# A Digital Platform Model for an Innovative Marketplace from Adoption to Commercialization - A Case Study on MSMEs

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*Abstract* — Micro, Small, and Medium Enterprises (MSMEs) remain a critical driver of the Philippine economy, yet many face barriers to technology adoption due to limited access to innovation information, weak digital capability, and insufficient linkages with technology providers. This study developed a digital platform model to support innovation adoption and commercialization among food manufacturing MSMEs in Misamis Oriental, Northern Mindanao. Anchored on AmBisyon Natin 2040, the Sustainable Development Goals, and e-governance principles, the study aligns with the MPSI agenda on public sector innovation. A design-and-development approach was used to produce a minimum viable product (MVP) with core features including a technology marketplace, onboarding workflows, and analytics. Fifteen (15) TNA records were analyzed. Results showed that 100% of MSMEs relied on traditional methods, 93% experienced information asymmetry, and 73% exhibited technical skill gaps, limiting productivity and innovation adoption. The proposed platform addresses these barriers through an integrated digital environment linking MSMEs, innovators, and government support. Unlike global platforms, it emphasizes localized innovation support, early-stage capacity building, and public sector integration, contributing to inclusive regional innovation and MSME competitiveness.

***Keywords — MSMEs, Digital Platform, Technology Adoption, TNA***

## I. Introduction

Despite a growing economy and a skilled workforce, the Philippines continues to face persistent challenges in technological readiness and innovation capacity, limiting its global competitiveness (Dongzal & Espinosa, 2022; Rabino, 2020). These gaps are particularly evident among food manufacturing MSMEs in Misamis Oriental, Northern Mindanao, where limited access to technology, weak digital capability, and insufficient linkages with innovation providers constrain productivity and competitiveness. While global innovation ecosystems emphasize digital platforms, knowledge exchange, and technology commercialization, many local MSMEs remain

reliant on traditional production methods and lack access to timely information and technical support.

The MSME sector, comprising 99% of registered enterprises and employing approximately 60% of the workforce, plays a vital role in economic growth, job creation, and poverty reduction (Khatibi, 2021). However, technological adoption remains uneven. While some firms invest in modern equipment and processes, many continue to operate without integrating science and technology, resulting in inefficiencies and limited compliance with regulatory and quality standards (Barroga et al., 2019; Parrilli & Elola, 2012). These constraints are often driven by information asymmetry, low technical capacity, and weak innovation support systems.

Anchored on AmBisyon Natin 2040 and the Sustainable Development Goals, this study proposes a digital platform to support innovation adoption and commercialization among food manufacturing MSMEs. Specifically, it tests the hypotheses that: (H1) MSMEs exhibit significant technological deficiencies—particularly in reliance on traditional methods, information asymmetry, and technical skill gaps; (H2) the proposed platform will demonstrate acceptable usability and functionality; and (H3) its development and implementation process will be feasible. By bridging global innovation models with localized MSME needs, the study contributes a scalable, government-enabled approach to inclusive regional development.

**Background and Rationale**

Numerous technological initiatives targeting MSMEs and emerging enterprises have been introduced in recent years (PricewaterhouseCoopers, 2020). However, global indicators suggest that adoption remains limited. A World Bank report (2021) notes that emerging economies in East Asia, including the Philippines, continue to lag in technology adoption and innovation capacity. This is reflected in the country's ranking of 50th out of 139 economies in the 2025 Global Innovation Index (WIPO, 2025), indicating persistent gaps in innovation performance.

At the national level, data from the Philippine Statistics Authority (PSA) show that MSMEs account for 99.5–99.6% of all business establishments and generate approximately 62–65% of total employment, yet contribute only around 25% of export revenues, indicating relatively low productivity and limited participation in higher-value markets. Manufacturing, including food processing, is among the key MSME sectors but continues to face constraints in upgrading production systems and meeting quality standards. At the regional level, development reports for Northern Mindanao highlight the need for MSMEs to improve technology upgrading, product development, and competitiveness to enhance productivity and market performance. These conditions are evident among food manufacturing MSMEs in Misamis Oriental, where many enterprises remain dependent on manual or semi-mechanized processes and exhibit low levels of digital adoption.

These trends align with the World Bank's (2021) identified barriers, including weak firm-level capabilities, limited access to information, and low workforce skills, resulting in weak

linkages between MSMEs, technology providers, and support institutions. The focus on food manufacturing MSMEs is particularly relevant due to their role in agro-industrial development and food security, yet their relatively low level of technological adoption makes them a critical sector for targeted innovation interventions.

**Statement of the Problem**

This capstone presents a technological innovation targeting multiple sectors of the Philippine economy, with a primary focus on MSMEs in the food manufacturing sector in Misamis Oriental, Northern Mindanao. Despite their small scale, MSMEs collectively have a substantial economic impact. According to the 2022 data from the Philippine Statistics Authority (PSA), MSMEs comprised 99.59% of all business establishments, totaling over 1.1 million enterprises nationwide.

However, technological adoption remains limited. A report by Bain & Company (2018) indicates that only 16% of MSMEs in ASEAN are fully digitalized, highlighting persistent gaps in innovation and productivity. These gaps are reflected in the analysis of selected food manufacturing MSMEs, where measurable inefficiencies were observed. For instance, one firm lacking a digital inventory system reported an estimated 15–20% raw material waste due to overstocking and spoilage, while another relying on manual production tracking experienced processing delays of 1–2 days per batch due to poor workflow coordination. In addition, several MSMEs without structured quality control systems reported inconsistent product outputs and rework rates of up to 10%, affecting market readiness and compliance.

These challenges reveal a critical gap in existing global platforms, which primarily focus on enterprise optimization, expert problem-solving, or crowdfunding, but do not address early-stage innovation needs, localized capacity gaps, and government-supported technology diffusion. In response, the proposed platform provides an integrated environment that connects MSMEs with technology providers, facilitates access to innovation resources, and supports adoption through structured workflows and digital tools. By directly addressing identified operational and knowledge gaps, the platform offers a context-specific solution to improve productivity, reduce inefficiencies, and enhance innovation uptake among MSMEs.

The capstone paper attempts to answer the following questions:

1. **H1:** Food manufacturing MSMEs in Misamis Oriental, Northern Mindanao exhibit significant technological deficiencies in areas such as digitalization, process efficiency, and innovation adoption, which can be effectively addressed through the proposed platform.

2. **H2:** The proposed platform, when designed using an integrated innovation framework, will demonstrate a high level of usability, functionality, and structural coherence addressing the technological deficiencies of its target users.

3. **H3:** The proposed development and implementation process of the platform will be feasible, systematic, and adaptable, as assessed based on standard software development and innovation management criteria.

## Objectives of the Study

In response to the identified challenges, the study formulated the following objectives:

(1) to identify and analyze the technological deficiencies of food manufacturing MSMEs, particularly in terms of reliance on traditional methods, information asymmetry, and technical skill gaps;

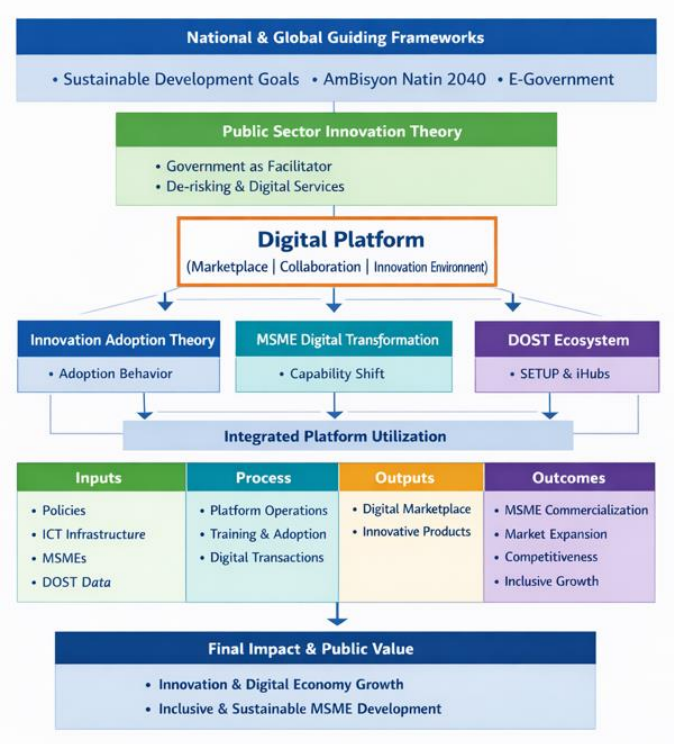
(2) to design and present a platform model and develop a functional prototype (MVP) that facilitates the promotion and diffusion of ready-to-use technological innovations; and

(3) to evaluate the feasibility and user acceptance of the proposed platform, including its usability, functionality, and adoption intent among target users and stakeholders.

## Conceptual Framework of the Study

With the aim of promoting and realizing public sector-services innovation and transformation that empowers end-users, this capstone paper utilizes and anchors concepts and theories of the Sustainable Development Goals, AmBisyon Natin 2040, and e-Government.

**Figure 1.** Capstone Study Framework



The following concepts and theories are being used as the structural foundation of this capstone paper and are integrated to fully realize an extensive and inclusive framework for the study:

**The Sustainable Development Goals**

This study aligns with key Sustainable Development Goals (SDGs) by embedding their principles into the design and implementation of the proposed platform.

SDG 4: Quality Education. The platform operationalizes this goal by providing digital learning modules, technology demonstrations, and knowledge resources accessible to MSMEs. These features support continuous learning and capacity-building, particularly for enterprises in remote and underserved areas with limited access to formal training.

SDG 8: Decent Work and Economic Growth. The platform contributes to this goal by enabling technology adoption and commercialization, which can improve MSME productivity and competitiveness. Through features such as a technology marketplace and innovation linkages, the platform supports enterprise growth, job creation, and technopreneurship.

SDG 9: Industry, Innovation, and Infrastructure. This study directly advances SDG 9 by developing a digital innovation platform that strengthens innovation ecosystems. It facilitates access to technologies, structured onboarding processes, and integration with support systems, promoting sustainable industrialization and innovation diffusion.

SDG 11: Sustainable Cities and Communities. The platform supports this goal by encouraging the adoption of efficient, scalable, and sustainable technologies among MSMEs, contributing to improved local production systems, reduced inefficiencies, and enhanced community-level economic resilience.

SDG 17: Partnerships for the Goals. The platform operationalizes partnerships by enabling collaboration among MSMEs, technology providers, academic institutions, and government agencies. Its design promotes multi-stakeholder engagement, particularly through potential integration with existing programs and innovation hubs.

These SDGs are inherently interconnected; thus, the platform adopts an integrated approach to ensure that advancements in innovation, education, and economic development collectively contribute to sustainable and inclusive growth.

**AmBisyon Natin 2040**

Serves as a roadmap for the government and other stakeholders to align their policies, programs, and actions with the long-term development goals and aspirations of the Filipino people (NEDA, n.d.). In this capstone paper, AmBisyon Natin 2040 aims to provide a framework for

sustainable and inclusive growth, scaling-up technology adoption, stimulating innovation and ensuring that MSMEs remain competitive on the global stage.

Digital Transformation: Embracing innovative technologies to enhance services, increase transparency, and improve efficiency. This capstone study includes the development of a digital platform for digital service delivery backed by data analytics for evidence-based decision-making.

Collaboration and Partnership: This capstone study promotes collaboration between the public sector, private sector, civil society, and academia. Public-private partnerships can play a significant role in successfully implementing technology adoptions and commercialization.

Innovation Hubs: The platform promotes innovation discussions to foster research, development, and innovation in various sectors, specially to MSMEs.

Inclusivity: This capstone paper emphasizes inclusivity. It seeks to ensure that economic growth benefits all segments of the population, particularly marginalized and vulnerable groups.

Global Competitiveness: The digital platform envisions the Philippines as a globally competitive nation, with a strong standpoint towards technology adoptions and a resilient economy.

By grounding the digital platform with the goals and vision of AmBisyon Natin 2040, its contribution and impact will align and support the technological developments of the country gearing towards a revolutionized innovative ecosystem for MSMEs.

**E-government**

The E-Governance Act (Senate Bill No. 1738) requires the government to create a comprehensive, interconnected, and interoperable network for information and resource-sharing and communications across all levels of national and local government; an internal records management information system; a centralized information database; and digital platforms for public service delivery.

E-government comprises several digital projects and methods designed to enhance government accessibility, responsiveness, and efficacy. This study pertains to the utilization of information and communication technology (ICT) to optimize service delivery, strengthen interactions between inventors and adopters, and facilitate technological acceptance and commercialization.

The digital platform employs a content management system for public communication, disseminating essential information, and soliciting opinions and contributions from residents and stakeholders.

Data Management: This capstone study focuses on improving content management systems and analysis to support evidence-based decision-making for policy formulations.

Transparency and Accountability: The digital platform makes specific data more accessible to the public. With an efficient content management system, it showcases a marketplace for adoption and commercialization.

Accessibility: The digital platform aims to ensure that its digital services are accessible to all citizens, including those with disabilities or limited access to technology.

By applying the principles of e-government, this study will beneficially enhance its operations, improve citizen engagement, and foster innovation both in the public and industrial sectors, specially the MSMEs.

**Significance of the Study**

1. This study serves as a digital intervention within the Philippine innovation ecosystem by addressing the gap between technology development and commercialization. It provides measurable benefits across key stakeholders.

2. First, it addresses the reliance on traditional methods through a data-driven technology matching system. For programs such as DOST SETUP, the platform streamlines TNA processes and can contribute to reductions in production costs by an estimated 10–15% and improvements in process efficiency by 15–20% through appropriate technology adoption. Government agencies can also utilize platform analytics to track MSME modernization and support evidence-based policymaking.

3. Second, it reduces information asymmetry by serving as a centralized digital marketplace, enabling MSMEs to access market-ready technologies more efficiently. This can lead to reduced technology search time by up to 50% and increased adoption rates. Simultaneously, it provides innovators with a direct channel to commercialize technologies, improving visibility and utilization of R&D outputs.

4. Third, it bridges technical skill gaps by integrating training materials, technical documentation, and expert support. This supports effective technology transfer, potentially reducing technology rejection or underutilization rates by 20–30% and improving workforce capability.

5. Finally, the platform contributes to national development goals by enhancing MSME productivity, competitiveness, and innovation capacity. It aligns with AmBisyon Natin 2040 and advances SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure), promoting inclusive and sustainable economic development.

**Scope and Delimitation**

This study is geographically limited to selected food manufacturing MSMEs in Misamis Oriental, Northern Mindanao. It employed a descriptive-analytical case study design using secondary data analysis of TNA records from 2023 to 2025. From a population of thirty (30) TNA projects, fifteen (15) were selected through simple random sampling to ensure representativeness. The analysis focused on identifying patterns in innovation adoption and commercialization using existing documented records, with no primary data collection conducted.

The study is further limited to the design and development of a prototype digital platform (MVP), focusing on core functionalities for promoting and commercializing technologies among MSMEs. It does not include detailed financial feasibility, cost–benefit analysis, or full-scale deployment. Integration with government systems, including DOST SETUP and DOST Regional iHubs, is discussed at a conceptual level only. All data used were anonymized in compliance with data privacy standards.

Future studies may expand this work by incorporating primary data collection, surveys and interviews, conducting pilot implementation and impact evaluation, and performing financial and scalability analyses. Further research may also explore full system integration with government platforms, cross-regional validation, and sectoral comparisons to enhance the platform's applicability and long-term sustainability.

**Definition of Terms**

These are the operational terms used in the study, each carefully defined to ensure clarity and consistency throughout the capstone research:

*Platform* – a web- and mobile-based digital system that enables technology promotion, matching, and adoption, integrating innovation support features beyond typical digital marketplaces.

*Data* – information stored, processed, or retrieved from the platform, including analyzed records from DOST TNA.

*MSMEs* – micro, small, and medium enterprises located in Misamis Oriental, Northern Mindanao.

*e-Government/e-Governance* – the use of ICT to enhance service delivery, stakeholder interaction, and technology adoption processes.

*Commercialization* – the process of transforming validated technologies into market-ready products or services for adoption and economic use.

*Innovation Diffusion* – the spread and adoption of new technologies, ideas, or practices among MSMEs through digital platforms and institutional linkages.

*Technology Needs Assessment (TNA)* – a systematic process by DOST to identify and prioritize technological gaps and requirements of MSMEs and communities.

## REVIEW OF RELATED LITERATURE

**AmBisyon Natin 2040 -** The National Economic and Development Authority (NEDA) developed AmBisyon Natin 2040, a collection of aspirational declarations intended to direct the nation's strategy for the forthcoming 16 years and act as its core framework. AmBisyon Natin 2040 encapsulates the shared long-term vision and ambitions of the Filipino populace, aiming for a thriving middle-class society by 2040. This vision highlights the eradication of poverty, the promotion of longevity and health, and the cultivation of an educated and innovative populace, hence requiring the formulation of new strategies to improve the Filipino lifestyle (Lopez et al., 2019).

NEDA (n.d.) emphasizes that these aspirations depend on particular factors, such as healthy lifestyle choices, the utilization of safer and cleaner products and processes, the development of health-promoting products, the enactment of policies that foster work-life balance, and the provision of access to affordable, high-quality healthcare. Sustained progress in reaching these goals is primarily driven by research and innovation, since they play a crucial role in providing evidence that influences policy decisions, especially in the health sector (Lopez et al., 2019).

Globally, research and innovation have had a considerable influence on human well-being, significantly enhancing productivity and the national economy (Lopez et al., 2019). A dynamic research and development industry can significantly enhance the nation's sustainable technological advancements, innovations, and adoptions, characterized as development that satisfies current requirements without jeopardizing future generations' capacity to fulfill their own demands. This approach acknowledges that growth must be inclusive and environmentally sustainable to mitigate poverty and promote shared prosperity for the present population while catering to the requirements of future generations (Hatfield, 2018).

Formulating a long-term vision for research, technological innovation, and adoption is essential to guide the trajectory of technical advancements in the country, in alignment with AmBisyon Natin 2040 and fostering sustainable development on a larger scale.

**Innovation Ecosystem in the Philippines -** The notion of an innovation ecosystem entails a nuanced and multifaceted comprehension of science and technology and its subsequent influence on society. Described by Jackson (2011), as the economic dynamics of the intricate relationships among actors and entities with the overarching objective of facilitating technology development and innovation, the innovation ecosystem centers on the interconnectedness of two mutually reliant

systems. These are the knowledge economy, propelled by foundational research, and commercial economy, steered by market dynamics.

Studies indicate that, on one side, technological innovation is poised to yield novel products, processes, and markets. Conversely, economic growth is expected to foster research and development, leading to subsequent innovation (Clarete, et al., 2014). Numerous contemporary societies aspire to construct a robust innovation ecosystem to realize sustainable growth in their national economies. Despite this apparent worldwide inclination, certain countries lag behind due to their tendency to overlook the importance of science and technology and research and development in this context. The Philippines is an example of such a nation. Consequently, it is unsurprising that the Philippine economy is stuck in a low-level equilibrium, ensnared in a vicious circle of limited technological innovation, declining competitiveness, modest economic growth, insufficient investment in science and technology, research and development, and so forth (Clarete, et al., 2014).

Research shows that the state of the Philippine innovation ecosystem has a noticeable impact on the overall condition of science and technology in the country (Rabino, 2020). However, a more significant concern arises from the widespread consequences of these outcomes on the socio-economic status of the nation. The issue of inadequate investment in education, generally, and in science and technology specifically, has been overshadowed by other factors that receive varying degrees of emphasis. Despite the well-established evidence from neighboring countries that underscores the interactive and mutually reinforcing relationship between technological innovation and economic growth, the Philippines appears to neglect this factor even in the face of globalization (Rabino, 2020). Continuous improvement of the Philippines' overall innovation ecosystem is imperative. To achieve this, strategic priorities must be established. A foremost focus should be on investing in education and human capital, as this foundation empowers individuals to thrive and generate innovations (Rabino, 2020). Promoting research and development as a viable professional career among both students and professionals is crucial to attract their interest in this field. Encouraging local inventors to submit applications to IPOPHIL and introduce their creations for commercial application is also essential. Ultimately, the collaboration among stakeholders should consistently prioritize factors such as knowledge sharing, trust, and social capital.

**MSMEs in the Philippines -** In 2008, the Philippine Congress established Republic Act No. 9501, known as the Magna Carta for MSMEs, to promote, support, enhance, and foster the growth and development of the MSME sector in the Philippines. MSMEs are classified according to investment capitalization, sales turnover, and total personnel count inside an institution (Ajuwon et al., 2017). These firms include diverse commercial activities throughout industry, agribusiness, trade, and services, defined by total assets and personnel count.

Since the 1970s, the Philippine government has consistently endeavored to foster and advance SME development, transitioning from an inward-focused strategy to a more outward-oriented approach (Aldaba, 2011). The government possesses extensive strategies for sustainable

growth and SME development, highlighting their economic significance. Proponents of policies and programs that bolster small enterprises contend that they are labor-intensive, efficient, equitable, geographically extensive, and conducive to entrepreneurship (Nichter & Goldmark, 2005).

Quingco and Leonoras (2020) contend that MSMEs are essential to the economy, functioning as catalysts for a globally competitive Philippine economy. The MSME sector, acknowledged by scholars such as Pradhan and Munda (2010) and Aldaba (2011), is integral to the nation's sustainable economic growth, enhancing innovation, industrial production, exports, and industrial management. In developing nations, especially in Asia, Africa, and Latin America, the MSME sector is crucial for job creation, income distribution, poverty alleviation, and rural economic advancement (Tambuna, 2012).

Research by Prasetyo (2008), Kiss and Zagyi (2014), Sarkar (2016), and others highlights the MSME sector's significance in income and employment generation, entrepreneurial growth, local competitiveness, and poverty alleviation. Mahadea & Kaseeram (2018) assert that entrepreneurship integrates labor and capital, acting as a conduit for employment and economic development. The advancement of the MSME sector enhances the money supply in both urban and rural regions, hence augmenting individuals' purchasing power and per capita income (Baral, 2013).

The advancement of the MSME sector can result in heightened employment, income enhancement, and accelerated economic expansion, thereby alleviating poverty (Manzoor et al., 2019). Nonetheless, challenges like political instability, law enforcement issues, financial limitations, energy shortages, taxation difficulties, labor disputes, regulatory reforms, and insufficient coordination and information sharing across institutions impede the growth and development of MSMEs (Subhan et al., 2014).

**MSME Modernization and Social Well-Being -** The modernization of MSMEs, through digitalization, innovation adoption, and improved access to technology, indirectly contributes to broader social well-being. By enhancing productivity and competitiveness, modernized MSMEs are able to generate more stable and higher-quality employment opportunities, thereby strengthening job creation and income stability (Manzoor et al., 2019). Increased business efficiency and expansion also stimulate local economies, which supports poverty reduction and improves overall living standards.

Moreover, in sectors such as agribusiness and food manufacturing, MSME modernization plays a critical role in improving food security. Technological advancements enable better production, processing, and distribution of goods, ensuring more reliable access to food supplies while reducing waste. As MSMEs grow and become more resilient, they contribute to more inclusive economic participation, particularly in rural areas where opportunities are often limited (Tambuna, 2012). In this way, MSME modernization not only drives economic growth but also

fosters social development by addressing key issues such as poverty, unemployment, and food sustainability.

**Current Platforms** - Numerous global platforms have been developed to support innovation, product development, and entrepreneurial activities. These technologies share similarities with the intended platform of this capstone project in terms of fostering innovation and improving processes; however, they differ significantly in scope, target users, and level of integration.

Pendo is an all-encompassing product experience platform that enables organizations to prioritize product development in their operations. It integrates software usage analytics, in-app guidance, and user feedback mechanisms to help teams respond to evolving customer needs and improve product experiences (Pendo, 2023). Additionally, the platform provides training, education, and global engagement opportunities for product leaders. As emphasized by Yale (2018), there is a need to create systems that eliminate barriers, complex structures, and overlooked ideas. While Pendo effectively supports data-driven decision-making for established organizations, it is primarily geared toward optimizing existing digital products rather than nurturing early-stage innovation. In contrast, the proposed platform focuses on enabling local innovators and inventors, particularly in the Philippines, by providing an accessible environment that supports idea development, collaboration, and innovation growth.

Jungleworks is a technology firm specializing in on-demand delivery and operations management solutions. Its platforms are designed to streamline business processes, enhance delivery management, and improve customer experience through scalable and flexible systems. Jungleworks aims to empower businesses by increasing operational efficiency and supporting growth across organizations of varying sizes. However, its primary focus is on logistics and operational optimization rather than innovation development. Compared to this, the proposed platform emphasizes innovation enablement, supporting users from ideation to potential commercialization rather than focusing solely on operational performance.

IdeaConnection is an open innovation network composed of over 20,000 experts across more than 180 countries. It utilizes a crowdsourcing model to solve technical challenges, achieving a high success rate by forming multidisciplinary teams compensated through a pay-for-success approach. Its services include problem-solving, technology scouting, and expert augmentation. In 2020, IdeaConnection partnered with Planbox to enhance innovation lifecycle management capabilities (E.T. Bureau, 2020). Despite its strengths, IdeaConnection primarily serves organizations with defined technical problems and sufficient resources to engage expert networks. In comparison, the proposed platform targets early-stage innovators and MSMEs, providing not only problem-solving support but also opportunities for capacity-building, collaboration, and local ecosystem integration.

Crowdfunding platforms such as Kickstarter and Indiegogo allow innovators to present projects and solicit financial support from a global audience. Kickstarter promotes creative projects and emphasizes the importance of artistic and innovative expression in society (Soul, D.L., 2015). Similarly, Indiegogo enables entrepreneurs to connect with communities interested in supporting emerging technologies and novel solutions (Verlini, A., n.d.). While these platforms are effective in providing visibility and funding opportunities, they typically cater to projects that are already developed and ready for public engagement. They do not provide structured mechanisms for early-stage ideation, technical validation, or guided innovation development. In contrast, the proposed platform offers a comprehensive innovation pipeline, supporting users from idea generation through development and potential commercialization, particularly for innovators who may not yet be ready for global crowdfunding platforms.

Overall, existing global platforms tend to focus on specific aspects of innovation, such as product optimization (Pendo), operational efficiency (Jungleworks), expert-driven problem solving (IdeaConnection), and crowdfunding (Kickstarter and Indiegogo). These systems are generally oriented toward established organizations or mature innovations. In contrast, the proposed platform addresses a significant gap by focusing on grassroots innovation, local ecosystem integration, and end-to-end innovation support, particularly within the Philippine context. Unlike existing technologies, it integrates innovation support with digital platform capabilities to empower local innovators and promote Filipino-developed products on a broader, potentially global scale.

**Anchored Frameworks: Diffusion of Innovation Theory** - The examination of incorporating innovative inventions into diverse contexts has been a focus of study for over thirty years. Rogers' Diffusion of Innovations, detailed in his publication, has become a significant paradigm in this domain, as noted by Sherry and Gibson (2002). This model has functioned as a fundamental framework in various investigations across multiple fields. Dooley (1999) and Stuart (2000) recognized political science, public health, communications, history, economics, technology, and education as disciplines that have significantly employed Rogers' theory. It was characterized as a broadly recognized theoretical framework, especially in the domain of technological diffusion and adoption.

Rogers (2003) posits that adoption signifies the decision to wholeheartedly accept an innovation as the preferred course of action, whereas rejection denotes the choice to forgo the innovation. Rogers defines diffusion as the process by which an innovation is conveyed through certain channels over time among the constituents of a social system. This definition emphasizes creativity, communication channels, time, and the social system as the four fundamental components crucial to the diffusion of innovations (Sahin, 2006).

**Good Governance** - Theoretical and practical discourses on good governance have been prominent for the past thirty years. In modern literature on political science, administrative sciences, and development studies, the concepts of "Governance" and "Good governance" are

becoming increasingly significant. There is an increasing recognition that effective governance encompasses legitimate, responsible, and efficient approaches to obtaining and employing public authority and resources to fulfill widely recognized societal goals (Ali, 2015).

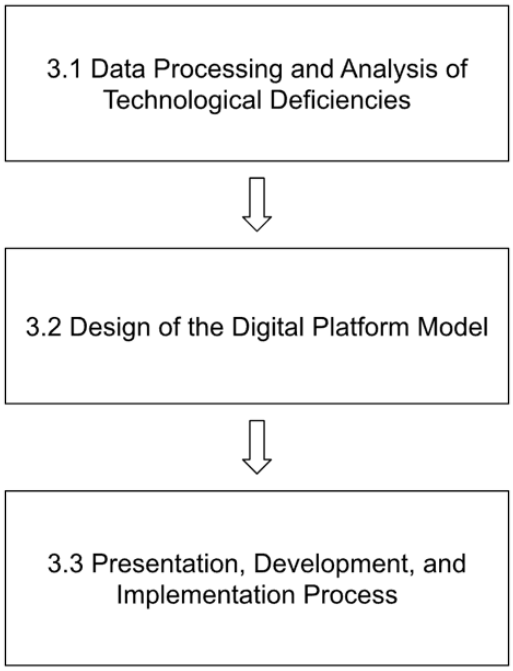
The concept of governance, albeit not novel, has origins as ancient as human civilization, with its perspective embedded in cultures since the advent of communal coexistence (Preti, 2004). This entails the collaborative decision-making process and the execution of laws, regulations, and policies to promote order and harmony within a communal setting. Nonetheless, the concept of good governance has become prominent, especially in the rejuvenation of democratic institutions, frequently linked to the phenomenon known as the third wave of democracy. This focus on effective governance seeks to enable participatory democracy, advance human development, and fulfill the goals of globalization.

The primary aim of effective government must be to establish a civil society (Preti, 2004). A civilization that embraces and fosters technology advances and advancements. The government ought to be participatory, consensus-driven, accountable, transparent, responsive, effective, efficient, equitable, and inclusive, while adhering to the rule of law (Ali, 2015).

## II. Methodology

This capstone study focuses on the design and development of a prototype of a platform that markets innovative technologies ready for adoption and commercialization.

**Figure 2.** Innovation approach flow



Technological Deficiencies of Food Manufacturing MSMEs - This study utilized TNA records collected by DOST Northern Mindanao (2023–2025) to identify key technological deficiencies of food manufacturing MSMEs in Misamis Oriental. A descriptive-analytical case study design with secondary data analysis was employed. An analytic framework was applied to categorize deficiencies into three key dimensions: reliance on traditional methods, information asymmetry, and technical skill gaps. From a population of thirty (30) TNA projects, fifteen (15) records were selected through simple random sampling to ensure representativeness. To ensure systematic analysis, identified gaps were coded and quantified using a structured scheme. Each deficiency observed in the TNA records was assigned to one of the three dimensions and recorded using frequency counts based on occurrence across cases. In addition, the presence of each gap per MSME was encoded using binary coding (1 = present, 0 = not present), allowing aggregation and comparison across samples. This approach enabled the identification of the most prevalent deficiencies and their relative distribution. Thematic analysis revealed recurring issues such as continued dependence on manual or outdated production processes (reliance on traditional methods), limited access to relevant technical information, market insights, and support services (information asymmetry), and insufficient technical knowledge in areas such as product development, quality control, and digital tools (technical skill gaps). The study relied entirely on existing TNA records, with no primary data collection conducted. In compliance with the Data Privacy Act of 2012 (RA 10173) and the principles of e-Governance, the platform will integrate protocols to protect the intellectual property of innovators and the sensitive business data of MSMEs.

Design and Presentation of the Platform Model - This phase focused on establishing the conceptual design, theoretical foundations, and framework models that underpinned the proposed platform. Relevant concepts and theories were systematically integrated to guide both the development process and the expected outputs of the capstone study. These frameworks served as the structural foundation of the platform, ensuring coherence between the study's objectives, system design, and intended outcomes. By aligning theoretical constructs with practical application, the model provided a clear basis for platform functionality, innovation support mechanisms, and overall system architecture, enabling the study to effectively achieve its desired results.

Development and Implementation Process - The platform development will begin with the creation of a context diagram and data flow diagrams (DFDs) to define system boundaries and visualize the flow of information. These will guide the overall system design and architecture. An open-source development tool will be used to build a Minimum Viable Product (MVP) containing the core features of the platform. The MVP will then undergo pilot testing with 3–5 food manufacturing MSMEs in Misamis Oriental, Northern Mindanao. User feedback will be collected through survey questionnaires, semi-structured interviews, and system usage logs to assess usability, functionality, and user experience. The results will inform iterative improvements,

allowing refinement of features, interface, and performance. This approach ensures a user-centered and adaptive development process aligned with MSME needs.

The objective of the platform is to bridge the gap between innovators and MSMEs, where innovators can post their innovative technologies giving the MSMEs the repository, the platform, where they can view and check technologies for possible adoption. The application also contains educational resources, like demonstrations and tutorials, where MSMEs can be educated for the purpose and proper usage of the innovative technologies available for commercialization. Test, ideate, iterate. Further test and refine the platform. Test the prototype or MVP.

Research Timeline - The study was conducted over a 12-month period, consisting of Phase 1: Framework Design (Months 1–2); Phase 2: Data Preparation (Months 3–4); Phase 3: MVP Development (Months 5–7); Phase 4: Pilot Testing (Months 8–9); Phase 5: Data Analysis (Months 10–11); and Phase 6: Refinement and Documentation (Month 12).

Implementation Considerations, Sustainability, and Stakeholder Validation - The implementation of the proposed platform recognized several practical challenges that may affect adoption among MSMEs. Key constraints include limited internet access, particularly in rural areas, which may restrict consistent platform usage; varying levels of digital literacy among MSME owners and workers, affecting their ability to effectively utilize digital tools; and financial limitations, which may hinder participation, technology adoption, and scaling of innovations. To address these challenges, several mitigation strategies were proposed. Capacity-building initiatives such as government-led training programs can enhance digital literacy and innovation capabilities among MSMEs. Financial barriers may be alleviated through subsidies, grants, or incentive programs, enabling wider participation. In addition, partnerships with universities and research institutions can provide technical support, mentorship, and access to expertise, thereby strengthening the platform's innovation ecosystem. A sustainability plan was also incorporated to ensure long-term viability. The platform is designed to align with and potentially integrate into existing government initiatives such as the DOST SETUP and regional innovation systems like DOST Regional iHubs. This integration supports continuous funding, technical assistance, and institutional backing, enabling the platform to function as part of a broader innovation support infrastructure. To further ensure relevance and usability, stakeholder validation was conducted through interviews and/or focus group discussions involving MSMEs, innovators, and government representatives. These engagements provided insights into user needs, platform functionality, and implementation feasibility. Feedback gathered from stakeholders informed refinements in the platform design, ensuring alignment with real-world requirements and increasing the likelihood of successful adoption.

## III. Results and Discussion

This chapter presents the findings derived from the design and development phases of the digital platform model. The results are discussed in relation to the primary research questions,

focusing on the platform's architectural framework, its development process, and the specific technological needs identified within the food manufacturing MSME sector in Misamis Oriental, Northern Mindanao.

**Technological Deficiencies of Food Manufacturing MSMEs**

Using fifteen (15) TNA records from DOST Northern Mindanao (2023–2025), this study identified key technological deficiencies among food manufacturing MSMEs in Misamis Oriental.

First, persistence of traditional methods was observed across all sampled firms, 15 out of 15, with continued reliance on manual or semi-mechanized processes, limiting compliance with standards and reducing productivity (Parrilli & Elola, 2012).

Second, information asymmetry was evident in 14 out of 15 MSMEs, characterized by limited awareness of available technologies and weak capacity to identify appropriate solutions. Many firms remain dependent on government programs for compliance, upgrading, and training, consistent with findings in developing economies (World Bank, 2021).

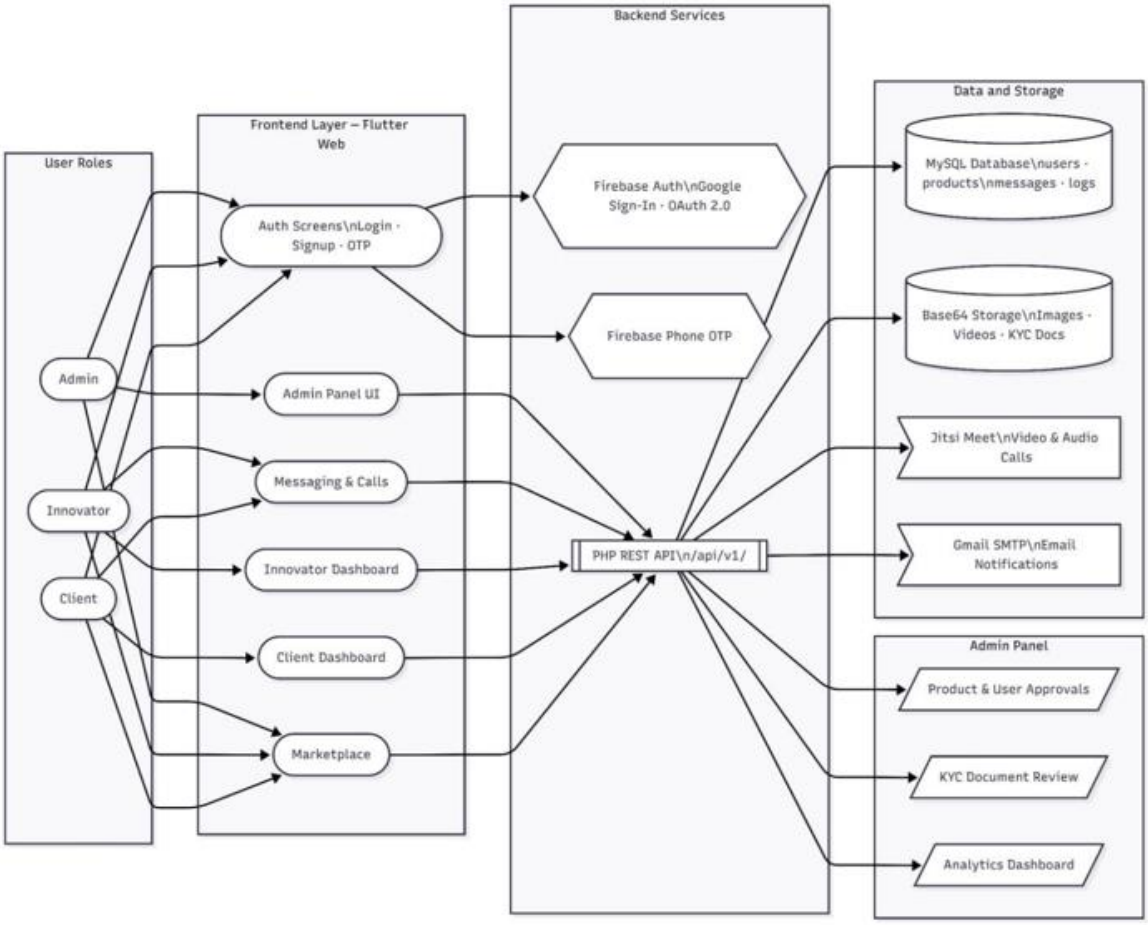
Third, technical skill and resource gaps were present in 11 out of 15 MSMEs, constraining effective technology adoption and innovation. Limited access to expertise, training, and innovation networks further hinders modernization efforts.

These findings highlight systemic barriers to innovation that the proposed platform aims to address by enabling access to technologies, improving information flow, and strengthening linkages between MSMEs, experts, and innovation providers. In compliance with the Data Privacy Act of 2012, all TNA data were anonymized and handled under strict confidentiality protocols. The platform design incorporates secure onboarding, user consent mechanisms, and enhanced authentication features to ensure data privacy and protection of sensitive information.

**Design and Presentation of the Platform Model**

The design of the digital platform serves as a strategic response to the innovation gaps identified in the Philippine MSME sector. It is built upon a multi-dimensional framework that bridges the technical capabilities of innovators with the practical needs of local enterprises.

**Figure 3.** Architectural diagram of the platform




The proposed platform is designed as an integrated, interconnected, and interoperable digital network, aligned with the E-Governance Act (Senate Bill No. 1738), to support transparent and efficient delivery of public sector-led innovation. Such digital marketplaces are increasingly recognized as essential for facilitating industrial product–service systems in modern B2B environments (Mourtzis et al., 2021).

Guided by the Diffusion of Innovation Theory, the platform adopts a user-centric design to lower barriers to technology adoption. It features structured onboarding with role-based access (e.g., admin, innovator, client), secure authentication (including 2FA), and approval workflows to ensure data integrity and system reliability. A moderated product posting system allows innovators to upload technologies with multimedia support (e.g., images and video demonstrations), addressing gaps in awareness and information dissemination that hinder MSME modernization.

The platform also functions as a dynamic digital marketplace, enabling users to search, filter, and interact with available technologies through features such as messaging, bookmarking, and expression of interest. These interaction mechanisms enhance engagement and facilitate linkages between MSMEs and technology providers. Digital adoption in such contexts is

increasingly viewed as a strategic requirement for resilience among MSMEs in emerging economies (Aloysian Publications, 2025).

To support decision-making, the platform includes analytics tools that monitor user activity, product engagement, and adoption trends. Overall, the model aligns with AmBisyon Natin 2040 and responds to the Philippines' innovation gaps, as reflected in its 50th ranking in the 2025 Global Innovation Index (WIPO, 2025).

**The Development and Implementation Process**

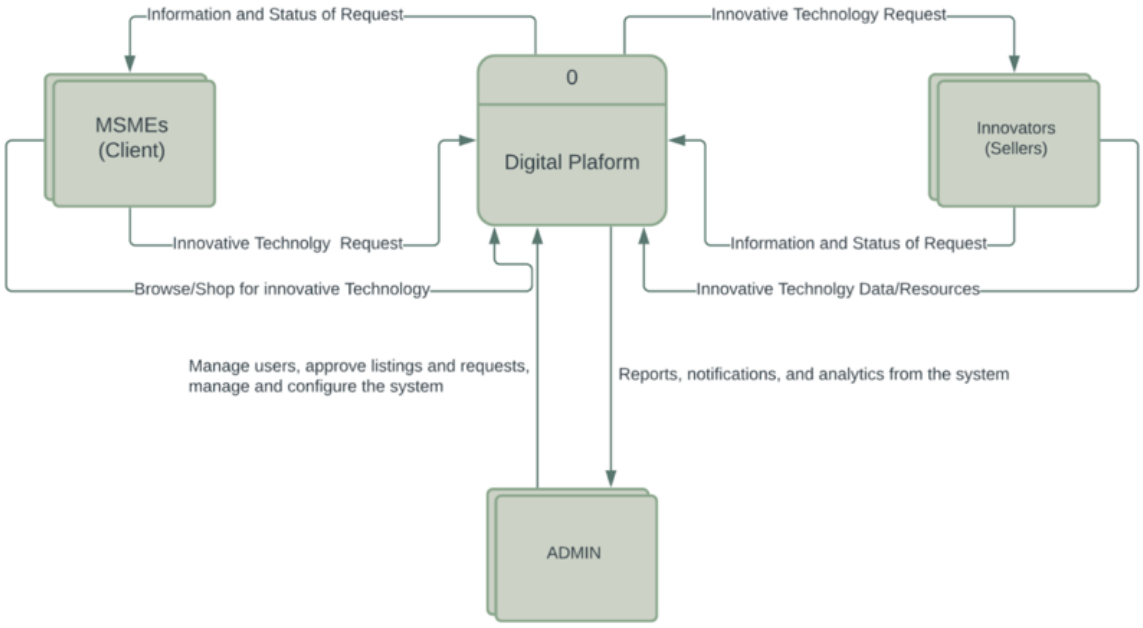
The development followed a structured innovation approach aligned with the study's hypotheses, progressing from system design to prototype validation.

To support H1 on identification of technological deficiencies, context and data flow diagrams were developed to map how information—such as user inputs, technical needs, and feedback—is captured, processed, and utilized within the system. This structured mapping ensures that platform functionalities are directly informed by MSME gaps identified from TNA records, enabling evidence-based design and decision-making.

To address H2 on the platform design and functionality, an MVP was developed using open-source tools, focusing on core features such as a technology repository, user onboarding, and interaction mechanisms. The prototype excludes financial transactions but prioritizes technology discovery and engagement, consistent with global platforms that leverage analytics and user feedback to drive innovation (Pendo, 2023).

The development process adopted an iterative design-thinking approach ("test–ideate–refine"), allowing continuous improvement based on user needs and system performance. This approach is critical given that, although many Philippine MSMEs recognize the benefits of digital technologies, adoption remains a challenge due to capability and process gaps (Epson, 2020). Overall, the methodology ensures that the platform is both functionally relevant and responsive to real-world MSME constraints.

**Figure 4.** Context and dataflow diagram of the system




## IV. Conclusion and Recommendations

This chapter presents the summary of the findings, the conclusions derived from the results, and the recommendations for the further development and implementation of the digital platform model designed to bridge the gap between technology innovators and MSMEs.

### Summary

This study aimed to design and develop a digital platform prototype to support technology adoption and commercialization among food manufacturing MSMEs in Misamis Oriental, Northern Mindanao.

The platform was conceptualized using AmBisyon Natin 2040 and e-Governance principles, and aligned with the E-Governance Act of 2025, emphasizing integrated and interoperable public service delivery. The developed Minimum Viable Product (MVP) incorporated core functionalities such as a technology repository, role-based user access, onboarding and approval workflows, and an interactive marketplace. These features reflect emerging models of digital B2B platforms that support product–service systems and innovation exchange (Mourtzis et al., 2021). Analysis of fifteen (15) TNA records (2023–2025) revealed significant technological deficiencies among MSMEs. These include the widespread reliance on traditional production methods, information asymmetry in accessing appropriate technologies, and technical skill gaps that hinder effective adoption. These findings are consistent with broader national challenges in innovation performance, as reflected in the Philippines' ranking in the

Global Innovation Index (WIPO, 2025), and reinforce the need for structured innovation support mechanisms.

## Conclusion

The study concludes that a public sector-led digital platform can serve as a viable mechanism for addressing technological deficiencies and facilitating innovation adoption among MSMEs. By integrating technology access, information exchange, and stakeholder linkages into a single digital environment, the platform addresses key barriers related to awareness, capability, and connectivity.

The findings support the hypotheses that MSMEs exhibit significant technological gaps (H1), and that a purpose-built platform can provide an acceptable and functional solution to address these needs (H2), with a feasible development and implementation approach (H3). The proposed model demonstrates that structured digital platforms can enhance MSME competitiveness, improve access to innovation resources, and strengthen collaboration among government, industry, and research institutions.

Overall, the platform represents a scalable and context-specific approach to bridging the gap between technology development and commercialization, contributing to inclusive economic growth, digital transformation, and a more resilient innovation ecosystem in the Philippines.

## Recommendations

To maximize the impact of the digital platform the following recommendations are offered:

1. It is recommended that the Department of Science and Technology (DOST) considers the adoption of this digital platform model to standardize and to integrate in the TNA process to further fulfill the mandates of the E-Governance Act. The platform can also be integrated into their iHubs system.

2. Future development should focus on integrating an AI-powered matching algorithm to automatically pair MSME deficiencies or needs with relevant technological solutions and a secure financial gateway for technology licensing.

3. For future researchers, a longitudinal study is recommended to track the actual productivity increases of MSMEs that utilize the platform over a two-year period to validate the commercialization framework in the Philippine context.

## REFERENCES

[1] Adebayo, N. A., & Nassar, M. L. (2014). Impact of micro and small business entrepreneurship on poverty reduction in Ibadan Metropolis, South Western Nigeria. International Review of Management and Business Research, 3(3), 1603-1626.
[2] Ajuwon, O. S., Ikhide, S., & Akotey, J. O. (2017). MSMEs and Employment Generation in Nigeria. The Journal of Developing Areas, 51(3), 229-249. https://www.jstor.org/stable/26416942
[3] Aldaba, R. M. (2011). 'SMEs Access to Finance: Philippines', in Harvie, C., S. Oum, and D. Narjoko (eds.), Small and Medium Enterprises (SMEs) Access to Finance in Selected East Asian Economies. ERIA Research Project Report 2010-14, Jakarta: ERIA. pp. 291-350.
[4] Ali, M. (2015). Governance and Good Governance: A Conceptual Perspective. Dialogue (Pakistan), 10(1).
[5] Baral, S. (2013). An Empirical Study on Changing Face of MSME Towards Emerging Economies in India. Radix International Journal of Research in Social Science, 2(1). http://dx.doi.org/10.2139/ssrn.3375260
[6] Barroga, K. D., Rola, A. C., Depositario, D. P. T., Digal, L. N., & Pabuayon, I. M. (2019). Determinants of the extent of technological innovation adoption among micro, small, and medium food processing enterprises in Davao Region, Philippines. Philippine Journal of Science, 148(4), 825-839.
[7] B.C Preti, Contemporary South Asia, Good Governance in South Asia (New Delhi: Kaling publication, 2004), 57
[8] Bureau, E. T. (2020, May 13). Planbox Acquires IdeaConnection, the Best-in-Class Open Innovation Expert Solver Network. EnterpriseTalk. https://enterprisetalk.com/news/planbox-acquires-ideaconnection-the-best-in-class-open-innovation-expert-solver-network/
[9] Clarete, R., Pernia, M., Gaduena, A, and Mendoza, A. (2014, June).The role of science, technology and research in economic development. Discussion Paper No. 2014-07. Quezon City, Philippines: University of the Philippines. Internet retrieval: www.econ.upd.edu.ph/dp/index.php/dp/article/view/1460
[10] Dooley, K.E. (1999). Towards a holistic model for the diffusion of educational technologies: An integrative review of educational innovation studies. Educational Technology & Society 2(4), 35-45.
[11] Dongzal, R., & Espinosa, E. (n.d.). The International association of Organizational Innovation ORGANIZATIONAL INNOVATION AND INNOVATION ADOPTION AMONG PHILIPPINE FOOD PROCESSING MICRO, SMALL, AND MEDIUM ENTERPRISES. Retrieved December 11, 2023, from https://www.ijoi-online.org/attachments/article/366/733%20Final.pdf
[12] Dhawan, V. (2021). Adopting digital technologies can help The Philippines become poverty-free by 2040. Retrieved from https://opengovasia.com/adopting-digital-technologies-can-help-the-philippines-achieve-its-vision-of-becoming-a-poverty-free-society-by-2040/#:~:text=For%20the%20Philippines%20government%2C%20the,expensive%20and%20of%20poor%20quality
[13] Garcia, E. (2017). Technology Transfer Modalities in the Philippines: Research to Market Stories in DOST-TAPI Presented in International Workshop on Supporting Innovative Entrepreneurs and Role of Technology Transfer And International Innovation Fair. https://www.apctt.org/sites/default/files/2020-07/Philippines.pdf

[14] Hatfield M, Sonnenschein HF, Rosenberg LE. Exceptional returns: the economic value of America's investment in medical research [Internet]. 2001 [cited April 2018]. Available from: http://www.laskerfoundation.org/advocacy/pdf/exceptional.pdf
[15] Jackson, D. (2011). What is an innovation ecosystem? Arlington, VA: National Science Foundation. Internet Retrieval: http://bit.ly/1yTOPcq.
[16] Kiss, K., & Zagyi, N. (2014). Principal Characteristics of the Indian Micro, Small & Medium Enterprises (MSME) Sector and Its Importance in Rural Development. Geographical Locality Studies, 4(2), 438-460. http://www.frugeo.science/GLS2_Paper-9.pdf
[17] Khatibi, Z. (2021). Pandemic Unemployment Levels in the Micro, Small, and Medium Enterprises: Evidence from the Philippines. International Journal of Progressive Research in Science and Engineering, 2(4), 13-15. https://www.journals.grdpublications.com/index.php/ijprse/article/view/253/248
[18] Laforga, B. M. (2021). PHL underperforms in innovation adoption. Retrieved from https://www.bworldonline.com/editors-picks/2021/02/25/346740/phl-underperforms-in-innovation-adoption/