling digital records and safeguarding user information.

For the fifth indicator, the weighted mean of 3.59, interpreted as Lubos na Sumasang-ayon (Strongly Agree), indicates that respondents recognize that PCC collects only relevant information needed specifically for its dashboard system.

Indicators six and eleven, both with weighted means of 3.61 and 3.60 respectively, interpreted as Lubos na Sumasang-ayon (Strongly Agree), show that respondents appreciate PCC's transparency in informing users about data usage and in ensuring that only authorized personnel access personal information.



The seventh and eighth indicators both received a weighted mean of 3.56, interpreted as Lubos na Sumasang-ayon (Strongly Agree). Respondents believe that users can decline to give data without losing access to essential services, and that PCC does not use personal data for unauthorized purposes.

The ninth indicator has a weighted mean of 3.55, also interpreted as Lubos na Sumasang-ayon (Strongly Agree), showing that users perceive PCC's digital services as fair, ethical, and aligned with data consent principles.

The tenth indicator received a weighted mean of 3.57, interpreted as Lubos na Sumasang-ayon (Strongly Agree), meaning respondents feel assured that PCC does not misuse their personal data.

For the twelfth indicator, the weighted mean of 3.58, also interpreted as Lubos na Sumasang-ayon (Strongly Agree), reflects respondents' trust that PCC respects privacy rights and maintains confidentiality.

Finally, the thirteenth indicator, with a weighted mean of 3.52, interpreted as Lubos na Sumasang-ayon (Strongly Agree), indicates that respondents feel adequately informed regarding procedures to follow if their data is exposed or compromised.

Table 5 Mean Score on Digital Equity in Digital Innovation

| Indicators  | Weighted Mean | Verbal Interpretation                   |
|---|---------------|---|
| 1. Lahat ng miyembro ay may pantay-pantay na access sa digital services ng PCC. (All members have equal access to the center's digital services)                            | 3.26          | Sumasang-ayon (Agree)                   |
| 2. May sapat na internet access ang mga miyembro anuman ang kanilang lokasyon at katayuan. (All members have internet connectivity regardless of their location and status) | 3.30          | Sumasang-ayon (Agree)                   |
| 3. Naaabot ng PCC ang mga komunidad na may liblib na lugar. (PCC can reach the areas in remote and rural areas)   | 3.49          | Sumasang-ayon (Agree)                   |
| 4. Hindi nagdudulot ng diskriminasyon ang digital systems ng PCC. (PCC's digital systems does not results in inequality)  | 3.52          | Lubos na Sumasang-ayon (Strongly Agree) |
| <b>OVERALL WEIGHTED MEAN</b>  | 3.39          | Sumasang-ayon (Agree)                   |

Table 5 presents the respondents' perception of ethical concerns in digital innovations in terms of digital equity at the Philippine Carabao Center. Based on the weighted mean values, the results show that respondents generally perceive PCC's digital services as inclusive and accessible, although some issues in connectivity remain. For the first indicator, which obtained a weighted mean of 3.26 with a verbal interpretation of "Sumasang-ayon (Agree)", the results indicate that respondents generally believe that all members have equal access to PCC's digital services. The second indicator recorded a weighted mean of 3.30, also interpreted as "Sumasang-ayon (Agree)".

This implies that respondents believe internet access is generally adequate for members to use PCC's digital services. However, the "Agree" rather than "Strongly Agree" rating reflects that some users particularly in remote areas may still experience unstable or limited connectivity.

For the third indicator, the weighted mean of 3.49 falls under "Sumasang-ayon (Agree)", indicating that respondents recognize PCC's efforts to reach remote communities through digital platforms. The fourth indicator shows the highest value, with a weighted mean of 3.52 interpreted as "Lubos na Sumasang-ayon (Strongly Agree)".

Table 6 Mean Score on Informed Consent in Digital Innovation

| Indicators  | Weighted Mean | Verbal Interpretation                   |
|---|---------------|---|
| 1. Ako ay hiningan muna ng pahintulot bago gamitin at kolektahin ang aking impormasyon. (I am asked permission before my personal data is collected and used).  | 3.63          | Lubos na Sumasang-ayon (Strongly Agree) |
| 2. Ako ay binigyan muna ng malinaw na paliwanag ukol sa digital innovation bago ibigay ang aking personal na impormasyon. (I receive clear explanations before providing my personal information digitally)                                 | 3.56          | Lubos na Sumasang-ayon (Strongly Agree) |
| 3. Malinaw ang proseso ng PCC sa paghingi ng pahintulot para sa digital na gawain. (The process of PCC in requesting consent are clear and concise)   | 3.58          | Lubos na Sumasang-ayon (Strongly Agree) |
| 4. May opsyon ang mga gumagamit ng digital services ng PCC na tanggiin ang paggamit ng kanilang datos na hindi nawawala ang kanilang access sa serbisyo. (Users of PCC's digital services can refuse without losing access to the services) | 3.53          | Lubos na Sumasang-ayon (Strongly Agree) |
| <b>OVERALL WEIGHTED MEAN</b>  | 3.58          | Lubos na Sumasang-ayon (Strongly Agree) |

Table 6 presents the respondents' perception of ethical concerns in digital innovations in terms of informed consent.

For the first indicator, which has a weighted mean of 3.63, the verbal interpretation is "Lubos na Sumasang-ayon (Strongly Agree)." This means that respondents strongly believe that PCC asks for user permission first before collecting or using personal information, reflecting ethical and responsible data practices.

The second indicator received a weighted mean of 3.56, interpreted as "Lubos na Sumasang-ayon (Strongly Agree)." This indicates that respondents feel they are provided with clear explanations regarding PCC's digital processes before they give their personal data.

For the third indicator, the weighted mean of 3.58 also corresponds to "Lubos na Sumasang-ayon (Strongly Agree)." This demonstrates that respondents perceive PCC's consent procedures as clear, systematic, and transparent, suggesting that guidelines for requesting permission are properly communicated.

The fourth indicator obtained a weighted mean of 3.53, likewise interpreted as "Lubos na Sumasang-ayon (Strongly Agree)."

Table 7 Mean Score on System Bias in Digital Innovation

| Indicators  | Weighted Mean | Verbal Interpretation                   |
|---|---------------|---|
| 1. Ang digital system ay patas sa lahat ng gumagamit. (The digital system is fair to all users)   | 3.30          | Sumasang-ayon (Agree)                   |
| 2. Ang digital system ay idinisenyo alinsunod sa mga pangangailangan ng mga vulnerable na grupo. (The system is designed to address the needs | 3.56          | Lubos na Sumasang-ayon (Strongly Agree) |

|  |      |   |
|--|------|---|
| of the marginalized communities)   |      |   |
| 3. Pantay ang serbisyo na binibigay ng PCC sa lahat ng gumagamit nito anuman ang kanilang katayuan. (PCC provides equal services to all users regardless of their social status)   | 3.47 | Sumasang-ayon (Agree)                   |
| 4. Isinasalang-alang ng PCC ang ibang pangangailangan ng iba't ibang sektor ng lipunan. (PCC's digital system considers the diverse needs of the different sectors of the society) | 3.52 | Lubos na Sumasang-ayon (Strongly Agree) |
| <b>OVEREALL WEIGHTED MEAN</b>  | 3.46 | Sumasang-ayon (Agree)                   |

Table 7 presents the weighted mean results on respondents' ethical concerns regarding digital innovations in terms of system bias at the Philippine Carabao Center (PCC). The findings indicate a generally positive perception of fairness, equality, and inclusivity in PCC's digital systems.

The first indicator obtained a weighted mean of 3.30, interpreted as Sumasang-ayon (Agree), suggesting that respondents perceive PCC's digital systems as generally fair to users.

The statement regarding the system's consideration of marginalized groups yielded a weighted mean of 3.56, interpreted as Lubos na Sumasang-ayon (Strongly Agree), indicating a strong belief that PCC's digital innovations integrate inclusivity in their design.

The indicator on equal provision of services regardless of user status garnered a weighted mean of 3.47, also interpreted as Sumasang-ayon (Agree). This implies that respondents view PCC's digital platforms as equitable in terms of service delivery. Lastly, the consideration of diverse societal needs obtained a weighted mean of 3.52, interpreted as Lubos na Sumasang-ayon (Strongly Agree), highlighting respondents' recognition of PCC's efforts to accommodate various sectors.

Table 8 Mean Score on Trust in Digital Innovation

| Indicators   | Weighted Mean | Verbal Interpretation                   |
|--|---------------|---|
| 1. May tiwala ako na maayos na pinangangasiwaan ng PCC ang aking impormasyon. (I trust that the PCC handle my information responsibly)   | 3.56          | Lubos na Sumasang-ayon (Strongly Agree) |
| 2. Ligas akong nakakagamit ng mga digital na plataporma ng PCC. (I feel secure when using the Center's digital platforms)  | 3.58          | Lubos na Sumasang-ayon (Strongly Agree) |
| 3. Nagbibigay ng sapat na impormasyon ang PCC ng kanilang digital na serbisyo upang mapagkatiwalaan ng mga mamamayan. (PCC's digital service provides information on netizens and users to gain their trust) | 3.51          | Lubos na Sumasang-ayon (Strongly Agree) |
| 4. Hindi nang-aabuso ang PCC sa pag-access ng impormasyon mula sa digital data ng mga gumagamit nito. (The PCC does not misuse its access to user's digital data)  | 3.49          | Lubos na Sumasang-ayon (Strongly Agree) |
| <b>OVERALL WEIGHTED MEAN</b>   | 3.54          | Lubos na Sumasang-ayon (Strongly Agree) |

Table 8 presents the weighted mean results describing the respondents' level of trust in the digital innovations of the Philippine Carabao Center (PCC). All four statements obtained weighted mean scores ranging from 3.49 to 3.58, which fall under Lubos na Sumasang-ayon (Strongly Agree).

The weighted mean of 3.56 indicates strong confidence that PCC responsibly manages the personal information of its users. Similarly, the highest weighted mean of 3.58 shows that respondents strongly agree that PCC's digital platforms are safe and secure, reflecting users' positive perception of the Center's cybersecurity and system reliability.

A weighted mean of 3.51 reveals that respondents strongly believe PCC provides clear and sufficient digital service information, which enhances the organization's transparency and public trust. Meanwhile, the weighted mean of 3.49, though slightly lower, still reflects strong agreement that PCC does not misuse or exploit user data. This indicates that users trust PCC to uphold ethical standards in digital data management.

Table 9 Mean Score of Proposed Ethical and Inclusive Digital Governance Framework

| Indicators   | Weighted Mean | Verbal Interpretation                   |
|--|---------------|---|
| 1. Naniniwala ako na dapat isama ang mga marginalized na komunidad sa paggawa ng desisyon para sa isang inklusibong digital na serbisyo. (I believe that marginalized communities should be involved in decision-making for an inclusive digital service).                       | 3.66          | Lubos na Sumasang-ayon (Strongly Agree) |
| 2. Naniniwala ako na ang mga marginalized na komunidad ay dapat bigyan ng prayoridad sa mga digital na serbisyo ng gobyerno. (I think marginalized communities should be given priority to digital government services).   | 3.69          | Lubos na Sumasang-ayon (Strongly Agree) |
| 3. Naniniwala ako na dapat kumonsulta ang mga ahensya ng gobyerno sa mga organisasyong sibil at mga lider ng komunidad tungkol sa mga digital na inobasyon. (I think the government agencies should consult with civil society and community leaders about digital innovations). | 3.63          | Lubos na Sumasang-ayon (Strongly Agree) |
| 4. Dapat palakasin ang proteksyon ng privacy ng datos para sa kaligtasan ng mga marginalized na komunidad. (Data privacy must be strengthened for the protection of the marginalized community).   | 3.65          | Lubos na Sumasang-ayon (Strongly Agree) |
| 5. Naniniwala ako na dapat mangalap ng mga feedback upang higit pang mapabuti ang mga digital na serbisyo. (I think feedback should be collected to further improved digital services).  | 3.65          | Lubos na Sumasang-ayon (Strongly Agree) |
| 6. Sapat na pagsasanay ang kailangan upang magkaroon ng digital literacy para sa mga gumagamit nito. (Proper training is necessary to ensure that users gain literacy on the proper use of the digital innovation).  | 3.66          | Lubos na Sumasang-ayon (Strongly Agree) |
| <b>OVERALL WEIGHTED MEAN</b>   | 3.66          | Lubos na Sumasang-ayon (Strongly Agree) |

Table 9 presents the weighted mean results on respondents' proposed framework for promoting inclusive digital innovations. All weighted means ranging from 3.63 to 3.69 are interpreted as Lubos na Sumasang-ayon (Strongly Agree), indicating very strong support for measures that enhance inclusion, equity, and community participation in digital governance.

The highest weighted mean of 3.69 reflects strong agreement that marginalized communities should be prioritized in digital government services. This suggests that respondents believe digital transformation should address existing inequalities by extending greater access and support to underserved populations. The weighted

means of 3.66 and 3.63 indicate similarly strong support for the involvement of marginalized groups in decision-making and for the consultation of civil society and community leaders.

Weighted means of 3.65 for both data privacy protection and feedback collection highlight respondents' strong advocacy for safeguarding user information and establishing mechanisms for continuous improvement. The emphasis on feedback reflects the belief that user-centered approaches strengthen transparency, accountability, and quality of digital services.

Additionally, the weighted mean of 3.66 shows strong agreement on the need for digital literacy training underscoring the importance of equipping citizens, especially from marginalized sectors, with the skills needed to use digital platforms effectively.

## DISCUSSIONS

Concerning the user's perception on PCC's digital innovation in terms of accessibility, transparency, and accountability, the study concludes that digital transformation has improved the efficiency and responsiveness of service delivery. It revealed that with the integration of the iREB Dashboard, it helps streamlined administrative processes, reduced workloads, and enhanced access to information.

With respect to the ethical concerns associated with PCC's digital systems, particularly on data privacy, digital equity, informed consent, system bias, and trust. The study concludes that the institution emphasizes strong ethical governance in its implementation of digital innovations.

In addressing the ethical concerns that emerged in the implementation of digital innovations, the study concludes that despite strong agreement across all indicators such as data privacy, digital equity, informed consent, system bias, and trust, several underlying challenges continue to constrain the effective use of PCC's digital systems

For the final objective of the study, which sought to propose a framework that ensures the ethical and inclusive implementation of digital innovations in government service delivery, the study concludes that the establishment of an Ethical and Inclusive Digital Governance Framework is essential to strengthen the access of farmers' cooperatives and associations to PCC digital services in Region III.

### Proposed Ethical and Inclusive Digital Governance Framework

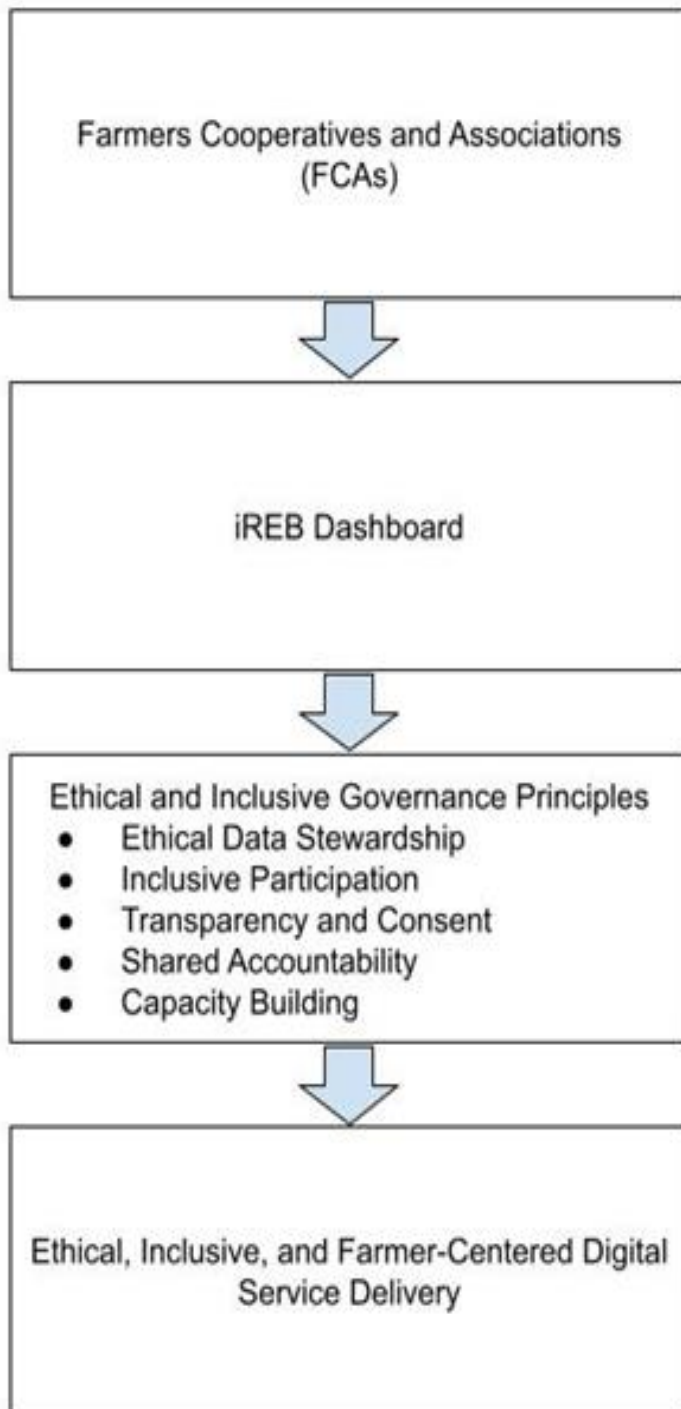
Based on the findings of the study and the actual experiences shared by Farmers' Cooperatives and Associations (FCAs), this research proposes an Ethical and Inclusive Digital Governance Framework to guide the implementation and use of the iREB dashboard of the Philippine Carabao Center (PCC). The framework is grounded on the ethical concerns encountered by FCAs in their interaction with the digital system and is intended to ensure that digital innovation supports FCAs without compromising their rights, data privacy, and transparency.

Because the iREB dashboard contains confidential and sensitive information, such as milk production records, income, expenses, and enterprise performance, this arrangement raises ethical concerns related to data privacy, informed consent, transparency, accountability, and inclusivity.

FCAs limited participation in the data process, coupled with their dependence on intermediaries, creates risks of misunderstanding, misrepresentation, and reduced control over their own information. These lived experiences underscore the need for a governance framework that ensures the iREB dashboard remains farmer-centered, ethically managed, and socially inclusive, rather than functioning solely as a technical monitoring tool.



## Proposed Ethical and Inclusive Digital Governance Framework



The proposed Ethical and Inclusive Digital Governance Framework presents a simplified structure for the ethical implementation of the iREB dashboard. The framework begins with the Farmers' Cooperatives and Associations (FCAs) as the primary data owners and beneficiaries of the system. Their data are processed through the iREB dashboard, which supports monitoring and decision-making.

The Ethical and Inclusive Digital Governance Framework is composed of five interrelated components, each directly responding to the ethical concerns identified from the experiences of FCAs using the iREB dashboard.

1. **Ethical Data Stewardship** - This component emphasizes the responsible handling and protection of farmers' data within the iREB system. Since encoders have access to confidential information related to production, income, and enterprise performance, ethical data stewardship ensures that data ownership remains with the farmers, system access is clearly defined and information is safeguarded against misuse, unauthorized access,

or unintended disclosure.

2. Inclusive System Participation - Recognizing that not all FCA members possess the same level of digital skills, this component promotes inclusivity by institutionalizing assisted system use. While encoders may continue to input data, farmers are encouraged to remain informed participants through simplified summaries, clear explanations of reports, and opportunities to review and validate encoded information.
3. Transparency and Informed Consent - This component ensure that farmers are adequately informed about what data are collected, who encodes them, how the data are used, and who has access to the information.
4. Accountability and Shared Responsibility - Digital governance involves multiple stakeholders, including farmers, FCA officers, encoders, and PCC personnel. This component establishes shared accountability, where encoders are responsible for accurate, ethical, and honest data entry, while the agency ensures oversight, system monitoring, and compliance with data privacy standards.
5. Capacity Building and Digital Empowerment - To address long-term digital inequality, this component focuses on continuous training and digital literacy development for FCA members.

## RECOMMENDATIONS

The findings and conclusions of this study yield the subsequent recommendations for more research on digital governance, inclusivity, and the ethical dimensions of public sector innovations:

1. It is recommended that the PCC Executive Management, led by the Center Directors, in coordination with the Information and Communication Technologies Section (ICTS) and the Administrative Division, develop a localized administrative reform plan to streamline frontline services through the sustained integration of digital innovations.
2. It is recommended that the PCC Human Resource Division and the Ethics Committee reinforce the organization's ethical digital governance framework by updating data privacy policies and conducting regular compliance audits in accordance with the Data Privacy Act of 2012 and other public sector ethics codes.
3. It is recommended that the Philippine Carabao Center (PCC), in collaboration with local government units (LGUs) and partner cooperatives, implement coordinated strategies to address the ethical concerns identified in the study in a specific and actionable manner.
4. It is recommended that the Planning and Information Management Division (PIMD), in coordination with the Information and Communications Technology Section (ICTS), should enhance data privacy measures by implementing robust encryption protocols, updating privacy policies, and conducting annual audits to ensure that user data is fully protected by the end of 2025.

## Ethical Approval

This study received ethical clearance from the Polytechnic University of the Philippines Open University System (PUP OUS) Ethics Review Committee prior to the conduct of data collection. All ethical standards governing research involving human participants were strictly observed. Participation was voluntary, informed consent was obtained from all respondents, and confidentiality and anonymity were ensured. All data were handled in accordance with institutional ethical guidelines and the Data Privacy Act of 2012 (Republic Act No. 10173).

## REFERENCES

1. Atske, S., & Atske, S. (2024b, August 6). *Experts say the 'New normal' in 2025 will be far more Tech-Driven, presenting more big challenges*. Pew Research Center. <https://www.pewresearch.org/internet/2021/02/18/experts-say-the-new-normal-in-2025-will-be-far-more-tech-driven-presenting-more-big-challenges/>
2. Berenjestanaki, M. H., Barzegar, H. R., Ioini, N. E., & Pahl, C. (2023). Blockchain-Based E-Voting

- Systems: A Technology review. *Electronics*, 13(1), 17. <https://doi.org/10.3390/electronics13010017>
3. CHED. (2022). *National Higher Education Research Agenda (NHERA) 2022–2028*. Commission on Higher Education. <https://ched.gov.ph>
4. Criado, J. I., Sandoval-Almazán, R., & Gil-Garcia, J. R. (2024). Artificial intelligence and public administration: Understanding actors, governance, and policy from micro, meso, and macro perspectives. *Public Policy and Administration*, 40(2), 173–184. <https://doi.org/10.1177/09520767241272921>
5. Dhirani, L. L., Mukhtiar, N., Chowdhry, B. S., & Newe, T. (2023a). Ethical Dilemmas and Privacy Issues in Emerging Technologies: A review. *Sensors*, 23(3), 1151. <https://doi.org/10.3390/s23031151>
6. Hayes, A. (2024, June 27). *Descriptive Statistics: definition, overview, types, and examples*. Investopedia. [https://www.investopedia.com/terms/d/descriptive\\_statistics.asp](https://www.investopedia.com/terms/d/descriptive_statistics.asp)
7. National Economic and Development Authority. (2022). *Philippines Voluntary National Review on the Sustainable Development Goals*. NEDA. <https://www.neda.gov.ph>
8. Organisation for Economic Co-operation and Development. (2019, May 22). *Declaration on Public Sector Innovation* (OECD Legal Instruments, No. OECD/LEGAL/0450). OECD. Retrieved from <https://oecd-opsi.org/wp-content/uploads/2018/11/OECD-Declaration-on-Public-Sector-Innovation-English.pdf> *Observe*
9. Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A. G. (2009). A qualitative framework for collecting and analyzing data in focus group research. *International Journal of Qualitative Methods*, 8(3), 1–21. <https://doi.org/10.1177/160940690900800301>
10. Philippine Carabao Center. (2023). *Annual Report 2023*. Department of Agriculture–Philippine Carabao Center. <https://www.pcc.gov.ph>
11. Rawls, John, 1971, *A Theory of Justice*, Harvard, MA: Harvard University Press.
12. United Nations Development Programme. (2022). *Digital strategy 2022–2025*. UNDP. <https://www.undp.org/digital/Digital-Strategy>