

Quimba, Francis Mark A.; Andrada, Abigail E.; Barral, Mark Anthony A.

Working Paper

HEIGHTS-IE: Higher education institutions generating holistic and transferable solutions-innovation ecosystems, Philippines

PIDS Discussion Paper Series, No. 2024-25

Provided in Cooperation with:

Philippine Institute for Development Studies (PIDS), Philippines

Suggested Citation: Quimba, Francis Mark A.; Andrada, Abigail E.; Barral, Mark Anthony A. (2024) : HEIGHTS-IE: Higher education institutions generating holistic and transferable solutions-innovation ecosystems, Philippines, PIDS Discussion Paper Series, No. 2024-25, Philippine Institute for Development Studies (PIDS), Quezon City, <https://doi.org/10.62986/dp2024.25>

This Version is available at:

<https://hdl.handle.net/10419/311714>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

DISCUSSION PAPER SERIES NO. 2024-25

HEIGHTS-IE: Higher Education Institutions Generating Holistic and Transferable Solutions—Innovation Ecosystems, Philippines

*Francis Mark A. Quimba, Abigail E. Andrada,
and Mark Anthony A. Barral*



The PIDS Discussion Paper Series constitutes studies that are preliminary and subject to further revisions. They are being circulated in a limited number of copies only for purposes of soliciting comments and suggestions for further refinements. The studies under the Series are unedited and unreviewed. The views and opinions expressed are those of the author(s) and do not necessarily reflect those of the Institute. The Institute allows citation and quotation of the paper as long as proper attribution is made.

This study is carried out with support from the University of Notre Dame.

CONTACT US:

RESEARCH INFORMATION DEPARTMENT
Philippine Institute for Development Studies

18th Floor, Three Cyberpod Centris - North Tower
EDSA corner Quezon Avenue, Quezon City, Philippines

publications@pids.gov.ph
(+632) 8877-4000

<https://www.pids.gov.ph>

HEIGHTS-IE: Higher Education Institutions Generating Holistic and Transferable Solutions—Innovation Ecosystems, Philippines

Francis Mark A. Quimba
Abigail E. Andrada
Mark Anthony A. Barral

Contributors:

HyoJung Jang (University of Notre Dame), Bethany Little (University of Notre Dame), Elizabeth Dolan (University of Notre Dame), Nancy Rydberg (University of Notre Dame), Juan David Parra (Universidad Del Norte), Fernanda Assuncao Soares Jones (University of Notre Dame), Andrea McMerty-Brummer (University of Notre Dame), Edward Jurkovic (University of Notre Dame), and Kevin Mann (University of Notre Dame)

PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

December 2024

Abstract

The paper examines the role of higher education institutions (HEIs) in the agribusiness innovation ecosystem in Central Visayas, Philippines, underlining their contributions, the challenges the faced, and the opportunities. Using a mix-methods approach, the research reveals that HEIs serve as knowledge sharers and collaborators within the ecosystem. Their impact, however, is limited by inadequate funding, lack of entrepreneurial engagement, among others. The agribusiness innovation ecosystem is perceived by stakeholders as nascent yet growing industry, with potential for significant economic contributions. The study further identifies areas for improvement, such as policy enhancement, deeper collaboration and engagement, and supportive intellectual property frameworks. The paper recommends strengthening HEI involvement in the agribusiness innovation to boost their role in driving regional economic growth and in addressing emerging issues like climate change and food security.

Keywords: agribusiness, agribusiness innovation ecosystem, capacity building, entrepreneurship, food security, higher education institutions, intellectual property, knowledge sharing, regional development, research and development, sustainable agriculture

Table of Contents

1. Executive Summary	1
1.1 Project Overview	1
1.2 Key Findings by Research Question (RQ)	1
1.3 Recommendations	3
2. Introduction	4
2.1 Evaluation Purpose and Audience	4
2.2 Context and Project Background	4
2.2.1 HEIS and innovation ecosystems in the Philippines	4
2.2.2 Innovation performance of the country	5
2.2.3 Addressing innovation performance	6
2.2.4 Region VII innovation landscape	7
2.2.5 HEI involvement in R&D and innovation - the nicer & cradle programs	10
2.2.6 Current issues related to HEI involvement	11
3. Research Questions	13
4. Methodology	15
4.1 Sample Description	16
4.2 Limitations	17
5. Findings	18
5.1 RQ1: Outcomes/Results	18
5.2 RQ2: HEI Roles	21
5.3 RQ 3: Relationships	25
5.4 RQ4: HEI Resource Needs	30
5.5 RQ5: HEI Resource Provision	36
5.6 RQ6: Government Policy and HEI Policy	38
5.7 RQ7: MARKETS	44
5.8 RQ8: Culture	47
6. Recommendations	49
6.1 Recommendations for national and/or regional government(s):	49
6.2 Recommendations for HEIs	51
7. Bibliography	54
8. Annexes	57

List of Tables

Table 1. Distribution of R&D funds in Central Visayas, by Sector, 2018.....	9
Table 2. R&D Personnel by Region, 2018	10
Table 3. Final data collection of Stakeholders in the Innovation Ecosystem (IE) of the Agribusiness Sector in Region VII-Central Visayas	16

List of Figures

Figure 1. Comparative global innovation index dimension scores of the Philippines (2021 vs. 2022)	5
Figure 2. Comparative global innovation index scores of the Philippines for intellectual property- related indicators (2021 vs. 2022)	6
Figure 3. Regional inclusive innovation centers.....	7
Figure 4. Methodology overview	15

Abbreviations

AGILE	Academe-Government-Industry Linkage Endeavor
AIE	Agribusiness Innovation Ecosystem
ASEAN	Association of Southeast Asian Nations
BFAR	Bureau of Fisheries and Aquatic Resources
BISU	Bohol Island State University
BPO	Business Process Outsourcing
BSF	Black Soldier Fly
CCCI	Cebu Chamber of Commerce and Industry
CHED	Commission on Higher Education
CIB.O	Cebu IT-BPM Organization
CITU	Cebu Institute of Technology University
CoE	Centers of Excellence
CPBI	Census of Philippine Business and Industry
CRADLE	Collaborative R&D to Leverage the Philippine Economy
CSR	Corporate Social Responsibility
CTU	Cebu Technological University
CVAARRDEC	Central Visayas Agriculture, Aquatic and Resources Research, Development and Extension Consortium
CVFIC	Central Visayas Food Innovation Council
DA	Department of Agriculture
DA-BAR	DA-Bureau of Agriculture Research
DepEd	Department of Education
DICT	Department of Information and Communications Technology
DOST	Department of Science and Technology
DOST-PCAARRD	DOST Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
DOST-PCIEERD	DOST Philippine Council for Industry, Energy and Emerging Technology Research and Development
DOT	Department of Tourism
DTI	Department of Trade and Industry
ECCP	European Chamber of Commerce of the Philippines
FabLabs	Fabrication laboratories
FGD	Focus Group Discussion

FTE	Full-Time Equivalent
GII	Global Innovation Index
GRDP	Gross Regional Domestic Product
HEIs	Higher Education Institutions
IE	Innovation Ecosystem
IP	Intellectual Property
ITSOs	Innovation and Technology Support Offices
KIIs	Key Informant Interviews
LGU	Local Government Unit
MSMEs	Micro, Small and Medium Enterprises
NCR	National Capital Region
NEDA	National Economic Development Authority
NICER	Niche Centers in the Region for R&D
NORSU	Negros Oriental State University
PhilMech	Philippine Center for Postharvest Development and Mechanization
R&D	Research and Development
RAFI	Ramon Aboitiz Foundation Inc.
RDC	Regional Development Council
RDRC	Regional Development Research Council
RIICom	Regional Inclusive Innovation Committee
RIICs	Regional Inclusive Innovation Centers
S&T	Science and Technology
S4CP	Science for Change Program
SSF	Shared Services Facilities
STI	Science, Technology, and Innovation
STRIDE	Science, Technology, Research, and Innovation for Development
SUCs	State Universities and Colleges
SWU	Southwestern University
TBI	Technology Business Incubator
TUMSAT	Tokyo University of Marine Science and Technology
UNESCO	United Nations Educational, Scientific and Cultural Organization
UP	University of the Philippines Cebu
USAID	U.S. Agency for International Development
USC	University of San Carlos

USJ-R	University of San Jose-Recoletos
UV	University of the Visayas
VUA	Vrije Universiteit Amsterdam

HEIGHTS-IE: Higher Education Institutions Generating Holistic and Transferable Solutions—Innovation Ecosystems, Philippines

Francis Mark A. Quimba, Abigail E. Andrada, and Mark Anthony A. Barral

1. Executive Summary

1.1 Project Overview

Central Visayas has been a key economic driver in the Philippines,¹ with agribusiness as an emerging industry in the region. The region has a budding innovation ecosystem, with developments in intellectual property registration and the establishment of the Regional Inclusive Innovation Center (RIIC). However, challenges persist, such as the concentration of R&D funding in Metro Manila, the nascent R&D participation of HEIs, the private sector's perception of HEIs as less important sources of innovation information, and conflicting timelines between research production and utilization.

To understand how the HEIs participate in the Agribusiness innovation ecosystem, a mixed-methods research approach was adopted, including literature reviews, stakeholder mapping, systems-thinking workshops, key informant interviews (KIIs), and focus group discussions (FGDs). The study involved various stakeholders, including government representatives, HEI representatives, private sector participants, and development partners, to gather comprehensive insights.

1.2 Key Findings by Research Question (RQ)

The results of the key informant interviews and focus group discussions for 8 key research questions are as follows:

RQ1: What are ecosystem actors' perceptions of the level of development, functionality, and purpose of the innovation ecosystems under study?

Ecosystem actors' perceptions of the level of development of the agribusiness innovation ecosystem (AIE) in Region VII (Central Visayas) ranged from seeing it as small or nascent (35% of respondents) to mid-level (15% of respondents). Also, many stakeholders said they believed the AIE is growing and recognized its potential to drive economic growth, food security, and transformative change in the agricultural sector. The ecosystem serves as a network for knowledge and resource sharing, with actors providing extension services, infrastructure support, and market connections.

RQ2: What roles are higher education institutions in this study currently playing in the innovation ecosystems of focus?

HEIs in Region VII primarily function as knowledge sharers, conveners, innovators, and trainers within the agribusiness innovation ecosystem. They collaborate with government, private sector,

¹ According to the National Economic and Development Authority, the Central Visayas was the Philippines' "fastest-growing economy in 2023." See the following website: <https://nro7.neda.gov.ph/central-visayas-is-phs-fastest-growing-economy-in-2023/>

and NGOs to enhance agricultural technology and innovation through research and development support. While HEIs offer significant expertise and resources, their role in terms of funding innovations is limited.

RQ3: What is the level of coordination and partnership between key actors in the HEIs under study and the actors engaged in the innovation ecosystems under study?

While the agribusiness innovation ecosystem continues to evolve, it is characterized by a growing level of collaboration between HEIs, the government, and the private sector. HEIs demonstrate active involvement through curricular enhancements and strategic partnerships, particularly with government agencies and private sector entities. Factors such as funding, infrastructure, human resources, and leadership influence the level of coordination and partnership between HEIs and other stakeholders.

RQ4: What resources do the stakeholders at the higher education institutions included in the study need to be able to engage effectively in the innovation ecosystems of focus?

To effectively engage in the agribusiness innovation ecosystem, HEI stakeholders require capacity strengthening and professional development opportunities, access to research grants and funding, incentives, and recognition, support from HEI leadership and administration, opportunities for collaboration and partnerships, and information dissemination platforms.

RQ5: What are ecosystem actors' perceptions of HEIs' provision of key resources needed for strengthening the agribusiness innovation ecosystem in region vii?

Ecosystem actors have nuanced perceptions of HEIs' provision of resources needed for strengthening the agribusiness innovation ecosystem. Industry and NGO representatives recognize the diverse expertise, specialized knowledge, and network resources of HEIs, while government representatives acknowledge the skilled manpower, infrastructure, and technology resources available in HEIs. However, inadequate financial resources and the need for more practical research and effective stakeholder engagement are identified as areas for improvement.

RQ6: how does the policy/regulatory environment shape the incentives and disincentives for HEI engagement in innovation ecosystems?

National policies significantly impact HEI engagement in the agribusiness innovation ecosystem. While supportive policies like the Philippine Innovation Act and the Innovative Start Up Act provide crucial funding and incentives for innovation, certain regulations, such as procurement laws and civil service regulations, may limit HEIs' flexibility to engage in entrepreneurial activities and collaborative projects. HEI policies related to research and publication, intellectual property, extension and community engagement, and collaboration and partnerships shape the incentives and disincentives for HEI stakeholders to engage in agribusiness innovation activities.

RQ7: How do market-related factors in the Philippines shape opportunities for hei engagement in the agribusiness innovation ecosystem in region vii?

Market-related factors such as a limited understanding of supply chains, the presence of middlemen, and overdependence on agricultural imports present challenges and opportunities for HEI engagement in the agribusiness innovation ecosystem. HEIs can address these issues by conducting research, providing solutions, and enhancing the competitiveness of local agricultural products.

RQ8: How do context-specific norms, perceptions, and values affect HEI actors' proclivity to engage in innovation ecosystems?

Context-specific norms, perceptions, and values affect HEI actors' proclivity to engage in the agribusiness innovation ecosystem. The focus on research and publication, lack of entrepreneurial mindset, perception of agribusiness as irrelevant or outside of HEI expertise, and values placed on community engagement or producing quality graduates all shape HEI stakeholders' willingness to participate in agribusiness innovation activities.

1.3 Recommendations

To enhance the role of HEIs in the agribusiness innovation ecosystem, several recommendations are put forward:

1. **Strengthen Policy Implementation and Funding:** The Philippine government should ensure the effective implementation of supportive policies like the Philippine Innovation Act and the Innovative Start Up Act. Adequate funding and clear guidelines are essential for these policies to promote innovation effectively.
2. **Review and Reform Policies:** While recent reforms, such as the new procurement law, have aimed to streamline processes, certain regulations, including civil service rules, may still hinder HEIs' ability to engage in entrepreneurial activities. A comprehensive review of these regulations is necessary to identify and address any barriers to innovation and collaboration.
3. **Update and Implement Responsive Policies for Emerging Issues:** The government should proactively address emerging issues in the agribusiness sector, such as climate change and food security. While there are existing policies such as the Climate Change Act of 2009 (Republic Act 9729) (Climate Change Commission 2011) and the Agriculture and Fisheries Modernization Act of 1997 that addresses the emerging issues of climate change and food security, there may be a need to update these policies² as well as implement more programs promoting sustainable agricultural practices and food security, ensuring stable food supply and modernized agribusiness systems (Galang 2022). The policies should also actively support research and development initiatives that focus on sustainable agricultural practices and innovative solutions to enhance food security.
4. **Establish Collaboration Platforms:** A regional or national platform for agribusiness innovation collaboration and knowledge sharing among HEIs, industry stakeholders, and government agencies should be established. This platform would facilitate networking, partnership building, and resource sharing.
5. **Enhance Intellectual Property Policies:** HEIs should develop clear and supportive intellectual property policies to encourage innovation. Transparent revenue-sharing mechanisms and support services for IP management and commercialization are crucial for fostering an enabling environment for agribusiness innovation.

² Bills have been proposed to address food security and climate change such as Senate Bill 2126 "Ensuring Zero Hunger for All Filipinos", Senate Bill 2745 "Magna Carta of Young Farmers" and Senate Bill 2027 "Climate Change Emergency Declaration Act".

6. **Align Faculty Promotion Criteria:** HEIs should recognize and reward faculty engagement in agribusiness innovation activities by aligning promotion and evaluation criteria. This includes introducing performance indicators that capture the impact of faculty contributions to the agribusiness sector.

7. **Develop Innovation Hubs and Programs:** HEIs should establish agribusiness innovation hubs and develop curricular and extracurricular programs that foster innovation skills and mindsets. These initiatives would provide faculty and students with the resources and opportunities to engage in the agribusiness sector effectively.

The findings provide insights into challenges, opportunities, and dynamics, laying the groundwork for future research to expand the scope of commodities, ensure balanced stakeholder representation, and explore HEI engagement nuances. By implementing the recommendations, HEIs can play a more effective role in strengthening the agribusiness innovation ecosystem in Central Visayas and drive regional economic growth and development.

2. Introduction

2.1 Evaluation Purpose and Audience

Agribusiness is defined as “...agriculture-related activities that put farmers, processors, distributors, and consumers within a system that produces, processes, transports, markets, and distributes agricultural products” (Briones and Galang, 2013, p. 8).³ This study aims to propose how higher education institutions (HEIs) can strengthen their engagement in the innovation ecosystem of the agribusiness sector in Central Visayas (one of the Philippines’ 17 regions) by understanding stakeholders’ perceptions of the size and functionality of their innovation ecosystem, the various roles being fulfilled within the system, actors’ ability to access needed resources, and the extent to which policies constrain or facilitate engagement in the innovation ecosystem.

2.2 Context and Project Background

2.2.1 HEIs and innovation ecosystems in the Philippines

Studies and reports on innovation ecosystems at the national level are widely available.⁴ For instance, the Science, Technology, Research, and Innovation for Development (STRIDE) project of USAID produced assessments and case studies in support of intersectoral collaborative research (RTI International 2020). The STRIDE 2020 assessment on innovation ecosystems in the Philippines reported that new government and university programs are addressing challenges in the innovation ecosystem by establishing linkages to government and academia to develop entrepreneurship, education, human capital, research quality, output, and enabling knowledge

³ This definition aligns with the ways USAID uses the term agribusiness. For example, in the USAID Agriculture Strategy Linking Producers to Markets, USAID refers to the agribusiness sector as “farming and related food processing and trade” (USAID 2004: p. 21).

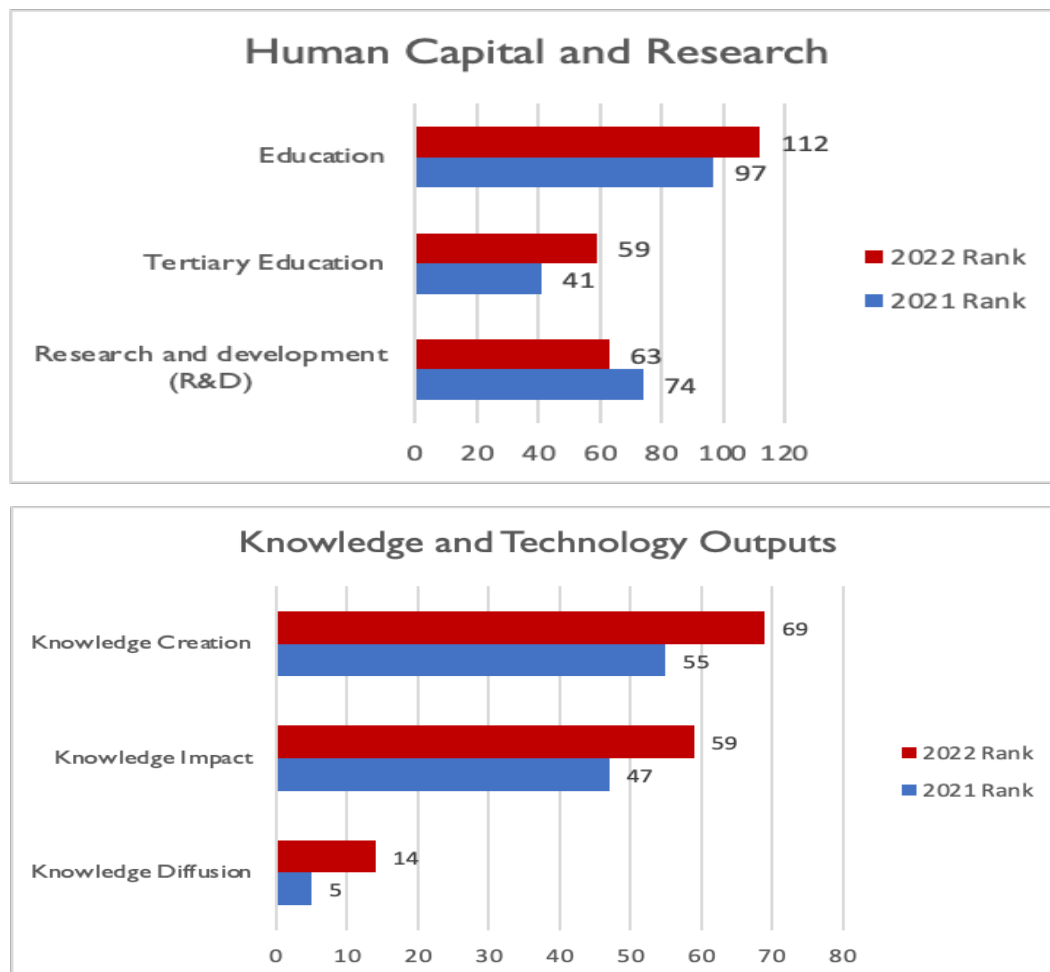
⁴ See Patalinghug E. (2003); Habaradas, R. B. (2008); Wignaraja (2008); Quimba, F. M. A., Albert, J. R. G., & Llanto, G. M. (2017); Albert, J. R. G., Quimba, F. M. A., Serafica, R. B., Llanto, G. M., Vizmanos, J. F. V., & Bairan, J. C. A. C. (2017). Sectoral Innovation ecosystems studies include: Quimba F. M. A. and Rosellon, M. A. D. (2012) for automotive; Macasaquit (2010) for electronics.

transfer and collaboration. However, procurement processes remain a significant barrier to innovation.

2.2.2 Innovation performance of the country

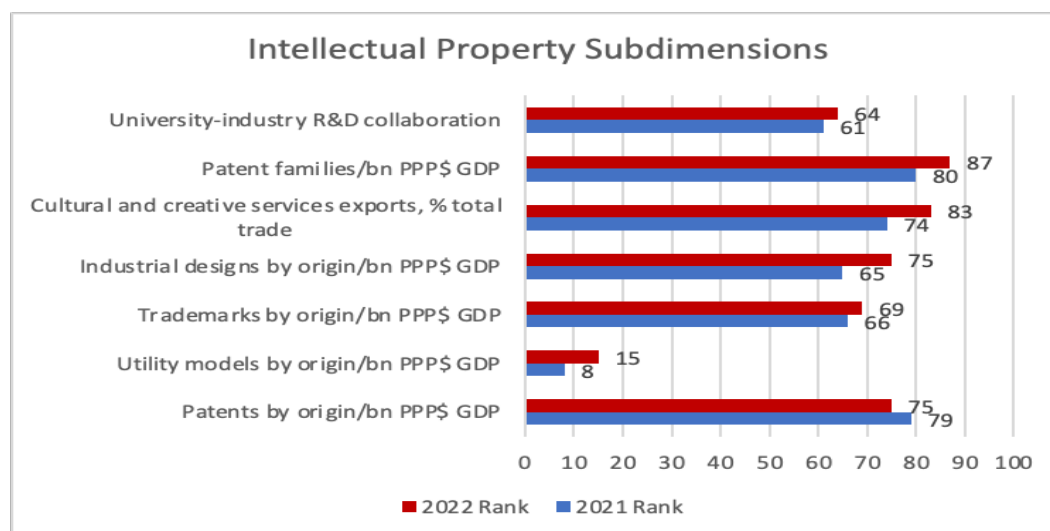
The 2022 Global Innovation Index (GII) report recognizes the Philippines for its potential to be an important player in the global innovation landscape, given it has one of the fastest innovations catch-ups to date (Arayata, 2022). The country ranks 59th among 132 countries and 5th among 36 lower-middle-income economies. Despite low inputs, the report also shows that the country's innovation performance is close behind some high-income European economies, such as Lithuania (39th) and Greece (44th). The Philippines also placed second in high-tech exports among neighboring economies in Southeast Asia, East Asia, and Oceania (WIPO 2022). Despite this seemingly positive performance, the country experienced a decline from its 2021 GII ranking of 51st out of 132.

Figure 1. Comparative global innovation index dimension scores of the Philippines (2021 vs. 2022)



Source: Global Innovation Index 2022 & 2021, WIPO

Figure 2. Comparative global innovation index scores of the Philippines for intellectual property-related indicators (2021 vs. 2022)



Source of data: Global Innovation Index 2021 & 2022, WIPO

2.2.3 Addressing innovation performance

With the release of the 2022 GII rankings, the Department of Science and Technology (DOST) has expressed continued commitment to improving the investments in science and technology (S&T) facilities and laboratory networks to support local industries, encouraging more government and private innovations (Ronda 2022). One program being implemented by DOST is the Science for Change Program (S4CP). S4CP was established in 2016 to improve innovation ecosystems in the regions outside the National Capital Region (NCR). The objective of S4CP is to significantly accelerate Science, Technology, and Innovation (STI) by increasing investment in S&T Human Resource Development and R&D. S4CP houses different projects⁵ that cater to HEIs with varying levels of R&D expertise (DOST 2021).

To support the development of agricultural research and innovations in universities, Higher education institutions can facilitate research through funding from government agencies such as

⁵ Four major S4CP projects are highlighted below (DOST, 2021), with links to their respective websites:

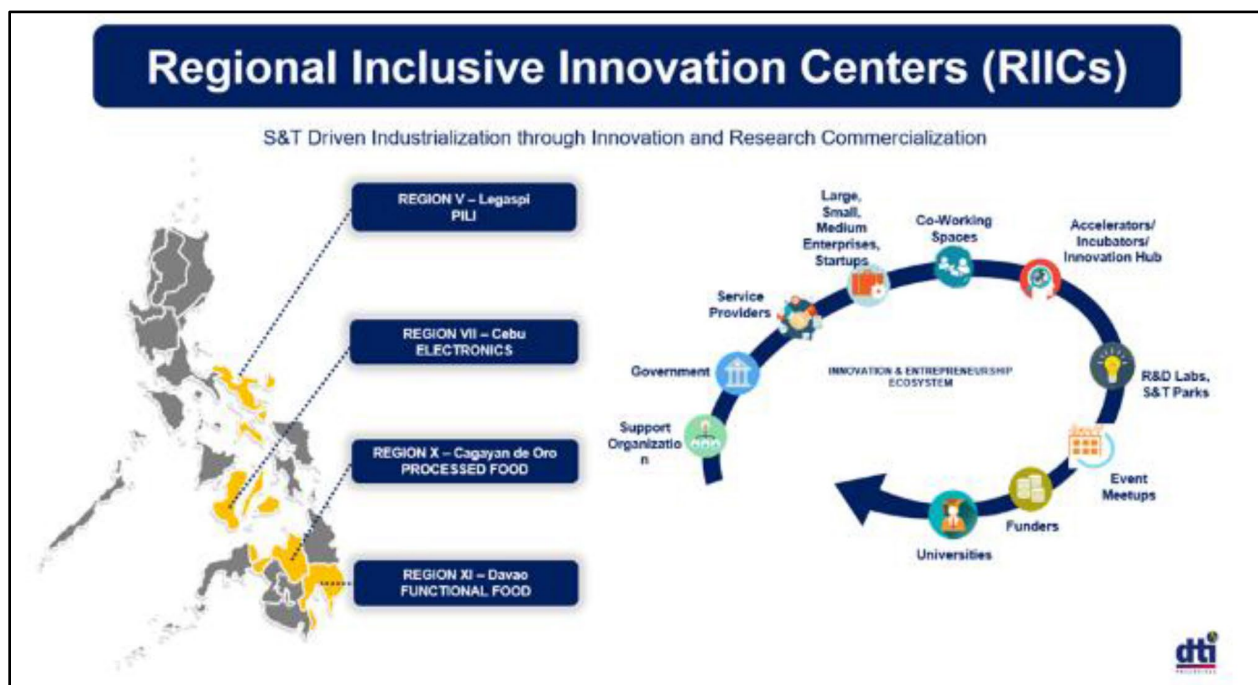
1. Accelerated R&D Program for Capacity-Building of R&D Institutions and Industrial Competitiveness (RD Lead): a mentoring program for RDIs (R&D institutions which include HEIs) that lack in-house R&D experts. Experts, called RD Leaders, are sourced out from other universities through the Balik-Scientist program.
2. Collaborative Research and Development to Leverage Philippine Economy (CRADLE): aims to promote collaboration of RDIs and Industry, recognizing that the industry, especially MSMEs, may not have sufficient R&D capabilities to produce outputs for industries.
3. Business Innovation through S&T (BIST): focuses on accessing expensive technological equipment by providing seed funds for local companies and MSMEs.
4. Niche Centers in the Region for R&D (NICER): aims to develop R&D capabilities in utilizing available commodities and expertise in the region to avoid duplication with other regions.

the DOST Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) and the Department of Agriculture-Bureau of Agricultural Research (DA-BAR). Research funding for agriculture and food processing is also provided by the Commission on Higher Education (CHED) and DOST-Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) (DTI 2018).

The government has also supported agricultural research and innovation through institutions such as the DA-Bureau of Plant Industry, which conducts crop research; DOST's Industrial Technology Development Institute for food processing and manufacturing research; and the DA's Philippine Center for Postharvest Development and Mechanization (PhilMech) which supervises research on post-harvest technology for key commodities (DTI 2018).

To connect with and integrate the innovation and entrepreneurial ecosystem of the country, the Department of Trade and Industry (DTI) established the Regional Inclusive Innovation Centers (RIICs). The RIICs envisions a “network of innovation actors that collaborate to commercialize market-oriented research towards the competitiveness of a region, which aims to generate better employment opportunities, more entrepreneurial activities, and sustainable economic prosperity in the country's regions” (DTI n.d.).

Figure 3. Regional inclusive innovation centers



Source: DTI (<https://innovate.dti.gov.ph/programs/riics/>)

2.2.4 Region VII innovation landscape

Central Visayas has been a key driver of the Philippine economy in recent years. During the period 2017-2021, the region accounted for an average annual share of 6.5% of the country's total GDP, only surpassed by the respective shares of the National Capital Region (NCR) (31.9%), Calabarzon (14.7%), and Central Luzon (11.1%) (PSA 2022). The economic strengths of Central Visayas can also be seen in its overall business landscape. In 2021, the region had 78,419 establishments in

operation, corresponding to 7.3% of the total establishments in the Philippines (fourth among all regions) (PSA 2021). Furthermore, in 2021, businesses in Central Visayas generated almost 774,000 jobs—around 10% of the total employment in establishments in the country (PSA 2021).

While the region is dominated by manufacturing and services sectors, agribusiness is considered one of the emerging industries in Central Visayas. The contribution of agribusiness to the regional economy mainly comes from industries that substantially utilize agricultural products as inputs, such as food and beverage, wood products, paper, and furniture (PSA 2020). In the 2018 Census of Philippine Business and Industry (CPBI), agriculture, forestry, and fishing only accounted for 0.9% of the total number of establishments in Region VII. The same industries constituted 1.2% of total employment and 0.3% of the regional value-added. On the other hand, agribusiness-related manufacturing covered 5% of the total number of Region VII firms and posted notably higher shares in regional employment (5.3%) and value-added (8.9%) (PSA 2020).

The food, beverage, and furniture sectors have significantly contributed to the growth of manufacturing in Central Visayas. The food and beverage sector constituted the bulk of manufacturing firms (51%) and accounted for 17.5% and 27.2% of regional employment and value-added, respectively (PSA 2020). The region, particularly Cebu, has also established its reputation as a major furniture production area in the country. In 2018, furniture manufacturing registered considerable shares in the number of establishments (7.4%), employment (6.1%), and value-added (3.6%) of manufacturing in Central Visayas (PSA 2020).

The region possesses a budding innovation ecosystem. RIIC has provided budget allocations for Region VII since 2018. However, it was not until 2021 that the Regional Development Council (RDC) signed a resolution to adopt the RIIC in Central Visayas (NEDA n.d.). A Regional Inclusive Innovation Committee (RIICom) was established in the region to connect a network of innovation agents, such as the government, higher education institutions, and the private sector, to commercialize and focus on market-oriented innovation research. Apart from DTI, other members from the government and private sector DOST, Department of Information and Communications Technology (DICT), Department of Education (DepEd), National Economic Development Authority (NEDA), Cebu Chamber of Commerce and Industry (CCCI), and Cebu IT-BPM Organization (CIB.O). Meanwhile, at least six HEIs in Cebu are invited to be part of RIICom: University of the Philippines Cebu (UP), University of San Carlos (USC), Cebu Technological University (CTU), Southwestern University (SWU), Cebu Institute of Technology University (CITU), and University of San Jose-Recoletos (USJ-R).

Central Visayas had total R&D expenditures of more than PhP 795 million in 2018 – the sixth highest among the regions. The private sector has also been relatively more involved in R&D activities in the region, based on expenditure (15.9% of total R&D expenditure in Central Visayas). However, given its high Gross Regional Domestic Product (GRDP), it has a lower ranking in the share of R&D expenditures in GRDP: 11th place among regions.

Like the other regions, the government was the primary source of R&D funds in Central Visayas (72%). However, it is interesting to note that the region exhibited one of the lowest percentages of funds sourced by the government. It was able to acquire a substantial amount of funds from the private sector (percentage), as well as foreign sources. It also registered the highest share of other sources among the regions, at 12% (DOST & UPLB INSTAT 2021, p. 62). The variety of sources of R&D funds in the region could indicate the presence of collaboration among the different regional innovation stakeholders (DOST & UPLB INSTAT 2021, p. 62)

The distribution of R&D funds in the region by sector is presented in Table 1. Private HEIs had mostly sourced their funds internally, as shown by the marginal shares of government and private sources. In contrast, the funding of public HEIs consisted of substantial percentages sourced by the government, as well as other sources. This suggests that collaborations between public HEIs and other innovation stakeholders, most notably the government, have occurred in the region. While government stakeholders mostly sourced their R&D funds internally, almost 6% were sourced from other government agencies, which could indicate inter-agency collaborations; signs of collaboration with the private sector and foreign entities could also be seen in their marginal shares in government R&D funds. Meanwhile, R&D activities seem to be non-existent among private non-profit organizations, as seen in the absence of R&D funds (DOST & UPLB INSTAT 2021, p. 62).

Table 1. Distribution of R&D funds in Central Visayas, by Sector, 2018

Sector	Sources of Funds				
	Institution's Own	Government	Private	Foreign	Other Sources
Private HEIs	100.0%	0.0%	0.0%	–	–
Public HEIs	36.3%	45.3%	–	–	18.4%
Government	93.6%	5.9%	0.2%	0.3%	–

Note: – means no data was observed; 0.0 means the share is less than 0.05, but greater than 0.

Source: 2018 Research and Development Survey Report, DOST and UPLB INSTAT (2021, p. 62).

In addition to the issues, Central Visayas has yet to build a critical mass of R&D personnel to sustain R&D and Innovation activities. The Regional Development Plan 2017-2022, published by NEDA Central Visayas, found that the number of researchers per million population (281 as of 2013) (NEDA Central Visayas 2017) is below the United Nations Educational, Scientific and Cultural Organization (UNESCO) standard of 380. 2018 data shows the region doing better relative to others but still below the UNESCO benchmark (380 researchers per million population) (NEDA Central Visayas 2017).

Table 2 shows the number of R&D personnel by region in 2018. In terms of totals, the region was mostly ranked within the upper half and has a relatively higher share of researchers among R&D personnel. However, in terms of totals in full-time equivalent (FTE),⁶ Central Visayas ranked lower. The same trend can be observed in R&D personnel figures per million population (DOST 2021).

⁶ FTE of R&D personnel is based on the ratio of working hours actually allotted to R&D activities divided by the total number of working hours (OECD 2015, p. 166).

Table 2. R&D Personnel by Region, 2018

Region	Total R&D Personnel		Researchers		Total R&D Personnel (per million population)		Researchers (per million population)	
	Total	FTE	Total	FTE	Total	FTE	Total	FTE
I - Ilocos	2,833	1,057	1,818	611	551	206	354	119
II - Cagayan	2,652	797	1,704	377	749	225	481	107
III - Central Luzon	4,130	2,146	2,487	1,161	357	186	215	100
IVA - Calabarzon	5,897	3,170	3,237	1,569	393	212	216	105
IVB - Mimaropa	979	354	725	169	315	114	233	54
V - Bicol	1,505	584	1,026	336	247	96	168	55
VI - Western Visayas	5,055	1,971	3,481	936	1,094	426	753	202
VII - Central Visayas	2,814	965	1,922	603	449	154	307	96
VIII - Eastern Visayas	2,904	981	1,845	629	625	211	397	135
IX - Zamboanga Peninsula	758	343	274	84	201	91	73	22
X - Northern Mindanao	2,296	985	1,497	542	474	203	309	112
XI - Davao	2,134	1,193	1,177	441	418	234	231	86
XII - Soccskargen	783	346	426	117	165	73	90	25
National Capital Region	16,477	7,789	12,243	5,819	1,258	595	935	444
Cordillera Administrative Region	1,925	648	1,008	281	1,074	362	562	157
Bangsamoro Autonomous Region	506	323	317	150	126	80	79	37
XIII - Caraga	915	384	661	242	335	140	242	88

Note: Region VII (Central Visayas) is shown in red for readability.

Source: 2018 Research and Development Survey Report, Department of Science and Technology (DOST).

2.2.5 HEI involvement in R&D and innovation - the nicer & cradle programs

Despite the limitations in R&D personnel and centralized funding sources for R&D, there have been bright spots in R&D and innovation in recent years. These have been achieved in part through the NICER (Niche Centers in the Region for R&D) and CRADLE (Collaborative R&D to Leverage the Philippine Economy) projects of DOST's Science for Change Project (S4CP). Capacitated through these programs, HEIs play a crucial role in implementing research programs for its target beneficiaries in the agribusiness sector.

The NICER Program

The goal of DOST's Niche Centers in the Regions for R&D (NICER) Program is to address the disparities in the regions' access to funding for R&D. Grants are awarded to eligible higher education institutions (HEIs) to enable them to use their current resources and capabilities to conduct high-quality research aimed at advancing regional development. To guarantee its socio-

economic impact in the area, a NICER proposal should be a distinct, cooperative project between HEIs, and endorsed by the Regional Development Council (RDC) (DOST 2021). In Central Visayas, two NICERs have been established: (1) the Biodiversity R&D Center, and the Environmental Informatics R&D Center. The Biodiversity R&D Center conducts assessments of biodiversity and natural resources on Cebu Island and is based at Cebu Technological University Argao Campus (DOST 2021). Meanwhile, the Environmental Informatics R&D Center at the University of the Philippines-Cebu studies the application of sensor systems and ICT for timely information and future projections of environmental impacts (DOST 2021).

The CRADLE Program

HEIs in the region have also spearheaded activities funded by the DOST's Collaborative R&D to Leverage the Philippine Economy (CRADLE) project. CRADLE seeks to foster local businesses' technological innovation and progress while also bolstering the expansion of the Philippine innovation ecosystem (DOST 2021). Through the program, R&D is conducted by the academic community and/or RDI in collaboration with Philippine businesses to enhance the latter's goods, procedures, and services, making them more competitive in their respective markets. Under this program, beneficiary companies must commit to adopting the developed solution and provide at least 20% of the funding (DOST 2021). This way, research outputs from the academy are directly translated commercially to the market.

One CRADLE project in Central Visayas is the “Black Soldier Fly (BSF) Farming for Agricultural Productivity and Waste Management” which is a collaboration between Chesed Farm (a local farm in Liloan, Cebu), which has supplied quail eggs and 25-day-old pullets in the Visayas and Mindanao since 2015. Chesed aims to expand its quail production to meet market demand but faces challenges, notably waste management. They currently compost quail manure, but it's a slow process. CRADLE is encouraging the use of Black Soldier Fly (BSF) technology, which can efficiently convert waste into valuable products like biofertilizers, prepupae feeds, and antimicrobial compounds. This project not only tackles waste issues but also offers additional income opportunities through organic compost and feed production (DOST 2021).

Another CRADLE project in Central Visayas is the “Carrageen Research & Development Lab (CR&De-L)” (DOST 2021). The CRADLE project by MCPI “aims to explore new applications for its existing carrageenan products to be used in creating soluble powders, paper and bioplastic sheets, gelation additives for various products, and gels with bioactive properties for 3D printable tissue scaffolds. The project involves collaboration with international experts from institutions like Tokyo University of Marine Science and Technology (TUMSAT) and Vrije Universiteit Amsterdam (VUA)” (DOST 2021).

These CRADLE and NICER projects highlight an innovation ecosystem that supports businesses closely tied to agriculture and environmental concerns (DOST, 2021).

2.2.6 Current issues related to HEI involvement

Funding issues for HEIs being focused on Metro Manila

According to 2019 data from the Commission of Higher Education, the concentration of RDE funding is largely in the major island of Luzon: NCR (344 HEIs including satellite campuses), Region IV-A Calabarzon (343), Region III Central Luzon (240), and Region V Bicol Region (170). Thus, it comes as no surprise that HEIs in the National Capital Region also received the most

resources from programs under DOST's S4CP in the past five years): less than half (46.8%) of disbursed funds of CRADLE, three-tenths (30.3%) of NICER and 16% of RD Lead. Meanwhile, Central Visayas, placing 5th in terms of the presence of HEIs (165), ranked 8th highest recipient of funds for both NICER (4.1%) and CRADLE (2.2%) projects, and 7th for RD Lead projects (6.3%).

Emerging Innovation and R&D Participation of HEIs

As presented previously, there is a lack of inputs (R&D Personnel) and non-governmental sources of R&D funding in the Region. Compared to other Regions, there are also a relatively small number of S4CP projects being undertaken in Central Visayas. However, HEIs supporting the conduct of innovation are evident in the offices established to support innovation and technology transfer. HEIs in Central Visayas such as CITU, CTU, Negros Oriental State University (NORSU), Silliman University, USC, USJ-R, and University of the Visayas (UV) established innovation and technology support offices (ITSOs) to encourage R&D activities, promote innovation, and protect the intellectual property rights of researchers in the university. CITU, NORSU, and UP have also dedicated technology business incubators to mainstream innovation and entrepreneurship.

There is some evidence of HEI involvement, particularly in agribusiness, such as the number of research institutions housed in Central Visayas HEIs conducting food-related (food processing, food manufacturing, packaging) research. These would include Cebu Institute of Technology University's Central Visayas Food Innovation Center, Cebu Technological University's Tuburan Campus Food Innovation Center, Cebu Technological University's Main Campus Institute of Food Science, Innovation and Technopreneurship, and Cebu Technological University's Tuburan Campus Center for Sustainable and Precision Agriculture.

Further, the DTI continuously implements innovation-related programs in partnership with HEIs to assist micro, small and medium enterprises (MSMEs). This is in line with one of RIICOM's objectives to build an innovation ecosystem focusing on advanced manufacturing. Fabrication laboratories (FabLabs) and 3D printers were made available in the region under the Shared Services Facilities (SSF) program which are utilized by MSMEs who cannot afford to acquire such equipment to build their prototypes and designs before mass production. Moreover, SSF Fab Labs serve as platforms for collaboration, co-creation, and knowledge-sharing among academia, industry, and government. Among prototyping services provided to individuals and businesses, fab labs further serve academia by providing an avenue to work on projects of commercial value (DTI, n.d.). Currently, there are seven FabLabs in Central Visayas housed by HEIs:

Since innovation ecosystems in Cebu are still perceived as emerging, albeit promising, studies at the sub-national level for the region remain limited. The question of how CRADLE and NICER projects have fostered more innovation and HEI-Private sector partnership is another research gap that needs to be answered.

HEIs Not Regarded as Important Sources of Information for Innovation by the Private Sector

A study in 2018 examining innovation among Philippine businesses and industry revealed that while 60% of firms were involved in innovation cooperation⁷ with HEIs, only 1.9% regarded HEIs as highly important sources of information on innovation (Albert et al. 2018).

Conflicting Perspectives Between HEIs and Other Actors on the Timeliness of Research and Innovation Production

Further, DOST's regional office in Central Visayas revealed in an interview that NICER projects in Central Visayas focus their efforts on available expertise instead of commodities.⁸ There is a need to realign the different perspectives of innovation actors and improve the synchronization of timelines between research production and research utilization. The academy argues that producing research is a thorough process that takes time, while industry players prefer fast-paced commercialization of these outputs.

3. Research Questions

The present research study addresses the following overarching question:

What lessons can be derived from analyzing the involvement of HEIs in LMICs in specific local and regional innovation ecosystems that could inform policies and strategies to enable LMIC HEIs to engage more effectively in and strengthen national and/or subnational innovation ecosystems?

To answer this question, the research team derived from the Hoffecker (2019) and 5Rs Framework (USAID n.d.) a series of research questions along five major themes: (1) Outcomes/Results; (2) Roles/Actors; (3) Relationships; (4) Resources; and (5) Enabling Environment/Rules. The research team used a mixed-methods approach to answer the following questions:

⁷ "Innovation co-operation is defined as active participation with other establishment or non-commercial institutions on innovation activities. Both partners do not need to commercially benefit" (PALAST 2006, p.7).

⁸ This is from an interview conducted with officials from the region in the process of crafting the Context Analysis Brief.

Outcomes/Results:

1. What are ecosystem actors' perceptions of the level of development,⁹ functionality, and purpose of the innovation ecosystems under study?¹⁰

Actors/Roles

2. What roles are higher education institutions in this study currently playing in the innovation ecosystems of focus?¹¹

Relationships

3. What is the level of coordination and partnership between key actors in the HEIs under study and the actors engaged in the innovation ecosystems under study?

Resources

4. **HEI Resource Needs:** What resources do the stakeholders at the higher education institutions included in the study need to be able to engage effectively in the innovation ecosystems of focus?¹²
5. **HEI Resource Provision:** What are ecosystem actors' perceptions of higher education institutions' provision of key resources needed for strengthening the innovation ecosystems of focus?

⁹ According to Hoffecker (informal conversation 2022) ecosystem actors can generally give a broad sense of the level of development, but are usually surprised about the actual number of actors in the system. Hoffecker suggests looking at the level of development according to broad categories, such as 1) large, vibrant, and well-developed, 2) medium, growing, in the process of diversifying, 3) nascent and underdeveloped.

¹⁰ We use a participatory approach to define "functionality" of the innovation ecosystem. This approach encourages ecosystem actors to define their goals for the innovation ecosystem and compare those goals with the current state of the innovation ecosystem and the process features needed to reach their goals.

¹¹ The roles outlined in detail by Hoffecker (2019) include innovate ("identify... and put to use new ways of doing things"), celebrate ("promot[e]... local innovators"), train, advocate, convene ("facilitat[e] mutually beneficial interactions" between key actors), connect (strengthen networks, relationships, and value chain development), fund, and share knowledge (Hoffecker 2019, p. 7).

¹² Hoffecker (2019) identifies the following resources: 1) natural resources, 2) human capital, 3) infrastructure, 4) social capital, and 5) financial resources as necessary for innovation ecosystem development (p. 8). In addition to the resources Hoffecker (2019) identifies, we would suggest adding resources to help research bridge the gap between invention and commercialization (see Jackson, 2011). We also identify relevant resources inductively through key informant interviews.

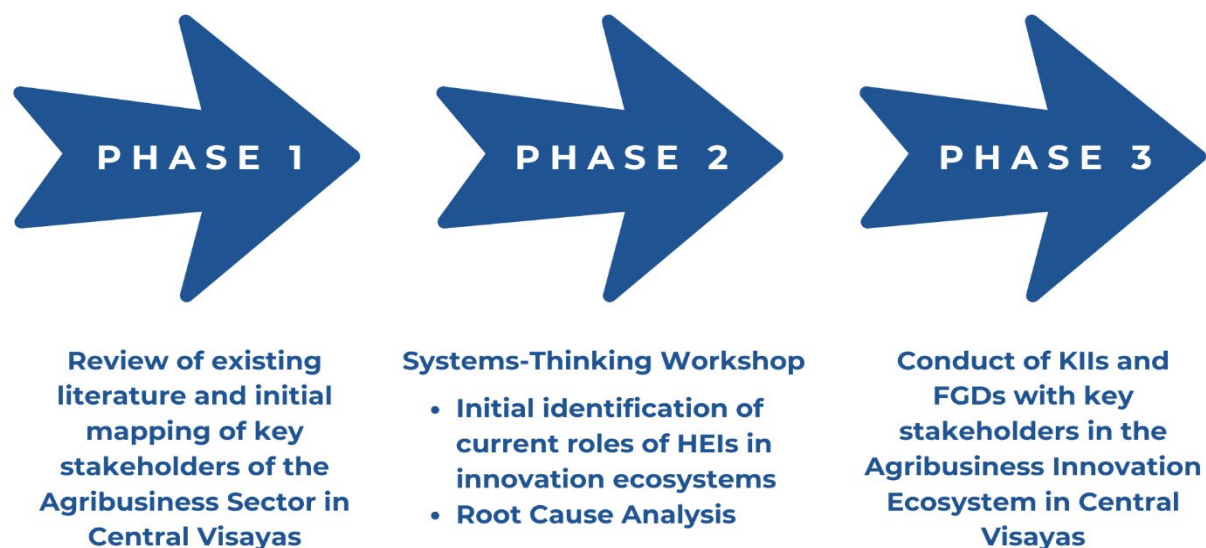
Enabling Environment/Rules

6. Policy

- 6.1. Government policy:** How does the policy/regulatory environment (legal formation, tax implications of investment, intellectual property protection, level of policy responsiveness to emerging new fields and needs) shape the incentives and disincentives for HEI engagement in innovation ecosystems?¹³
 - 6.2. Higher Education Policy:** How do higher education institutions' policies influence the incentives and disincentives for HEI engagement in innovation ecosystems (e.g., faculty and students' proclivity to engage and business interest in collaborating with HEI stakeholders to meet innovation needs)?
- 7. Market:** How do market-related factors in each country shape opportunities for HEI engagement in innovation ecosystems?
 - 8. Culture:** How do context-specific norms, perceptions, and values affect HEI actors' proclivity to engage in innovation ecosystems?

4. Methodology

Figure 4. Methodology overview



Source: SHARE/Authors' rendition

¹³ Hoffecker (2019) states “[t]he types of laws, regulations, and policies that exist in a location, as well as the manner and extent to which they are enforced, create the incentives—or disincentives—for innovation. From laws protecting intellectual property to regulations influencing the ability to start a new company to tax and certification policies, the legal, regulatory, and policy context directly affects the functioning and performance of local innovation ecosystems” (p. 9).

The study uses a mixed-methods research approach which follows three phases. Phase 1 involved a review of existing literature and an initial mapping of the relevant stakeholders of the agribusiness sector in Region VII-Central Visayas. For Phase 2, a systems-thinking workshop was conducted with stakeholders. Phase 2 initially identifies the current role of HEIs in Central Visayas with regard to their innovation ecosystems. Moreover, the workshop included a root cause analysis to better understand key issues preventing the agribusiness innovation ecosystem from reaching its full development and functionality. These two processes (analysis of the current stats of HEIs in their innovation ecosystems and root cause analysis to identify challenges for innovation ecosystem growth) are useful for greater evidence-based decision-making among the stakeholders involved in the innovation ecosystem, especially HEIs.

Phase 3 is a follow-up on key findings from the desk review and inputs gathered from the Systems Thinking Workshop, including further exploration of emerging key themes by interviewing important innovation ecosystem stakeholders. Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) with HEIs, entrepreneurs, economic development agencies, and government institutions are utilized to understand stakeholders' perceptions of the size and functionality of the innovation ecosystem, the various roles being fulfilled within the system, actors' ability to access needed resources, and the extent to which policies constrain or facilitate engagement in innovation ecosystems of the agribusiness sector in Central Visayas.

4.1 Sample Description

Table 6 presents the sample utilized in Phase 3 FGDs, KIIs, and Workshops. These include representatives from HEIs, the government, and the private sector.

Table 3. Final data collection of Stakeholders in the Innovation Ecosystem (IE) of the Agribusiness Sector in Region VII-Central Visayas

Respondent Type		FGD	KII
Government Representatives		13	2
Regional Offices of National Government Institutions		7	1
Local Government Units within Region VII		6	1
HEI Representatives		10	6
Public Universities		7	4
Private Universities		3	2
Private Sector Representatives		9	4
Industry		3	2
Development Partners		6	2
Total		32	12
Gender	Male	13	3
	Female	19	9

4.2 Limitations

The project explores the Agribusiness innovation ecosystem in the Central Visayas region. However, it is important to acknowledge and discuss the limitations encountered during the research process. Firstly, due to the nascent nature of the innovation ecosystem in the agribusiness sector, the commodities mentioned by interviewees may be limited to a few specific products, such as fiber, cacao, and mango. This limitation is largely dependent on the interviewees' knowledge and expertise, which may not encompass the full range of commodities in the region. Consequently, the findings may not reflect a comprehensive understanding of the innovation ecosystem across all agribusiness commodities.

Also, the representation of stakeholders in the various phases of the project posed some challenges. In the System Thinking Workshop (Phase 2), only 17 out of the 32 invited representatives from the government, HEIs, and non-government organizations attended. This limited participation may have impacted the depth and breadth of insights gathered during the workshop. Furthermore, the workshop had a higher representation of males compared to females. To address this gender imbalance, efforts were made to invite more women representatives during the KIIs and FGDs in Phase 3. However, the overall gender representation in the project may still be skewed, potentially affecting the perspectives and experiences captured.

It is also crucial to highlight that this study exclusively focused on universities and colleges and did not include Technical and Vocational Education and Training (TVET) institutions or polytechnic schools. This decision was influenced by the unique trifocalized education system in the Philippines. Under this system, the education sector is divided into three distinct subsystems: basic education overseen by the Department of Education (DepEd), higher education managed by the Commission on Higher Education (CHED), and technical-vocational education and training supervised by the Technical Education and Skills Development Authority (TESDA). Universities and colleges, which fall under CHED's purview, were chosen as the focus of this study due to their more prominent role in research, development, and innovation activities within the agribusiness sector. These institutions often house dedicated agricultural departments, research centers, and extension programs that directly contribute to the innovation ecosystem. While TVET institutions, regulated by TESDA, play a vital role in skills development and vocational training, their mandate and focus typically align more with practical skills acquisition rather than research and innovation. This structural separation in the Philippine education system influenced the study's scope. This limitation means that potential contributions from TVET institutions to the innovation ecosystem, particularly in terms of practical skills and technical expertise, may not be fully captured. Future research could benefit from exploring the role of TVET institutions to provide a more comprehensive view of the entire educational sector's impact on agribusiness innovation.

Despite these limitations, the project aims to contribute to understanding the innovation ecosystem within the region's Agribusiness sector. The findings, while not exhaustive, provide valuable insights into the challenges, opportunities, and dynamics of the ecosystem. Future research could build upon this work by expanding the scope of commodities studied, ensuring a more balanced representation of stakeholders, and further exploring the nuances of HEI categorization and engagement in the innovation ecosystem.

5. Findings

5.1 RQ1: Outcomes/Results

What are ecosystem actors' perceptions of the level of development, functionality, and purpose of the innovation ecosystems under study?

Agribusiness encompasses all the activities related to agriculture, involving farmers, processors, distributors, and consumers in a system responsible for producing, processing, transporting, marketing, and distributing agricultural goods (BOI n.d.). In Region VII, research participants' perceptions of the level of development of the AIE ranged from nascent and small to mid-level. The majority of the ecosystem stakeholders were optimistic about its potential, as technological advancements introduced by government agencies and institutions have spurred progress, leading to the development of various agricultural products and the improvement of production processes.

The functionality of the IE is impeded by the absence of clear plans of government agencies and public and private HEIs for the development of the agribusiness sector. The stakeholders interviewed perceived the purpose of the agribusiness IE to be to drive sustainable economic growth and transformative change in agriculture. The majority of them highlight the IE's role as an incubation hub, knowledge disseminator, and collaboration facilitator, stressing the importance of knowledge exchange and joint efforts among diverse stakeholders. With many of the roles in the IE satisfactorily fulfilled, the functionality of the ecosystem is high.

Purpose of the agribusiness innovation ecosystem

Most ecosystem actors interviewed perceive that the purpose of the agribusiness innovation ecosystem is to serve as a driver of sustainable economic growth in the region through the development of new products and processes that can address food security and increase the income of farmers in the region through upgrading and modernizing agri-business while also ensuring its long-term viability.

The role of innovation in the IE has led to the development of new products. Examples of these innovations produced through the IE include the development of new products to market, such as sweet potato chips, coconut, and palm oil. The IE has also supported innovations in aquaculture¹⁴ for *bangus* (milkfish) production, and mechanisms to address too much importation of grains. In the words of a representative of HEI representative:

“I think the current government is pushing for us to achieve food self-sufficiency. There's a big focus on aquaculture, especially *bangus* production.”

– Department chair at a private university

¹⁴ Defining the scope of the agribusiness sector has proven challenging due to the dynamic nature of its activities and the interconnections among its industries. Broadly, the agribusiness sector involves activities related to farm production, manufacturing and distributing farm equipment and supplies, as well as processing, storing, and distributing farm commodities. The agribusiness industry in the Philippines comprises approximately five subsectors, which include crop production, animal production (covering livestock and poultry), forestry and logging, fishery (including aquaculture), and agricultural support services and manufacturing (Bugador 2015).

This quote was chosen because achieving food self-sufficiency through a focus on aquaculture, as a part of the Agribusiness Innovation Ecosystem (AIE), signifies a strategic direction that can spur economic activity and growth within the region. Supportive of this direction, the local development authority in Central Visayas has noted in its Regional Development Plan 2023-2028 the thrust to modernize agriculture and agribusiness (NEDA 7, 2023). It also addresses food security by ensuring a stable supply of milkfish.

In addition, according to local government and private sector representatives, the AIE drives economic growth in the region by providing additional income to farmers and supporting the growth of new businesses. Some of the respondents perceive the AIE as a means of increasing the productivity of the farmers by providing them opportunities to add more value to their products, as the following quote from an interview with a representative from a national government agency illustrates:

"Success can be seen in terms of farm productivity, especially for our farmers, and also in terms of income. We hope for a continuous increase in income through value-adding processes."

– Representative from a national government agency

This quote indicates the government's recognition that the agribusiness innovation ecosystem can increase farmers' incomes through improved productivity and value-adding processes, which are essential elements of economic growth. The quote also aligns with the Regional Development Plan's strategy to modernize agriculture and agribusiness to generate quality jobs and competitive agricultural products.

Finally, all stakeholders interviewed also foresee the innovation ecosystem as a catalyst for transformative change, aiming to revolutionize the agricultural sector. This involves upgrading and modernizing agri-business while also ensuring its long-term viability. Most of the interviewed respondents emphasize the significance of attaining environmentally friendly economic growth and cutting down on carbon emissions. The majority of the stakeholders highlighted sustainable practices that may be explored within the IE, focusing on reducing wastage, especially in the production of agricultural products (e.g., dried mangoes, organic fertilizers, charcoal briquettes, paper, ink, flour, non-sugar products). For example, a representative from a private enterprise emphasized ways that can contribute to sustainable economic growth by supporting farmer incomes and promoting environmentally friendly agriculture:

"Cebu and the neighboring Bohol [are] very noted in tourism. Those [upland] areas with farmers, with tree nurseries, have plantation [...] we plan to have our own tree nursery and vegetable garden so that it could be farm-to-tables set up. If we have farmers and they have a plantation, why not incorporate it as part of the destination for tourism? It could help their livelihood because their patrons will increase, or if not the sales, then...we can beef that up with the farmers being the tour guides themselves."

– Representative of a private enterprise

The above quotation from the NGO respondent reflects the perception of the existence of an innovative business model where a farm-to-table setup not only contributes to sustainability but also opens a new stream of income for farmers, supported by local government initiatives.

Level of development of the innovation ecosystem

Ecosystem actors' perceptions of the level of development of the agribusiness innovation ecosystem ranged from small and nascent to mid-level. Some ecosystem actors from public and private HEIs and local government units expressed doubt over the existence of such an ecosystem due to the perceived lack of significant developments in the agribusiness sector. Also, some industry organizations emphasized that Region VII leans towards industrial activities and concentrates on manufacturing and services, particularly Business Process Outsourcing (BPO) entities. These are not directly engaged in agribusiness, and thus, they believe the sector is not a priority.

Official statistics about the region and the regional development plans, however, show that many of the industries and services in Region VII are, in actuality, related to agribusiness and agro-industries such as food and beverage, wood products, paper, and furniture. This finding points to the need to address the perception that agribusiness is disjoint from manufacturing and industry.

There is optimism regarding the potential of the agribusiness innovation ecosystem, as developments in agricultural techniques and products that employ or are made using technology are underway. Aquaculture is also being promoted in the Region, particularly in the production of *bangus* (milkfish). As part of its mandate, a local government unit has focused on the development and promotion of coconut and palm oil¹⁵. HEIs also mentioned the independent development of agricultural products such as camote (sweet potato) chips and goat cheese.

“We are still very small... I know Visayas State University (VISCA) has a lot of work, but they have not reached out[.] On the other hand, our farmers also seem like they have not changed.”

– City agriculturist from a local government unit

While various programs and activities have been initiated, discussions with local government units, HEIs, and industry associations show that the Agribusiness Innovation Ecosystem in Region VII is still in its nascency with farmers still adhering to traditional agricultural practices.

While key functions of the AIE are being fulfilled to a certain extent, such as knowledge and resource sharing, the agribusiness innovation ecosystem remains fragmented.

¹⁵ The national government, through the Philippine Coconut Authority, is distributing dwarf coconut seedlings to farmer's associations and cooperatives. The use of dwarf coconut seedlings represents an innovative technological advancement for the sector because it allows farmers to plant new seedlings without having to wait for their trees to reach a certain height before bearing nuts.

Local businesses, public and private HEIs, and cooperatives observe that the absence of clear and detailed national and local government plans obstructs the complete flourishing of a vibrant innovation ecosystem in Central Visayas' agri-business sector.

Government policies such as the “One Town, One Product” are also recognized by public and private HEIs as significant support for encouraging local product patronage and agribusiness innovation. Even with the integration of different innovations,

Without a clearly defined focus on agribusiness innovation, the government's approach to innovation extends beyond agribusiness to encompass other start-ups and participants in innovation initiatives. For example, the Department of Trade and Industry is supporting the development of start-ups and incubators. HEIs view start-ups as avenues of policy incentives for which they may receive funding and skills capacitation through incubator programs. There are positive responses to the government's programs for the development of start-ups particularly those geared towards agribusiness and agri-technology from private companies and venture capitalists. However, government units and HEIs perceive that the lack of a clear policy and defined strategies around which products to develop results in fragmentation of efforts.

We have been receiving proposals from different cooperatives across Cebu... they have their own unique products, only that they don't meet halfway because some would make goat cheese while some make other agricultural [products] while others made another thing but there is no common ground...its size is potentially large but only fragmented.” — Division chief from a national government agency

The above quote directly describes the innovation ecosystem as fragmented, with various entities working in silos without a unified direction or collaborative platform.

5.2 RQ2: HEI Roles

What roles are HEIs currently playing in the agribusiness innovation ecosystem in the Central Visayas region?

HEIs in Central Visayas play key roles in the agribusiness innovation ecosystem as knowledge sharers, innovators, conveners, and trainers. They partner with the government, the private sector, and NGOs to enhance agricultural technology and innovation, exemplified by projects like the materials library for the furniture industry. While offering significant research and development support, their financial role is limited.

Role	Definition
Knowledge sharers	“[P]roviding and sharing scientific knowledge, technical and practical know-how, information, and business intelligence” (Hoffecker 2019, p. 7).
Innovators	“Innovators identify, develop, and put into use new and improved ways of doing things within a specific local context” (Ibid).

Conveners	“This role involves bringing diverse members of the ecosystem together and facilitating productive, mutually beneficial interactions, whether in the context of working groups, stakeholder workshops and gatherings, task forces, or Innovation Platforms (IPs)” (Ibid).
Trainers	Training involves facilitating certain actors’ acquisition of “new mindsets, skills, and/or capabilities... whether in specific technical domains or more general business and leadership skills” (Ibid).

Primary function as knowledge sharers, conveners, innovators, and trainers.

Currently, higher education institutions in Region VII primarily serve as knowledge sharers, conveners, innovators, and trainers. Recognizing that these institutions generate and store knowledge, stakeholders in the innovation ecosystem highlight their role as knowledge sharers.

Knowledge Sharing

Often acting as the research arm for both the government and private sector, these institutions contribute to knowledge production and dissemination within the ecosystem. One specific example mentioned involves an HEI participating in a materials library project in collaboration with the DOST, the European Chamber of Commerce of the Philippines (ECCP), and a non-governmental organization. This project establishes a repository of materials (e.g. textiles, fabrics, swatches) used in the furniture industry, accessible to the public for research purposes.

"There was a project between Matic which is an NGO and DOST and ECCP before it was left by ECCP called the materials library, and in it they had the swatches of practically every single material that is used for the furniture industry in Cebu... companies and students would just go there and do research... It would not be possible if we didn't have the cooperation of the state university UP, USC (University of San Carlos) also, and UC- Cebu at that time, and (uhm) also CTU Argao for the fiber research." – Digital Fabrication Manager at a public HEI

The materials library also serves as a platform that links suppliers, processors and HEIs (research institutions) for the development of new and innovative products. The HEIs provided technical expertise related to materials-related research and fiber-related research. Their research products and collection of hard-to-find books on textile and materials also became part of the materials library collection. The quote was selected because it directly addresses the role of HEIs as knowledge sharers, highlighting their function in disseminating information and expertise, especially to researchers, companies, and students interested in the furniture or fiber industry which is part of the AIE. It captures the essence of HEIs' role in sharing knowledge and expertise, underscoring the educational and informational aspects of their contribution to the AIE.

Participants also highlighted various partnerships with government entities like the Department of Agriculture (DA), the Bureau of Fisheries and Aquatic Resources (BFAR), and others to connect with farmers in the communities to provide technical and business support. For example, an HEI respondent mentioned that they partner with farmer communities in the Municipality of Bantayan

and Alegria to transfer knowledge and provide business-related support. The respondent mentioned that Alegria is a municipality known for organic hog farming, so the HEI supports them in their value chain management. Other partnerships with government agencies include the operation of hubs (DOST), Food innovation centers (DTI) and even the CRADLE (DOST-PCIEERD).

Conveners and Connectors

In their role as conveners, HEIs can bring together diverse stakeholders, including those from the government, private sector, civic organizations, farmer groups, and other educational institutions through conducting research projects (E.g. CRADLE which is hosted in the HEI brings together industry, government and HEIs in order to conduct research and address specific problems of the industry stakeholders [see page 18]), providing access to fabrication laboratories including specialized workshops that support the application of technologies available in these fabrication laboratories¹⁶, and hosting networking events with a goal of making innovations accessible to small businesses.

HEIs have also collaborated with industry players such as the Ramon Aboitiz Foundation Inc. (RAFI). HEIs link farmers to RAFI to facilitate funding for farmers' innovation activities or adoption of new technology. One respondent private HEI mentioned that they have a good network of farmers and a good working relationship with some NGOs who are able to provide funding to farmers to support their attempts to adopt new technology.

“We (Private HEI) have a healthy relationship with RAFI and other NGOs that have some funds; that help the community. Like for example, the one in Bantayan where we help the seaweed farmers in Doong and in Lipayran. The Ambit Foundation shared some money to help the farmers, trying the technology that we (Private HEI) thought will work.” – Department Chair at a Private University

The quote highlights how Private HEIs through their network of farmers and other NGOs are able to bring together these groups in order to support their innovation activities through the provision of funding for new technology.

Emphasis was placed on the role of HEIs as conveners through their incubator and accelerator services for emerging enterprises and start-ups. Stakeholders acknowledged the efforts of HEIs in collaboration with the Department of Trade and Industry (DTI), Department of Information and Communications Technology (DICT), and Department of Science and Technology (DOST) in supporting the startup ecosystem in the region. The following excerpt from a conversation with the head of a technology business incubator at a private university emphasizes the following:

¹⁶ Examples of workshops include textile design workshop, toy making workshop, Exploring Mold Making through 3D Scanning to 3D Printing & Vacuum Forming Workshop and others. These workshops bring together MSMEs and technical experts from the HEIs and private sector to help MSMEs explore the technologies available to them from the fablabs.

"Conveners – through the Food Innovation Center, they have activities (e.g. food fairs, research, etc.) that convene the food [manufacturers and] the farmers that are into innovating their food [production] processes." – Head of a technology business incubator at a private university

The quotation illustrates how HEIs act as conveners, bringing together various stakeholders (like farmers and innovators) to collaborate and innovate in specific sectors such as food processing. The food innovation centers mentioned in the quote is part of the program of the DOST and DTI. "It serves as a hub for innovations, research and development, and technical support services for value-adding fresh produce and development of processed foods in different regions in the country." (DOST-PCIEERD nd, p. 2). This quote from a private HEI representative was chosen to show how HEIs create platforms for interaction and collaboration, which is essential for fostering innovation and development within the industry.

Innovators

HEIs are also recognized as innovators, playing a role in advancing agricultural technology, processes, and products through research and development. Specifically, engineering students from HEIs engage in innovative efforts by conducting research and development. For example, there are ongoing explorations into alternative applications for the cinnamon industry, and the development of lights using biotechnology is also under consideration.

"[T]hey (HEIs) have R&D units there and there is [sic] products of their research so those products can be adopted by agribusiness who are interested" – Representative from a national government agency

This government representative's quote was selected as it acknowledges the innovative capacity of HEIs through their research and development (R&D) units. It highlights the role of HEIs in producing research products that can be directly adopted by the agribusiness sector, thus positioning them as key innovators within the ecosystem. Other ecosystem stakeholders, such as private sector representatives and cooperatives, also share a similar perception.

Trainers

In addition to producing knowledge, ecosystem stakeholders such as government units and cooperatives view HEIs as trainers, imparting knowledge to students and industry professionals in both technological aspects and entrepreneurship. Utilizing digital technologies, HEIs have conducted training sessions through free webinars that have imparted knowledge on agriculture to students, farmers, and MSMEs.

"Trainers. Aside from being an educational institution, I was able to visit their (HEI) facility and listen to their welcome talks and they're actually promoting R&D of various ways of agribusiness." – Representative from a national government agency

This quote from a government official emphasizes the training function of HEIs, noting their efforts in promoting research and development in agribusiness. During the welcome talks, the speakers provide a background of the facility and enumerate the various services that the facility can provide to the trainees and participants, such as food skills training, food innovation research and using the equipment to test their products. The quote was selected because it reflects the recognition of HEIs' role in providing targeted training and education to enhance skills and knowledge in specific sectors alike agribusiness. All actors affirm that—apart from being knowledge sharers – HEIs serve as trainers.

It is also important to note that HEIs are also tailoring their course offerings to meet the demands of the AIE. HEIs are actively engaged, with certain universities introducing an Entrepreneurship curriculum due to significant student interest. For example, to address this rising demand, an HEI has forged a partnership with the Department of Agriculture to enhance HEIs' capabilities by developing additional course offerings related to agriculture. Presently, the curriculum offers two tracks: culinary and agribusiness, with potential plans to include aquaculture in the future.

Support for Research and Development

Existing partnerships between HEIs and agricultural enterprises have been established through knowledge transfer of agri-technologies and innovations to address the research requirements of the latter.

HEIs' research portfolio encompasses innovative approaches to waste utilization, such as converting mango waste into alternative flour and exploring uses for coffee, cacao, and banana by-products. HEIs are also at the forefront of reviving traditional industries, exemplified by CNU's work on the cinnamon industry. Sustainable farming practices are another key focus, with research on organic hog farming and seaweed cultivation. Food innovation centers within HEIs are driving product development and supporting local SMEs. Additionally, HEIs are addressing environmental concerns through biodiversity conservation research and exploring the potential of agri-tech solutions. This multifaceted approach to research demonstrates the significant contribution of HEIs to the agribusiness innovation ecosystem, fostering sustainability, economic growth, and technological advancement in the agricultural sector.

5.3 RQ 3: Relationships

What is the level of coordination and partnership between key actors in the HEIs under study and the actors engaged in the innovation ecosystems under study?

The collaboration between higher education institutions and other actors within the agribusiness innovation ecosystem in Region VII is multifaceted with varying degrees of strength. Some Public and Private HEIs demonstrate active involvement through curricular enhancements and strategic partnerships, particularly with government agencies and NGOs. In contrast, some business groups that mentioned they have limited awareness of HEI activities and initiatives mention limited connection to HEIs. Despite early-stage challenges and certain sectors, such as farmer cooperatives and SUCs without agribusiness/agriculture curricula remaining disconnected from other actors in the innovation ecosystem, public and private HEIs emphasize strong connections within the Agribusiness Innovation Ecosystem. HEI's involvement in driving collaboration within the innovation ecosystem is influenced by funding, infrastructure, human resources, and leadership.

Existing actor networks have the potential to enhance opportunities for HEI partnerships in the AIE.

The degree of cooperation in general is high.

Most public and private HEIs in the ecosystem affirm that collaboration between HEIs and other participants in agribusiness is strong. They highlight the robust connections between government, the private sector, and HEIs through substantial collaboration in research projects, training, development of innovative technologies, and extension programs among key players in the Agribusiness Innovation Ecosystem.

According to the FGD respondents, such as HEIs and government units, a bidirectional relationship is observed between HEIs and government units where HEIs support the government with research, training, and community services, and HEIs depend on government support for funding, technology transfers, and commercialization. Due to limited capacities, local government units (LGUs) frequently rely on HEIs to perform research tasks, such as specific technical research for the products they plan to support.

Public and private HEIs highlight strong partnerships for capacity-building programs and funding with national government agencies such as the Department of Agriculture (DA), Bureau of Fisheries and Aquatic Resources (BFAR), Department of Interior and Local Government (DILG), Department of Science and Technology (DOST), Department of Trade and Industry (DTI), and the National Economic Development Authority (NEDA). HEIs have successfully engaged in various joint projects with national and local government bodies, such as the collaboration between UP and DOST for the CRADLE Program (See page 18).

Additionally, in its efforts to support MSMEs, the Department of Trade and Industry has collaborated with USC to enhance the competitiveness of their products. Workshops were conducted to improve branding and online presence for these MSMEs. Moreover, DTI collaborated with UP and CTU to organize communication workshops aimed at enhancing the online visibility of MSMEs through various promotional materials, like Facebook ads. DTI also hosts gatherings and networking events to connect stakeholders within the innovation ecosystem which have been beneficial for MSMEs to expand their network and link with HEIs that provide training.

Cooperatives, local enterprises, and public HEIs also highlighted robust partnerships with the private sector. Respondents cited successful collaborations with PhilExport, Cebu Export, and the Cebu Chamber of Commerce and Industry. Despite having their own R&D departments, businesses in the industry frequently engage with HEIs to execute comprehensive research projects. The industry representative of the weaving company mentioned that while their R&D department is capable of research, the technicalities and procedures are not as comprehensive as what is produced in HEIs, which is why they partner with a certain HEI. They combine the results of the research with what they know about the market in order to support their business. Research endeavors are aligned with the most recent market trends and existing demand. Although certain products have not reached commercial production levels, significant backing from the private sector has been evident, such as the HEI's registration of utility models for various culinary innovations developed with support from local businesses.

Perceived moderate level of interaction

However, an HEI representative highlights a more moderate level of interaction between higher education institutions and other ecosystem stakeholders, such as the private sector and national and local government units. This is attributed to the early stage of the ecosystem's development and the emerging misalignments on priority products to develop which are promoted by HEIs and funding entities, such as the private sector and government. Additionally, some HEI representatives note that certain SUCs remain disconnected from stakeholders within the innovation ecosystem as they have yet to adopt agricultural innovations in their curricula. Although there were initial collaboration efforts for agribusiness between HEIs and government agencies, such as the RAISE Program¹⁷, some of these initiatives were eventually discontinued. However, ongoing efforts are acknowledged in terms of faculty development for research and innovation.

A private sector stakeholder emphasized that collaboration involves a two-way dialogue that can sometimes lead to disagreements during the innovation process. Developing new products that meet market demands is particularly difficult when collaboration is required. While one party might envision the potential of a new product or process, this vision might clash with the perspectives of others, potentially impeding the realization of innovation. Consequently, individuals in the design industry might hesitate to engage in collaborations due to these challenges.

An industry representative noted the best practices of other ASEAN nations that have established robust partnerships with various local communities. For instance, the University of Chiang-Mai in Thailand has undertaken diverse research endeavors focused on plant-based dyes, surplus materials, and combinations for leather that incorporate fibers. They have also established a textile library that designers and artisans can access. The industry representative expressed that a lack of awareness of ongoing research for plant-based dyes and materials such as leather hinders the replication of the textile library in Central Visayas.

This observation is highlighted further by another respondent from a business group who mentioned that he is not aware of any engagements of the university in agribusiness. The respondent continues to mention that while he may not be aware, it may be because the researches and engagements of the HEIs are not being publicized. Such limitation not only prevents the practical application of research but also hinders the formation of new partnerships.

Some public HEIs remain skeptical about the engagement and active participation of HEIs with stakeholders in the innovation ecosystem, primarily due to the observed limited agribusiness activity within HEIs. HEIs acknowledge the absence of full integration of agribusiness within their curricula. Although several State Universities and Colleges (SUCs) have embraced different technologies, these advancements in agriculture applications are yet to be implemented.

Finally, another ecosystem actor, a government representative, highlights the need for HEIs to improve their engagement with stakeholders.

¹⁷ The Regional Agri-Aqua Innovation System Enhancement (RAISE) Program of the Department of Science and Technology - Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) involves 53 SUCs and research and development institutes implementing 83 project components categorized as regional intellectual property technology business management office, regional agribusiness hub, regional agri-aqua technology business incubator, and regional knowledge management hub.

"Most of the clients who goes to our agency comes from the SUCs to inquire about certain fiber crop; if or where the product can be procured, and it stops there. After that, we don't know what happened." – Representative from a national government agency

The above quote indicates a perception that while HEIs, particularly SUCs, engage with government agencies to inquire about agribusiness-related products, there is a lack of follow-through and feedback on the outcomes of these inquiries. The participant suggests that HEIs could improve their communication and engagement with ecosystem stakeholders to ensure more effective collaboration and resource provision. HEIs should also strengthen the knowledge databases and product information that they provide to the public and government agencies so that they can position themselves as indispensable sources of information that the stakeholders would be happy to continue engaging with.

Partnerships influenced by financial, human resource, and HEI leadership factors within HEIs.

The interviewed participants from academia, government units, and industry acknowledge that technology, funding, infrastructure, extension services, human resources, HEI management, and an innovation council¹⁸ play essential roles in fostering collaboration between stakeholders in the innovation ecosystem and HEIs.

a. Faculty have limited time to effectively engage in the AIE.

HEI faculty often have little time to effectively engage in the AIE. Faculty members' constrained teaching schedules within HEIs often hinder the pursuit of research and collaborations for innovation.

Nevertheless, technological advancements have facilitated smoother communication among parties through email, chat, and video calls. A representative from an HEI mentioned that establishing partnerships proved challenging when done in person due to faculty members' constrained schedules caused by teaching commitments.

Time constraints and incentives for faculty to focus on publishing in academic journals similarly inhibit faculty's effective partnership with industry, government, and local stakeholders. Some public HEI and industry participants expressed partnership challenges, indicating that involvement is high in certain areas, such as applications of emerging technologies in different fields, but is not consistent across all agricultural domains. They note communication issues where results and applications of research studies were not effectively shared across industry players, local government units, and HEIs. Representatives from industry organizations and local enterprises pointed out a communication gap where research findings are not effectively shared with stakeholders. Moreover, the scholarly nature of research conducted by HEIs impedes collaboration, as findings often don't translate into actionable policies. As faculty members

¹⁸ Innovation councils are networks of stakeholders related to specific innovation ecosystem ((e.g. Central Visayas Food Innovation Council [CVFIC], Regional Development Research Council [RDRC], Central Visayas Agriculture, Aquatic and Resources Research, Development and Extension Consortium [CVAARRDEC]. These councils provide leadership and identify goals and activities related to the innovation ecosystem they are part of.

prioritize publishing their research, there is limited involvement or continuation of engagement with local communities.

b. HEI leadership

As budget allocation is often decided by top management, HEI leadership which is supportive of the agribusiness initiatives stands as a crucial factor in enabling collaborations and partnerships as they decide which programs to fund and undertake. An HEI respondent fondly recalls the role of their former president in pushing for their HEI to support Region VII through research on food security. It is through his leadership that initiatives such as the Carolinian Bridges¹⁹, TBIs and Fablabs were established in their HEI.

“There has to be that leader who will prod you, “Come, come! We can do something here.” Otherwise, we will [be] just left waiting.” – Representative from a public HEI

The quote above emphasizes that for the agribusiness innovation ecosystem to grow, strong leadership with a targeted focus on agribusiness initiatives must empower faculty, researchers, and students. This underscores that direction-setting by the HEI leadership encourages researchers to engage in the agribusiness sector.

However, the periodic turnover in HEI leadership introduces some uncertainty around whether budget priorities of previous administrations will be maintained, thus inhibiting sustainable agribusiness partnerships with HEIs.

c. Financial constraints

HEIs rely heavily on government funding and the absence of adequate resources, particularly capital, dissuades innovators from engaging in research and development and collaborative efforts. While HEIs try to seek funding from other sources—such as the private sector—they do not ensure sustainable funding in comparison to dedicated budgets allocated by governments.

d. Extension services and HEI infrastructure attract AIE actors

Extension services and the availability of robust infrastructure are facilitators of HEI seen as vital components for effective integration into AIE. Public and private HEIs emphasize the pivotal role of HEIs in furnishing innovators with research and development facilities, as well as necessary equipment or resources for production.

Established actor networks enable HEI partnerships

The role of associations and networks as an enabler of collaboration between HEIs and AIE actors is underscored by HEI representatives and industry representatives. Two such networks mentioned by research participants are farmers' associations, organized by the farmers themselves, and innovation councils, organized by the government.

¹⁹ Carolinian Bridges is a regional technopreneurship forum launched in 2019 at the University of San Carlos. It was established to strengthen the linkages in the sci-tech driven entrepreneurial ecosystem.

Farmers' associations make substantial contributions to partnerships in the innovation ecosystem by expanding the network of farmers and linking them with HEIs and government agencies that can provide training for upskilling and funding. A public HEI stakeholder mentioned a farmer's association led by a barangay captain who received significant support for its research projects from the municipal mayor.

Research participants emphasized that a dedicated council for innovation activities is essential for integration into the innovation ecosystem and the execution of programs. This points to the need to have a regional council that would take the lead and convene the AIE stakeholders in order to have a more vibrant innovation ecosystem in which knowledge and ideas are freely transferred to farmers. Research participants indicated that regional councils (e.g. Central Visayas Food Innovation Council [CVFIC], Regional Development Research Council [RDRC], Central Visayas Agriculture, Aquatic and Resources Research, Development and Extension Consortium [CVAARRDEC]) can facilitate collaboration for ease of program implementation. As these councils are already in place, respondents suggest that they should continue to actively work on building more partnerships with various stakeholders such as universities, government agencies, cooperatives, farmers' organizations, and private sector companies, provide more direct support to farmers, and serve as a bridge with other sectors.

5.4 RQ4: HEI Resource Needs

What resources do the stakeholders at the higher education institutions included in the study need to be able to engage effectively in the agribusiness innovation ecosystem of Region 7?

The key resources needed by HEI stakeholders to effectively engage in the agribusiness innovation ecosystem include capacity-building and professional development opportunities, access to research grants, continued funding for HEI laboratories and infrastructure, incentives and recognition for faculty to undertake research, direction setting from HEI leadership and administration, opportunities for collaboration and partnerships with other stakeholders in the agribusiness ecosystem, and information dissemination platforms to present research findings and new innovations by HEIs. By providing these resources, HEIs can create an enabling environment that empowers their stakeholders, including innovators, professors, researchers, and administration, to actively contribute to the growth and advancement of the agribusiness sector through innovation and research.

Capacity-building and professional development training

According to representatives from public HEIs, faculty and researchers require capacity-building and professional development opportunities to enhance their skills, knowledge, and expertise in agribusiness innovation. An HEI participant highlights that while R&D is already part of their mandate, translating research into innovation and a business enterprise is a skill that needs to be developed among the faculty and researchers.

"Required resources would be capacity-building.. [to address the] difficulty in compliance of commercialization...those desired resources... are available yet limited in BISU²⁰ with regards to the agribusiness innovation ecosystem". – Vice President in a Public HEI

The quote above supports the need for capacity-building programs that not only focus on research and innovation skills but also foster an entrepreneurial mindset among faculty and researchers. Participants from public HEIs interviewed also emphasize the importance of training that addresses the difficulties in the commercialization process of R&D (e.g., infrastructure for production, capital for initiating an enterprise, etc.) and expand the network of the HEI stakeholders in the AIE. The importance of training faculty in establishing effective partnerships with industry stakeholders also emerged among public HEI stakeholders.

"For me, partnership, maybe other, other partnership [with], other industry, other - any- anything that ... stirs up or support our initiatives in, in CTU²¹, it's very welcome." – R&D Center Director of a public HEI

The quote suggests that capacity-building should include training on developing partnership and collaboration skills among HEI faculty to effectively engage with industry partners and support agribusiness innovation initiatives.

Research grants, funding and physical capital

HEI stakeholders, particularly researchers, require access to research grants and funding to pursue their projects and ideas in the agribusiness sector. HEI participants fondly recalled how, through government funds, they were able to pursue research and innovation projects in the agribusiness sector.

"There [is] a lot of funding from DOST (Department of Science and Technology), from DA (Department of Agriculture), ... [and] other funding agencies. [...] So, there are different funding agencies that support, but when you say 'is it enough?' of course it's not enough because we have many needs" – R&D Center Director of a public HEI

While the quote points to the crucial role that funding from government agencies like the DOST and the DA plays in enabling HEI stakeholders to undertake research and innovation activities in the agribusiness sector, it also implies that government agencies are not able to fund everything because of the different needs of the HEIs.

²⁰ BISU refers to the Bohol Island State University which is a public higher education institution located in the Province of Bohol, Philippines.

²¹ CTU refers to the Cebu Technological University which is a public higher education institution located in the Province of Cebu, Philippines.

Industry representatives interviewed perceive that HEIs do not have access to adequate financial resources to support their research and innovation activities. An industry representative reported that private companies are reluctant to fund these activities in HEIs because the outputs from these activities are not immediately generated.

"I understand that [private companies] are reluctant to fund [as] there is no automatic output, but what needs to be (uhm) conveyed all the time is the output of this is not immediate, but it snowballs. ... [I]f they would fund this research, the result [would] affect other research, which [would] inch closer to what is more relevant to you. ... [T]here is [an] exponential effect- it's not immediate but exponential." – Manager at a private company

This quote suggests that industry actors perceive that funding research for public HEIs is difficult to secure, as organizations that would provide alternative funding – apart from government – such as private enterprises, business organizations, etc. expect immediate benefits to be derived from the research of HEIs for practical applications in the industry.

Funding is also particularly crucial due to the infrastructure and physical requirements of HEIs, who need well-equipped facilities that have the necessary materials, machines, and equipment to conduct research, innovate, and engage with stakeholders in the agribusiness innovation ecosystem. An HEI participant mentions how the state-of-the-art facility funded with the support of government agencies that they have been using since 2015 is able to support the biological and physio-chemical analysis of products developed in the HEIs. Other innovations and prototypes are also produced in makerspaces that provide access to state-of-the-art technology, such as 3D printers and laser cutters.

"Our research laboratories were equipped by CHED [Commission on Higher Education]. Modesty aside, we [were] given approximately around 70 million already since 2015 in support of science equipment not only biology, physics, chemistry... [S]o as of the moment, we already have the GCMS [Gas Chromatography-Mass Spectrometry], we have HPLC [High performance liquid chromatography], we have the AAS [Atomic Absorption Spectrophotometer] so we have this [these] sophisticated equipment that could really study important biological as well as physico-chemical component of our commodity and then that's basically our counterpart for the funding that we are asking or seeking from DOST" – Director in a public HEI

"If we want to make different prototypes that require maybe 3D printing, laser cutting so especially if we are developing technologies and we want to create some kind of prototype so we can have it made in maker-space. – Manager in a private HEI

The quotes above also illustrate the importance of having substantial government funding to ensure HEIs have well-equipped research laboratories with sophisticated equipment to analyze and study various components of agricultural commodities, which is essential for driving innovation in the sector. It also highlights the need for HEIs to have facilities like makerspaces that enable

prototyping and the development of new products, which, in turn, support innovators and entrepreneurs in the agribusiness sector.

HEI representatives also perceive that public HEIs that are mandated to have research facilities for specific areas should be funded by Congress to ensure that resources are available to meet this mandate.

"[Funding] should be part within the planning of the entire University and it should be lobbied to congress, especially for the funding that if there is really the establishment of different research institute in the University, it should... this should be budgeted with certain budget in order to ahh achieve the visions of the research institute and of course in line to agriculture". –
Director at a public HEI

The quote from a respondent who came from a public HEI illustrates the perception that HEIs need to have adequate funding through dedicated budgets. It also mentions the role of lobbying efforts to secure funding for the operation of research institutes focused on agriculture and agribusiness innovation.

Recognizing that the government cannot fully fund all the R&D and innovation activities of the HEIs, government representatives acknowledge the presence of other possible sources of funding that can support the innovation and entrepreneurial activities, such as venture capitalists, private businesses, and large corporations that wish to conduct R&D.

"[I]f there are possible partners for them [HEIs] from private individuals or groups or venture capitalists. In the startup market, the VCs are very interested to partner with the likes of them". –
Representative from a national government agency

This quote indicates that government actors perceive the potential for HEIs to access financial resources through partnerships with private investors and venture capitalists who are interested in agribusiness startups.

Recognition in the form of financial rewards and robust support from HEI leadership

Public and private HEI faculty and researchers are aware of the recognition and incentive structure to encourage and motivate them to engage in the agribusiness innovation ecosystem but express that these incentives are insufficient.

"The president of the university gave us a presidential citation for recognition for those faculty who engage and reach to the final phase of research, and that is publication so, but in terms of monetary, we have not received any, unlike other universities." – Director in a public HEI

This quote suggests that while non-monetary forms of recognition, such as presidential citations, can be valuable incentives for stakeholders in the HEIs, there is also a need for financial incentives to further encourage and reward HEI stakeholders for their contributions to agribusiness innovation.

Meanwhile, a representative from a public HEI noted that policy guidance from HEI leadership and administration is also required to effectively engage in the agribusiness innovation ecosystem.

"The key factor is really support and also a mandate and not only financial support, but also ... a mandate for us to have a time or a system in our university wherein it fosters those particular initiatives ... of those centers and faculty, and also it ... encourages the faculty will be ... more - encouraged to participate and to initiate programs [in agribusiness]." – R&D Center Director of a public HEI

The quote emphasizes the importance of having a mandate to support innovation, which encourages centers within higher education institutions and faculty to engage in and start programs within the agribusiness innovation ecosystem.

Sustainable collaboration and partnerships

According to public and private HEIs, they need opportunities to foster a deeper form of collaboration and partnerships with Industry, farmers, NGOs, and other stakeholders in the agribusiness innovation ecosystem to exchange knowledge, share resources, and work together on innovative projects. An HEI participant highlighted the need for the right kinds of partnerships, where both parties have unified interests, such as a specific product they wish to develop, to foster collaboration and relationships with stakeholders, ensuring growth over time.

"I think one of the barriers is the right partnership because, personally, in our sectors, we have [had] a lot [of] partnerships before. It did not grow because it is not their [partners'] priority. [W]e usually go to [the] government, go to *baranggay*, to do this training and all. [W]e have this NGO [partner] that has been with us since 2020. During the pandemic, they came to us, and it's been a good partnership until now. And we're able to contribute our resources, our expertise, and our technology, and in return for the partnership, they also created a program within their organization which expanded to different regions. – R&D Center Director of a public HEI

The quote highlights the importance of establishing the right partnerships that align with the priorities and goals of HEI stakeholders in advancing agribusiness innovation. The HEI respondent in the quote cites their partnership with an NGO that the respondent felt is a good example of a partnership that stood the test of time because of the common goal of addressing the challenges of the pandemic. Because the partnership was also forged during the pandemic, it may also be a reason for the partnership with the NGO to continue even until now. Meanwhile, other respondents concur with the need to establish long-term partnerships, suggesting that collaboration with other

HEIs and experts is crucial for HEI stakeholders to access a wider range of specialties and expertise.

Dissemination platforms for HEIs

Related to fostering partnerships would be providing HEIs with the platform to promote the research and development products and innovations that are happening in their institutions. As one non-HEI observer noted, they face difficulties working with HEIs because of their limited awareness of HEI research and innovations. Another industry participant raised the issue of not having a unified database to consult whenever they are looking for HEIs with whom they can form partnerships.

“They [HEIs] don't advertise. We [the private sector] don't know what they offer. It's a guessing game.” – Head at a private sector company

“It would be easier for private organizations like us to look for the products of the other organizations, what are the agribusinesses, what are the products. And there are also other organizations even not listed that are looking for potential partners or even beneficiaries.” – Manager at a private sector company

The first quote suggests that HEIs need to actively promote and advertise their research and innovations to engage with the private sector and other stakeholders. The participant emphasizes that without proper information dissemination to present research findings, such as on agricultural products and developed technologies for farming, the private sector is unaware of what HEIs can offer, making it challenging to establish supportive collaborations. Representatives from HEIs also support this finding, noting that while other faculty members focus on publication for academic purposes, dissemination of research for application is often neglected. There is a need for a centralized database or repository of HEI research, innovations, and partners. The industry participant suggests that such a database would make it easier for private organizations to identify potential partners, beneficiaries, and agribusiness products, fostering greater collaboration and support for HEI initiatives.

Supporting this observation, an industry representative proposed the idea of a research fair or platform for HEIs to showcase their research and innovations. Industry stakeholders agree that there is a need for HEIs to be more proactive in promoting their research products for the industry to be encouraged to work with them.

"I'm thinking of something more proactive, for example, like a science fair or something or (uh) like HEIs will present [their] research[h] ... "this is what [has] been [published in] our peer [reviewed] journals in the past years" ... And this is how this thesis can be converted in a ... meaningful way in your industry. What is the relation of this thesis? What is the relation of this project or (uhm) capstone research, for, for example, [to] the auto industry or for the furniture industry ... We also have fellow designers that - they do not know where to approach or who to approach ... [to] do a research on this." – Manager at a private sector company

The quote presents the challenge faced by the industry in collaborating with HEIs but, at the same time, proposes the development of a proactive platform, such as a science fair or research presentation, where HEIs can showcase their research and innovations to industry stakeholders. The participant suggests that such a platform would help bridge the gap between HEI research and industry needs, making it easier for stakeholders to approach HEIs for collaboration and support.

5.5 RQ5: HEI Resource Provision

What are ecosystem actors' perceptions of higher education institutions' provision of key resources needed for strengthening the Agribusiness Innovation Ecosystem in Region VII?

Agribusiness ecosystem actors have nuanced perceptions of HEIs' provision of different types of resources needed for strengthening the agribusiness innovation ecosystem. Industry and NGO representatives recognize the diverse expertise, specialized knowledge, and network resources of HEIs while also emphasizing the need for financial resources to support research and innovation. Government representatives acknowledge the skilled manpower, infrastructure, and technology resources available in HEIs, as well as their trust in HEIs' capacity to support community-based projects. HEI representatives themselves highlight their provision of specialized infrastructure, technology resources, and network partnerships with industry associations and government consortiums. These varied perceptions underscore the multifaceted role of HEIs in providing different types of resources to support agribusiness innovation and the importance of aligning these resources with the needs and expectations of different ecosystem actors.

Human capital and expertise housed within higher education institutions (HEIs)

According to industry representatives, the human capital and technical expertise in the HEIs are valuable for their research and information needs. One Industry representative from the consulted experts mentioned that they are pleased with experts in Cebu who can research upcycling and waste management. A similar observation can be made from government representatives interviewed who believe they have a lot of experts in the HEIs. Concurring with these two is the NGO that highlighted the impressive expertise present in public HEIs included in the study.

"For me, I think it better- like for Cebu, at least, we really need someone to do research on waste management- waste management and the conversion of waste to upcycled materials...." –
Manager at a private company

"When it comes to expertise, we have a lot of experts [in HEIs]." – Representative from a
research consortium

"I think their [CTU] human capital, their resources, they are I think they [CTU] are in terms of human capital I think they are more advance and prepared and [ahh] they are more knowledgeable and then maybe [ahh] as HEIs I think it's part of their curriculum? [ahh] it's part of their curriculum to their they already have it in terms of how they contribute to the ecosystem"
– Manager at a multi-purpose cooperative

These quotes suggest that stakeholders from industry, government, and civil society organizations perceive HEIs as having the necessary manpower and expertise to research agribusiness and related topics such as waste management and material upcycling, which would have practical applications for industry. This is also affirmed by a representative from a research consortium which emphasized that HEIs house experts who can conduct necessary research for agribusiness. The NGO representative even hints at some HEIs having agribusiness as part of their curriculum as having better expertise than other HEIs.

While faculty members are equipped with expertise and knowledge, there is a need to empower students to engage in research for innovation. The expertise of graduates significantly impacts HEI involvement. An industry organization in the innovation ecosystem stressed the necessity of forestry and data management skills. For example, an industry representative noted during the interview that some plantation specialists lack exposure to environmental subjects in their curriculum (e.g., tree identification), leading to the hiring of graduates from other institutions due to their proficiency.

This collective acknowledgment from various stakeholders underscores the perception that HEIs have the technical expertise necessary for advancing research and innovation within the agribusiness ecosystem.

Physical infrastructure and advanced technological resources within HEIs

Government representatives interviewed recognized the infrastructure and physical resources available in HEIs as an important resource in the agribusiness innovation ecosystem. A government representative mentioned that certain public HEIs have adequate land resources, while other respondents (HEI representatives) highlighted various laboratories present on their campus.

"I think the university has a lot of laboratories. [We have an] engineering laboratory. We have a laboratory also here in the School of Business and Economics. So, we believe that we can tie up with partners in improving the technology." – Chairman of Private HEI

The quote illustrates how HEI representatives perceive their HEIs to have access to well-equipped research laboratories and sophisticated technology that can be leveraged to study and develop agribusiness innovations.

Areas for improvement: need for practical research and effective stakeholder engagement

Some representatives from local businesses and industry associations identify areas where HEIs could enhance their resource provision to better support the agribusiness innovation ecosystem. For instance, an industry representative mentions the need for more practical and relevant research.

"We want to create an environment that makes it interesting and something that is not just interesting but something that they can say 'we can gain from it.'" – Manager at a private company

This quote suggests that HEIs should focus on conducting research that is not only interesting but also provides tangible benefits and value to stakeholders in the agribusiness sector. This reflects the private sector's need to have access to profitable research and innovation.

5.6 RQ6: Government Policy and HEI Policy

A. Government policy: How does the policy/regulatory environment (legal formation, tax implications of investment, intellectual property protection, level of policy responsiveness to emerging new fields and needs) shape the incentives and disincentives for HEI engagement in Agribusiness innovation ecosystems in Region VII?

National policies significantly impact the engagement of HEIs in agribusiness innovation ecosystems. Procurement laws can hinder HEIs by imposing stringent procedures and limiting their entrepreneurial activities. Civil service regulations that prevent additional remuneration for public HEI staff involved in innovation activities further discourage participation. However, supportive policies like the Philippine Innovation Act and the Innovative Startup Act of 2019 provide crucial funding and incentives for innovation, although these mandates require consistent congressional support. Tax exemptions for cooperatives also encourage partnerships by maximizing financial resources. Responsive policies addressing emerging issues, such as climate change, support HEIs by funding research into climate-resilient crops and adapting to new challenges, thereby fostering agribusiness innovation and meeting the evolving needs of stakeholders.

National-level policies

Interviewed representatives from HEIs perceive the procurement laws (a national-level policy) as a hindrance to their engagement in agribusiness innovation ecosystems as they prolong and complicate the process of acquiring materials, equipment, and even consultants.

“I think one of the challenges is the procurement policy. I think [for] most researchers, that is the primary obstacle. ... We get the funding, then it reaches us many months later nearing the deadline, and we have to make the most of what we have. So that – the procurement policy – is something that, even as an institution, we are affected by this, because we have to follow certain rules. There are things you need to purchase, and then you have to follow – [and] sometimes it would not be reimbursed.” – R&D Center Director at a public HEI

A representative from a public HEI highlights the restricting impact of procurement policies on their ability to engage in entrepreneurial activities and innovation. For example, one project director at a public HEI commented that:

"Commission on Audit and Procurement laws of the Philippines because the university is not built to run a business.... Everything has to be procured through the procedures of the procurement laws of the Philippines, which does not favor enterprise." – Project Director at a public HEI

The quote suggests that stringent procurement laws can disincentivize HEIs from engaging in agribusiness innovation and entrepreneurship, as they stifle researchers' enterprising spirit.

Another national-level policy that constrains the participation of HEI researchers and faculty in the agribusiness innovation ecosystem is the regulations related to the civil service. The civil service rule restricts personnel from public HEIs from receiving additional remuneration for entrepreneurial engagements at the university.

"We cannot [receive] additional pay for doing entrepreneurial work for the university because we have designations, and that is according to the civil service laws" – Project Director at a public HEI

The quote suggests that civil service laws and regulations can limit the ability of HEI faculty and staff to receive additional compensation for engaging in entrepreneurial activities, which may discourage them from participating in agribusiness innovation collaborations. Similarly, a representative from a public HEI mentioned that the Commission on Audit restricts faculty engagement in entrepreneurship activities as they are mandated to audit the income generation of government and state personnel.

In addition, government bureaucratic processes and the lack of clear government policies can create disincentives for collaboration. An HEI representative mentions how misaligned objectives have prevented partnerships from flourishing.

"I think the activity [in the AIE] it really depends on the time. There are times that the planning is okay, but then during the implementation, there are many things going on in the LGU. So, sometimes, it's difficult to accommodate the different programs. I think that area is a challenge for us. And also, maybe difficulties in collaborating. I think [the] relationship with the LGU, if we don't have a good relationship with the LGU, it's really hard to, to present your program there, to coordinate with the mayor, and it really takes a lot of patience when we coordinate with them. Sometimes, they, they, we would coordinate- many, many times the schedule would be changed, postponed because (uh) these personalities also have other engagements." – R&D Center Director at a public HEI

This quote highlights that the absence of clear partnership policies and misaligned priorities can hinder the growth and sustainability of collaborations between HEIs and agribusiness stakeholders. Such experiences may deter faculty from pursuing more partnerships and prevent their participation in the AIE. However, a government representative mentioned that accelerators are being conducted in Cebu for agribusinesses and start-ups with the participation of HEIs, which aims to discuss partnership proposals and provide access to grants from DOST-PCIEERD.

On the other hand, non-profit organizations and government respondents from our group of interviewees have recognized that the national government has continued supporting the innovation activities of HEIs. The NGO respondent is familiar with two innovation-related laws enacted by the Philippines in 2019: The Philippine Innovation Act and the Innovative Startup Act. These laws aim to improve firm productivity through innovation and increase economic activity in businesses by supporting the creation of startups.

“Two new laws supporting start-ups [were passed] in 2019. The laws mandates not only DTI, DICT but also DOST to provide funding.” – Lead at a start-up ecosystem builder

This quote indicates that legal mandates for government agencies to provide funding for startups can create incentives for HEIs to engage in the agribusiness innovation ecosystem as this ensures that funding may be made available. However, there is a need to ensure that these mandates are funded by Congress, so lobbying may play an important role in ensuring that these laws are fully implemented (See RQ 5). While restrictive procurement laws may limit HEI involvement in entrepreneurial activities, supportive policies that provide funding can significantly encourage their engagement in agribusiness innovation.

Tax exemption to incentivize partnerships

The tax environment and its implications for investments can influence HEI engagement in the agribusiness innovation ecosystem as it encourages partnerships with institutions exempt from paying taxes. An NGO representative highlights the tax incentives available for cooperatives.

“We have a tax exemption if we're able to comply with the requirements. All our members should have [a] tax identification number. Under the Cooperative Development Authority, all cooperatives should be exempted [from] taxes. So, we paid no tax.” – Chairperson of a multi-purpose cooperative

This quote suggests that tax exemptions for cooperatives²² can incentivize HEI partnerships and engagement with these organizations in the agribusiness sector because it ensures that the partners are able to maximize their financial resources as these are not reduced by taxes.

²² In the Philippine legal framework, cooperatives are defined as “autonomous and duly registered associations of persons with a common bond of interest who have voluntarily joined together to achieve their social, economic, and cultural needs and aspirations by making equitable contributions to the capital required, patronizing their products and services, and accepting a

National policy responsiveness to emerging issues

Government administrations' specification of priority themes (e.g., climate change, disaster and risk reduction and management) encourage HEIs to develop research studies and innovations that align with such themes. An industry representative observed that national policies, such as national development plans promulgated by the NEDA, which are industry roadmaps created by DTI, DOST, and the Department of Tourism (DOT), addressing emerging issues in the agribusiness sector, such as climate change, encourage HEIs to engage in the AIE, motivating them to fill gaps in stakeholders' (i.e., those engaged in farming) information needs. An NGO respondent concurred with this, observing the need to develop climate-resilient crops. Additionally, a professor from a public HEI emphasizes aligning priorities with development goals:

fair share of the risks and benefits of the undertaking in accordance with universally accepted cooperative principles" (RA 9520, Article 3).

“When we craft proposals, we basically align international development goals, national development goals and then the regional development goals. We align all [priority programs] of these government agencies [NEDA, DOST, DTI, DOT]. See the potential linkages and interconnectivity of each agency. Then, we can create a good story and overarching statement of the problem, which will address a big need in the society. [...] We focused on instructional materials because that’s where we are being tapped with our expertise by CHED, DEPED. So I think on a bigger scale, if we do research, we also do extension, we’re not just doing it for the purpose of localized need.” – Professor at a public HEI

The quote underscores how HEIs align their innovation initiatives with international and national development goals. Additionally, it suggests that HEIs are driven to conduct research and extension programs to address needs within their community while also supporting national objectives.

B. Higher Education Policy: How do higher education institutions’ policies influence the incentives and disincentives for HEI engagement in innovation ecosystems (e.g., faculty and students’ proclivity to engage and business interest in collaborating with HEI stakeholders to meet innovation needs)?

HEI’s policies related to research and publication, intellectual property, extension and community engagement, and collaboration and partnerships play a crucial role in shaping the incentives and disincentives for HEI faculty and researchers to engage in agribusiness innovation ecosystems. Policies that recognize and reward engagement, provide clear guidelines and support, and facilitate meaningful collaborations can encourage faculty, students, and researchers to actively participate in agribusiness innovation activities. However, policies that are overly restrictive, bureaucratic, or misaligned with the needs of the agribusiness sector can create disincentives for engagement.

Research and publication policies

HEIs included in the research often prioritize research and publication as key criteria for faculty promotion and recognition. This policy can create both incentives and disincentives for faculty who wish to or are currently engaged in agribusiness innovation. On one hand, it encourages faculty to pursue research that can lead to innovations in the agribusiness sector. On the other hand, the focus on publication can also create disincentives for engagement if it is not aligned with the practical needs of the agribusiness sector.

"Doing research and extension is a requirement for promotion. We do not get any monetary remuneration when we make or help accelerators or when we develop social enterprise[s]. We don't have any additional wage from it. What we get is the equivalent points to help us be promoted to higher rank." – Project Director at a public HEI

“[F]rom what I've observed in UP, the goal is still in publication. That's the focus.” – Director from a Public HEI

The first quote illustrates that research and publication policies incentivize faculty to engage in agribusiness innovation to advance their careers, while the second quote highlights that the overemphasis on publication can disincentivize faculty from engaging deeply with agribusiness stakeholders and translating their research into practical applications.

Effective intellectual property (IP) policies are vital for fostering innovation

For Private HEIs in the study, the policy environment surrounding intellectual property (IP) protection significantly influences HEI engagement in agribusiness innovation. For instance, a HEI representative emphasizes the importance of IP policies for innovation. Private HEIs value the implementation of IP policies as these act as documentation of the ownership of R&D outputs and innovations.

"So the IP Policy or the intellectual property policy is a policy that we follow here in the university for different innovation activities. [It] is mentioned there who should own the outputs and Ownership. How should it be assigned if ever [these] are protected? [T]hen we have, partnerships... then of course it [IP] should be part of that, it should be part of the agreement to be considered" – Manager from a Private HEI

The quotes suggest that clear IP policies within HEIs can provide incentives for researchers and innovators to engage in agribusiness innovation by protecting their outputs and defining ownership arrangements.

Extension and community engagement policies

According to the perception of private HEI representatives, HEIs' policies on extension and community engagement foster participation in agribusiness innovation ecosystems by incentivizing stakeholders through recognition and rewards. For example, a representative from a private HEI explained that policies aimed at making a meaningful impact on communities have motivated faculty to work with farmers and meet their needs through innovative solutions. The representative highlighted the role that HEI administration plays in the direction-setting of programs and activities to be undertaken by the university in support of agricultural communities:

"We have this community extension service, and normally this is for farmers and them. [HEI administration] want us [faculty] to really have an impact on the communities. So to have an impact, there has to be an innovation in terms of the proper way of doing things or growing vegetables, for example." – Chairman of a Private HEI

This quote explains how extension policies that prioritize impact and innovation can incentivize HEI stakeholders to engage with farmers and develop innovative solutions for the agribusiness sector. Relatedly, another HEI representative highlighted how the integration of extension into the curriculum created opportunities for engaging in the AIE.

"In return, all of those experiences from our community engagement, we bring with us back to our classroom to improve our teaching and learning practices, so we kinda like the research and extension endeavors of the faculty. It also helps our students to take their education more relevant and not just something like 'zoned out.'" – Project director at a public HEI

The quote above reveals how policies linking extension activities with teaching and learning can also create incentives for both faculty and students to actively participate in agribusiness innovation ecosystems by facilitating knowledge exchange between communities, faculty, and students. Teachers' and students' hands-on training from farmers empowers them to see the practical applications of theoretical lessons taught within the classroom.

Partnership policies

HEI policies that encourage and facilitate the establishment and funding of partnerships can create opportunities for HEI stakeholders to work with businesses and address real-world challenges. A government representative mentioned that several schools have already incorporated agriculture-related courses with opportunities for immersion, i.e., opportunities for students to directly engage and interact with farmers on their farms, in their curricula.

"They [HEIs] are also very interested in the partnership. In fact, in some schools, it is already part of their curriculum, especially for agriculture-related courses, to have immersions and experiences in agribusiness practices. They can adopt different agribusiness practices from the stations they collaborate with." – Representative from a national government agency

This quote suggests that policies integrating partnerships and immersions into the curriculum can incentivize students and faculty to engage with agribusiness stakeholders and gain practical experience. These can become foundations for interest in engaging in the AIE.

5.7 RQ7: MARKETS

How do market-related factors in the Philippines shape opportunities for HEI engagement in the agribusiness innovation ecosystem in Region VII?

The emerging agribusiness sector encounters obstacles such as a limited comprehension of the supply chain and its intricate network of involved actors in facilitating product movement from farm to market. These challenges are compounded by middlemen who restrict farmers' access to resources and information, which affects pricing. HEIs can mitigate these issues by researching and improving the agribusiness supply chains, thus empowering farmers to navigate the market effectively. Additionally, the reliance on imported agricultural products hampers local agribusiness growth. HEIs can enhance local product competitiveness through targeted research and development. Moreover, addressing the skilled labor shortage in agribusiness through education that is aligned with industry needs bolsters sector sustainability.

Limited understanding of the overall supply chains

As the Agribusiness industry is still nascent and growing, there is still limited information available to businesses regarding the sourcing of their products and their demand. Industry and local government unit respondents directly point to the knowledge gap surrounding the agribusiness supply chain and explicitly call for HEIs to address this issue through research. The first quote from an industry participant (IND) expresses the difficulty of participating fully in the sector without a clear understanding of the supply chain. This underscores the need for HEIs to step in and fill this information void.

"How can we help if we don't know the supply chain?" – Representative from a private company

"The agriculture industry's value [supply] chain is problematic. It still needs better understanding, better research on how to improve the supply chain." – Representative from a local government unit

A local government unit participant concurred on the critical need for HEIs to conduct research and provide insights into the various components and linkages within the agribusiness supply chain through the quote above. These quotes emphasize the current lack of comprehensive knowledge about the agribusiness supply chain and the important role that HEIs can play in bridging this gap through their research and expertise. By investigating and shedding light on the complex network of actors, processes, and relationships involved in bringing agricultural products from farm to market, HEIs can contribute to a more holistic understanding of the sector and identify opportunities for improvement and innovation.

Middlemen restricting farmers' access to resources

Related to the limited understanding of the overall value chain in the agribusiness sector is the concentration of information to middlemen/traders, who are often the only source of information on prices for farmers.

An industry participant suggested that middlemen or traders can limit farmers' access to essential resources and information, leading to information asymmetry. A government representative concurs by observing that farmers having limited know-how on being entrepreneurs are cheated by middlemen as goods are being bought at cheap prices.

"Traders are the ones blocking the accessibility [to raw materials and production inputs]" –
Owner of a private enterprise

"That [Farmers are poor, and it seems they are waiting for handouts. They are not entrepreneurs] is why they get cheated by the middleman. Goods are bought cheap. – Government representative from Regional office

This presents a clear opportunity for HEIs to engage in the agribusiness innovation ecosystem by conducting research and providing solutions to address information asymmetry and the power imbalance caused by middlemen. By mapping the value chain and identifying the roles and practices of various actors, HEIs can help create a more transparent and efficient system. This was suggested by an industry participant when he inquired about whether HEIs can support farmers to handle middlemen and also support their needs by providing sources of pricing information.

"[C]an the higher education [institutions] or can the academic institutions come in as a partner? So that the farmer partners will be continually capacitated in terms of what are the current trends in vegetable farming now? And then, can they [farmers] also be educated or be trained in terms of handling middlemen and pricing? – Manager at a private company

The above quote highlights how industry representatives perceive the potential for HEIs to empower farmers by equipping them with the knowledge and skills needed to navigate the value chain and negotiate better terms with middlemen.

Overdependence on agricultural imports

Industry respondents in our sample acknowledge the overreliance on imported agricultural products like grains, which could harm the local agribusiness sector by diminishing demand for locally produced goods and constraining growth opportunities for domestic farmers and agribusinesses.

“There's a lot of imported products because our consumers continue to support consuming its products. If we can re-engineer it [consumers] not to buy the apple even if he sees it, then he will not buy it, it will rot, and no one will import it, so we go back to eating guava, we go visit the mountains, mango which is our own local product.” – Owner of a private enterprise

As the Industry participant points out in the quote above, consumer preference for imported goods further exacerbates the issue of import dependence. As a result, local agribusinesses may struggle to compete with imported products, leading to stagnation in the development of the domestic agribusiness sector.

These market-related challenges present an opportunity for HEIs to engage in the agribusiness innovation ecosystem by focusing their research and development efforts on enhancing the competitiveness of local agricultural products. HEIs can work on developing new varieties of crops that are better suited to local conditions, improving yield and quality, and reducing the cost of production. By doing so, HEIs can help local farmers and agribusinesses to produce crops that can compete with imported products in terms of both quality and price. A representative from a public HEI recounts how a community sought assistance from a university to connect them with faculty experts. The representative also highlighted that HEIs are willing to collaborate with local agribusinesses and provide support through their technical expertise.

5.8 RQ8: Culture

How do context-specific norms, perceptions, and values affect HEI actors' proclivity to engage in innovation ecosystems?

Context-specific norms such as a focus on research and publication and a lack of entrepreneurial mindset among HEI stakeholders, perceptions of agribusiness as irrelevant or outside of HEI expertise, and values placed on community engagement and producing quality graduates all shape HEI actors' proclivity to engage in agribusiness innovation ecosystems.

Prioritizing research and publication

According to the perception of some interviewees from academia, the norm of prioritizing research and publication over engagement with policy and people can significantly limit HEI actors' involvement in the agribusiness innovation ecosystem. An HEI participant points out that the focus of HEIs and even government agencies is still on publication.

“The goal, if you look at DOST, for example, they have the 6P's objective, and from what I've observed in [the university], the goal is still in publication. That's the focus. Not that much on policy and people.” – Director from a public HEI

This quote highlights how the emphasis on research output and publication metrics can overshadow the importance of engaging with stakeholders and contributing to policy development. When HEI actors are primarily driven by the need to publish, they become less inclined to invest time and resources in building relationships with industry partners, understanding the needs of the agribusiness sector, and translating their research into practical solutions. Public and private HEIs view that this norm can create a disconnect between academic research and the real-world challenges faced by the agribusiness innovation ecosystem.

Another prevailing norm is focusing on education for employment rather than entrepreneurship. This can hinder HEI actors' engagement in the agribusiness innovation ecosystem. This norm has been observed by an NGO participant, who said that the mindset of parents is for education to become employed.

"I guess the mindset installed by their parents is to just go to school and get a job. That mindset should be removed because we are not here just to become employees, but to create employment opportunities as well." – Director of an agriculture cooperative

This quote underscores how the traditional view of education as a pathway to secure employment can limit HEI actors' ability to foster an entrepreneurial spirit among students and faculty. When the primary goal is to prepare students for jobs rather than encourage them to create new ventures, HEI actors are less likely to engage in agribusiness innovation activities involving risk-taking, creativity, and the development of new products or services. This norm can stifle the potential for HEIs to be drivers of innovation and economic growth in the agribusiness sector.

Perceptions of agribusiness as a low-priority area

The perception of agribusiness as a low-priority area can limit HEI actors' engagement in the sector. This is reflected in the quote from local enterprise participants who have already mentioned that the region's focus is manufacturing and industry. HEI respondents also perceive this as well.

"HEIs are busy with doing some other things rather than agriculture and agribusiness. There are very few of them, but we have [a certain Private HEI], we have [a certain Public HEI], but they are only few." – Representative from a public HEI

This quote suggests that certain HEIs may view agribusiness as less important than other areas of study or research, leading to a lack of focus and investment in the sector.

Another driver of this perception would be younger generations losing interest in farming and agriculture. This loss of interest in farming and agriculture affects enrolment in agriculture-related courses, signaling to HEIs that agribusiness is not a priority. Such was the observation made by a local government representative.

"Younger generations seem to be losing interest, and students are no longer eager to enroll in related courses." – Representative from a Local Government Unit

This quote summarizes a common observation mentioned during the systems thinking workshop and FGDs about the disinterest in agriculture and how it affects enrollment in agriculture courses. As HEI actors perceive agribusiness to be a less prestigious or relevant field, they become less motivated to engage in innovation activities or collaborate with industry partners. This perception results in missed opportunities for HEIs to contribute to the growth and development of the sector and to address key challenges such as food security and rural development.

Perceived lack of expertise among HEI actors

In addition, HEI actors' perceived lack of faculty expertise in agribusiness can hinder their involvement in the innovation ecosystem. This perception stems from the process of accreditation of HEIs in the Philippines. HEIs are regulated by the Commission of Higher Education and are subject to accreditation processes to ensure quality education and the excellence of degree programs offered. Some HEIs in Central Visayas achieved the status of being 'centers of excellence' (CoE) in their respective fields of expertise, which signifies academic quality, excellence, and innovation. This CoE recognition enhances their national and international reputation, attracting top students, faculty, researchers, and collaborators. While several benefits and privileges come with this status, some HEIs lament that perceptions of funders and regulators based on their recognized fields of expertise prevent them from engaging in the agribusiness sector.

"[A certain public HEI] is known as a center of excellence in future education. In terms of pedagogy, like environmental education, that's partly covered of [by] our expertise. And then we also offer biology degree programs. I think there's [a] mismatch." – Professor from a public HEI

This quote highlights how HEIs may feel that their expertise and focus areas are not well-aligned with the needs of the agribusiness sector as it has other courses in which they prioritize and are more renowned, leading to a reluctance to engage in innovation activities. This perception limits the potential for HEIs to leverage their unique strengths and capabilities to drive innovation in the agribusiness ecosystem because it makes HEI actors less likely to seek out collaborations with industry partners or to develop new programs and initiatives in the sector, believing that they lack the necessary knowledge and skills to contribute to agribusiness innovation.

Valuing community impact

The value placed on community engagement can motivate HEI actors to participate in agribusiness innovation, even if it is not their primary area of expertise. This is reflected in the quote from an HEI participant.

"Even if we don't have agribusiness degree program[s], because we feel that through agribusiness, we can touch lives. We can see tangible changes in the livelihood of the people in their economic situation, in their capabilities, in general, what they call their quality of life, we can really see and feel." – Professor from a public HEI

This quote underscores that despite lacking agribusiness courses, the desire to make a positive impact on communities can drive HEI actors to engage in agribusiness innovation activities, even if they do not have a specific background in the field. When HEIs prioritize community engagement and see the potential for agribusiness innovation to improve people's lives, their willingness to invest time and resources in building partnerships increases, developing new programs, and applying their expertise to address challenges in the sector. This value can be a powerful motivator for HEI actors to step outside their traditional roles and contribute to the growth and development of the agribusiness innovation ecosystem.

6. Recommendations

Based on the findings of this study, the following national-, regional-, and HEI-level policy recommendations are put forward:

6.1 Recommendations for national and/or regional government(s):

- 1. Strengthen the implementation of supportive innovation policies and ensure adequate funding for agribusiness innovation:** One of the study's key findings is that inadequate financial resources deter stronger engagement in the Agribusiness Innovation Ecosystem in Central Visayas. The Philippine government should focus on strengthening the

implementation of existing supportive policies, such as the Philippine Innovation Act and the Innovative Startup Act, which provide crucial funding and incentives for innovation. To ensure the effectiveness of these policies, the government should allocate adequate resources and establish clear guidelines for their implementation. This includes setting up dedicated funding mechanisms, streamlining application processes, and providing technical assistance to HEIs and other stakeholders. Moreover, the government should actively monitor and evaluate the impact of these policies, making necessary adjustments to optimize their effectiveness in promoting innovation in the agribusiness sector. By strengthening the implementation of supportive policies and ensuring adequate funding, the government can create a more enabling environment for HEIs to engage in the agribusiness innovation ecosystem, encouraging them to develop new technologies, products, and services that address the sector's needs.

- 2. Review and reform policies that hinder HEI engagement in the agribusiness innovation ecosystem:** The study shows that stringent national-level policies disincentivize HEIs from engaging in agribusiness innovation and entrepreneurial activities. The National government should review and reform restrictive policies, such as procurement laws and civil service regulations, that hinder HEIs' ability to engage in entrepreneurial activities and collaborative projects in the agribusiness sector. Procurement laws should be amended to provide more flexibility for HEIs to acquire the necessary materials, equipment, and services for their agribusiness innovation initiatives. This can include introducing fast-track procurement procedures for research and development projects, raising the threshold for competitive bidding, and allowing HEIs to engage in direct contracting with trusted suppliers. Additionally, civil service regulations should be revised to permit HEI faculty and staff to receive additional remuneration for their involvement in agribusiness innovation activities, such as consulting, technology transfer, and entrepreneurship. These reforms should be accompanied by appropriate safeguards and accountability mechanisms to ensure transparency and prevent abuse. By reviewing and reforming restrictive policies, the government can remove barriers to HEI engagement in the agribusiness innovation ecosystem, enabling them to contribute more effectively to the sector's development.
- 3. Develop responsive policies that address emerging issues in the agribusiness sector:** Recognizing their essential role in bridging information gaps among stakeholders on emerging issues, HEIs are motivated to engage in the agribusiness innovation ecosystem. Both the National and Regional government units should proactively develop responsive policies that address emerging issues in the agribusiness sector, such as climate change, food security, and technological disruption. This involves close collaboration with HEIs, industry stakeholders, and other relevant actors to identify pressing challenges and opportunities in the sector. The government should support research and development initiatives focusing on creating climate-resilient crops, promoting sustainable agricultural practices, and developing innovative solutions to enhance food security. Policies should also be designed to facilitate the adoption of new technologies, such as precision agriculture, data analytics, and blockchain, which can improve efficiency, transparency,

and competitiveness in the agribusiness sector. Furthermore, the government should provide incentives and support for HEIs to engage in multidisciplinary research and collaborative projects that address these emerging issues, fostering a culture of innovation and responsiveness in the sector. By developing responsive policies, the government can create an enabling environment for HEIs to contribute to the agribusiness sector's resilience and sustainability while also promoting economic growth and social welfare.

4. **Establish a regional/national platform for agribusiness innovation collaboration and knowledge sharing:** The study reveals difficulties in forging partnerships between HEIs and stakeholders in the agribusiness innovation ecosystem due to the lack of awareness of existing and/or completed innovations and research. The national government should establish a platform that facilitates collaboration and knowledge sharing among HEIs, industry stakeholders, government agencies, and other relevant actors in the agribusiness innovation ecosystem. This platform can serve as a centralized hub for information exchange, networking, and partnership building, enabling HEIs to connect with potential collaborators, access market intelligence, and showcase their research and innovations. The platform should also provide resources and support services, such as training programs, mentorship opportunities, and access to funding, to help HEIs build their capacity and effectively engage in the agribusiness innovation ecosystem. Moreover, the platform can host regular events such as conferences, workshops, and pitch competitions to stimulate dialogue, learning, and collaboration among ecosystem actors.

The regional offices of NEDA and DOST, in collaboration with CTU, are currently developing a central repository for research in Central Visayas called Project AGILE (Academe-Government-Industry Linkage Endeavor). By establishing a regional platform for agribusiness innovation collaboration and knowledge sharing, the government can foster a more dynamic and interconnected ecosystem, enabling HEIs to contribute more effectively to the sector's growth and competitiveness while also benefiting from other stakeholders' expertise and resources. Funding mechanisms should also be provided for the backend support of the portal and to ensure it is sustained.

6.2 Recommendations for HEIs

5. **HEIs should develop clear and supportive intellectual property (IP) policies:** The study finds that well-implemented intellectual property (IP) policies incentivize researchers to foster innovation as it defines ownership arrangements. Together with the IP Offices established within the University, HEIs should develop clear and supportive IP policies that encourage faculty, students, and researchers to engage in agribusiness innovation activities. These policies should provide guidance on the ownership, protection, and commercialization of IP generated through research and collaborative projects in the agribusiness sector. HEIs should establish transparent and equitable revenue-sharing mechanisms that reward inventors and innovators for their contributions while also ensuring that the institution benefits from the commercial success of their innovations. Moreover, HEIs should provide resources and support services, such as IP management training, legal assistance, and technology transfer offices, to help their stakeholders

navigate the complexities of IP protection and commercialization. By developing clear and supportive IP policies, HEIs can create a more enabling environment for agribusiness innovation, incentivizing their stakeholders to develop new technologies, products, and services that address the needs of the sector while promoting knowledge transfer and economic growth.

- 6. HEIs should align faculty promotion and evaluation criteria to recognize and reward engagement in agribusiness innovation activities:** A key finding of the study shows that while non-monetary forms (e.g. presidential citations) of recognition are valuable, there is also a need for financial incentives to reward faculty and researchers who engage in agribusiness innovation. HEIs should align their faculty promotion and evaluation criteria to recognize and reward engagement in agribusiness innovation activities, such as research, extension, and entrepreneurship. This involves broadening the traditional focus on academic publications and teaching to include metrics that capture the impact and relevance of faculty contributions to the agribusiness sector. HEIs can introduce performance indicators that measure faculty engagement in collaborative projects, technology transfer, community outreach, and the adoption and commercialization of their innovations. Moreover, HEIs should provide incentives and support for faculty to participate in agribusiness innovation activities, such as seed funding, release time, and professional development opportunities. By aligning faculty promotion and evaluation criteria to recognize and reward engagement in agribusiness innovation activities, HEIs can create a more supportive and inclusive academic culture that encourages faculty to apply their expertise and skills to address real-world challenges in the sector while advancing their careers and contributing to institutional goals.
- 7. HEIs should establish agribusiness innovation hubs and incubation centers:** Physical infrastructure is one of the key factors that influence partnerships between HEIs and stakeholders of the agribusiness innovation ecosystem in Central Visayas. More HEIs should establish agribusiness innovation hubs and incubation centers that provide a physical and intellectual space for faculty, students, and researchers to collaborate with industry partners, entrepreneurs, and other stakeholders in the agribusiness sector. These hubs and centers can serve as a catalyst for innovation and entrepreneurship, offering a range of services and resources, such as co-working spaces, prototyping facilities, mentorship programs, and access to funding and markets. Currently, CTU, in collaboration with DOST-PCAARRD, has an agriculture technology business incubation program within the university. HEIs can leverage their expertise and infrastructure to support the development and scaling of agribusiness startups and MSMEs while also creating opportunities for experiential learning and research for their students and faculty. Moreover, these hubs and centers can foster cross-disciplinary collaboration and knowledge exchange, bringing together experts from diverse fields such as agriculture, engineering, business, and social sciences to address complex challenges in the agribusiness sector. By establishing agribusiness innovation hubs and incubation centers, HEIs can create a vibrant and supportive ecosystem for agribusiness innovation, driving economic growth and social impact in their communities and beyond.

Although a Regional Food Innovation Center has been established in CITU, HEIs and government should address the challenges to its sustainability, such as maintenance and operation and high turnover rate among staff.

- 8. Develop curricular and extracurricular programs that foster agribusiness innovation skills and mindsets:** HEI respondents of the study revealed the perception that agribusiness is a low-priority area with little investment in the sector. HEIs should develop curricular and extracurricular programs that foster agribusiness innovation skills and mindsets among their students and faculty. This involves integrating entrepreneurship, design thinking, and problem-solving approaches into existing agriculture and business curricula, as well as creating new programs and courses that focus specifically on agribusiness innovation. Further, the Central Visayas Regional Development Plan 2023-2028 suggests that modern agricultural technologies should be integrated into elementary and high school curricula. HEIs can also offer extracurricular activities, such as hackathons, business plan competitions, and industry-sponsored projects, that provide students with hands-on experience in developing and pitching agribusiness innovations. Moreover, HEIs should promote a culture of creativity, risk-taking, and collaboration, encouraging students and faculty to explore new ideas and approaches to address challenges in the agribusiness sector. By developing curricular and extracurricular programs that foster agribusiness innovation skills and mindsets, HEIs can prepare a new generation of leaders and innovators who can drive the transformation and growth of the agribusiness sector while also creating value for their communities and society as a whole.

7. Bibliography

- Arayata, M. C. (2022, September 29). PH ranks 59th in 2022 Global Innovation Index. Philippine News Agency. <https://www.pna.gov.ph/articles/1184978>
- Albert, J. R. G., Serafica, R. B., Quimba, F. M. A., Vizmanos, J. F. V., & Bairan, J. C. A. C. (2018). What drives Filipino firms to innovate. <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidspn1807.pdf>
- Briones, I. M., & Galang I. M. R. (2013). Urgent: A road map for agro-industrial development in the Philippines. Policy Note. Philippine Institute of Developmental Studies. <https://pids.gov.ph/publication/policy-notes/urgent-a-road-map-for-agro-industrial-development-in-the-philippines>
- DOST. (2021). Niche centers in the regions for R&D. <https://s4cp.dost.gov.ph/programs/nicer/>
- DOST. (2021). Science for change program. <https://s4cp.dost.gov.ph/programs/cradle/>
- DOST. (2021). Science for change. <https://s4cp.dost.gov.ph/>
- DOST. (2024). Small enterprise technology upgrading program. https://ncr.dost.gov.ph/program_setup.php
- DOST. (n.d.). Fabrication laboratories. <https://www.dti.gov.ph/negosyo/shared-service-facilities/fabrication-laboratories/>
- DOST Central Visayas. (2021). 2020 DOST 7 accomplishment report “adapting to the new normal while flattening the curve through science and technology.” <https://region7.dost.gov.ph/wp-content/uploads/2021/04/Updated-2020-DOST-7-Accomplishment-Report.pdf>
- DOST and UPLB INSTAT. (2021). Research and development survey report 2018. <https://instat.uplb.edu.ph/wp-content/uploads/2021/05/RD-Survey-Report-2018.pdf>
- DOST-PCIEERD. nd. Boosting the Food Processing Industry Through Sustainable Food Innovation Centers. PCIEERD Policy Brief. https://pcieerd.dost.gov.ph/images/policy_advocacy/Boosting_the_Food_Processing_Industry_Through_Sustainable.pdf
- DTI. (2019). Inclusive Filipinnovation & entrepreneurship roadmap. <https://innovate.dti.gov.ph/wp-content/uploads/2020/10/IFER-Ebook-version-06-30-2020.pdf>
- DTI. (n.d.). Inclusive innovation industrial strategy. <https://innovate.dti.gov.ph/resources/i3s-strategy/inclusive-innovation-industrial-strategy/>
- EDC. (2023). Philippine Export Development Plan 2023-2028. <http://www.edc.net.ph/wp-content/uploads/2023/08/PEDP-2023-2028-Fulltext.pdf>

- Habaradas, R. B. (2008). Strengthening the national innovation system (NIS) of the Philippines: Lessons from Malaysia and Thailand. *Asian Journal of Technology Innovation*, 16(1), 1-22.
- Hoffecker, Elizabeth. (2019). Understanding innovation ecosystems: a framework for joint analysis and action. https://www.researchgate.net/publication/334099420_Understanding_Innovation_Ecosystems_A_Framework_for_Joint_Analysis
- IPOPHL. n.d. Glossary of key terms related to Intellectual Property. <https://www.ipophil.gov.ph/glossary-of-key-terms-related-to-intellectual-property/#:~:text=Utility%20model,which%20patent%20filings%20are%20subjected>.
- NEDA Central Visayas. (2017). Central Visayas Regional Development Plan 2017-2022. <https://neda.gov.ph/wp-content/uploads/2018/02/7-Central-Visayas-RDP-2017-2022.pdf>
- OECD. (2015). Frascati Manual 2015: Guidelines for collecting and reporting data on research and experimental development. <https://www.oecd.org/sti/frascati-manual-2015-9789264239012-en.htm>
- PALAST. 2006. The Community Innovation Survey 2006. The Harmonized Survey Questionnaire. The Palestine Academy for Science and Technology. Page 6. https://palast.ps/sites/default/files/inline-files/CIS2006_questionnaire_extended_version.pdf
- Patalinghug, E. (2003). The Philippine national innovation system: Structure and characteristics (No. 2003-04). PIDS Discussion Paper Series.
- Philippine Statistics Authority. (2022). Philippine statistical yearbook 2022. https://www.psa.gov.ph/system/files/psy/%28ons-cleared%29_psy2022_manuscript_June29_ONSF%20%281%29-signed.pdf
- Philippine Statistics Authority. (2021). 2021 Updating of the List of Establishments. <https://psa.gov.ph/content/psa-approves-conduct-2021-updating-list-establishments-ule-0>
- Philippine Statistics Authority. (2020). 2018 Census of Philippine Business and Industry: Manufacturing (Table 3). <https://www.psa.gov.ph/content/2018-census-philippine-business-and-industry-manufacturing>
- Quimba, F. M. A., Albert, J. R. G., & Llanto, G. M. (2017). Innovation activity of firms in the Philippines (No. 2017-44). PIDS Discussion Paper Series
- Quimba, F. M. A., & Rosellon, M. A. D. (2012). Innovation in the Automotive Sector of the Philippines. *Asian Journal of Technology Innovation*, 20(sup1), 49-65.
- RA 9520. An Act Amending the Cooperative Code of the Philippines to be Known as the “Philippine Cooperative Code Of 2008”, Article 3, General Concepts. <https://cda.gov.ph/issuances/republic-act-9520/#:~:text=%E2%80%93%A%20cooperative%20is%20an%20autonomous,their%20products%20and%20services%20and>

- Reyes-Macasaquit, M. (2010). Case study of the electronics industry in the Philippines: Linkages and innovation. *Fostering production and science and technology linkages to stimulate innovation in ASEAN*, 145-229.
- Ronda, R. A. (2022, September 30). Philippines slips 8 notches in Global Innovation Index. *The Philippine Star*. <https://www.philstar.com/headlines/2022/09/30/2213216/philippines-slips-8-notches-global-innovation-index>
- RTI International. (2020). USAID STRIDE annual report. Prepared for USAID/Philippines/Office of Education. https://pdf.usaid.gov/pdf_docs/PA00XF9X.pdf
- San Juan, A. E. (2022, October 4). PHL's 8-rung dip in innovation index most alarming—IPOPHL. <https://governance.neda.gov.ph/phls-8-rung-dip-in-innovation-index-most-alarming-ipophl/>. Prepared for the National Economic Development Authority Governance Staff.
- Wignaraja, G. (2008). Foreign Direct Investment, Innovation, and Exports: Firm-Level Evidence from People's Republic of China, Thailand, and Philippines (No. 134). ADB Economics Working Paper Series. <https://www.adb.org/sites/default/files/publication/28232/economics-wp134.pdf>.
- WIPO. (2022). Global innovation index 2022. World Intellectual Property Organization. <https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2022-section3-en-gii-2022-results-global-innovation-index-2022-15th-edition.pdf>.
- WIPO. (2018). Global innovation index 2018. World Intellectual Property Organization. https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018.pdf.

8. Annexes

Annex 1: Full description of evaluation methods

The Higher Education Institutions Generating Holistic and Transformative Solutions (HEIGHTS) Innovation Ecosystems study employed a mixed-methods approach to examine the role of higher education institutions (HEIs) in the innovation ecosystem of the agribusiness sector in Region VII (Central Visayas) of the Philippines.

Region VII (Central Visayas) was selected as the focus area for this study due to its significant economic importance and emerging innovation ecosystem. The region is a key driver of the Philippine economy, ranking as the fourth-largest contributor to the country's GDP and the largest economy in the Visayas and Mindanao areas. Central Visayas has a diverse economic landscape, with a strong presence in manufacturing and services, and an emerging agribusiness sector. The region also demonstrates a budding innovation ecosystem, as evidenced by its performance in the Cities and Municipalities Competitiveness Index and recent developments in intellectual property filings. The selection of Region VII was further justified by the establishment of a Regional Inclusive Innovation Committee (RIICom) to connect innovation agents across government, academia, and the private sector. This combination of economic significance, sectoral diversity, and nascent innovation infrastructure made Region VII an ideal candidate for examining the role of higher education institutions in fostering regional innovation, particularly in the agribusiness sector.

For the final Phase of the study, the research team began by carefully selecting six HEIs to represent three categories: those already engaged in the innovation ecosystem, those wanting to engage but facing barriers, and those with potential to engage but limited current involvement. For HEIs to be considered actively engaged in the innovation ecosystem, criteria that were considered included the presence of research centers, fabrication labs, government-funded innovation programs, and technology business incubators. This ensured a diverse range of perspectives on HEI engagement in innovation. The research team also referred the list to the Ecosystem Advisory Group that provided guidance to the team on which HEIs would be candidates for the selection. The advisory group even suggested that type 3 HEIs be called “HEIs with current limited involvement but has the potential to engage in the Agribusiness Sector” (previously from “HEIs that have potential to engage but do not see it as part of their mandate”) as innovation is part and parcel of HEI function.

Key informants were then identified from various stakeholder groups, including HEI representatives such as university officials and faculty, government agencies, private sector/industry partners, and non-governmental organizations. The research team made deliberate efforts to include diverse perspectives and representation from underrepresented groups, consulting with an Ecosystem Advisory Group to refine the sample.

Data collection methods consisted of key informant interviews (KIIs), focus group discussions (FGDs), and document review. Onsite FGDs were conducted to gather collective insights while Semi-structured interviews (See Annex II) were conducted with stakeholders until data saturation was reached for each group. An estimated 40 interviews were planned across stakeholder groups, with the final number determined by the point of data saturation.

The data collection process involved 6-8 trained data collectors conducting interviews and FGDs, supported by a resource person providing logistical and technical assistance. All interactions were audio recorded and transcribed, with note takers documenting key points during data collection. Ethical considerations were paramount, with informed consent obtained from all participants and strict confidentiality measures implemented, including data anonymization and secure storage.

Data analysis began with the development of a codebook in collaboration with cross-country research partners. The Country Research Lead spearheaded a thematic analysis of interview and FGD transcripts, with ongoing analysis during data collection to refine tools and assess saturation. The Principal Investigator facilitated cross-country comparison of emerging themes, ensuring consistency across the broader study. The team also used excel sheets that extracted chunks of quotes and categorized these quotes according to the themes, notes and key words.

Quality assurance measures included weekly meetings between the Country Research Lead and Program Manager, regular check-ins with the Principal Investigator during data collection and analysis, and peer debriefing sessions for feedback on coding and theme development. This rigorous process ensured the reliability and validity of the findings. The initial findings have also been presented to the Ecosystem Advisory Group and to the PIDS Research Workshop to ensure validity and consistency of arguments.

This comprehensive methodology was designed to provide a nuanced understanding of HEI involvement in the regional innovation ecosystem, with a particular focus on the agribusiness sector. By incorporating multiple stakeholder perspectives and employing an iterative analysis process, the study aimed to generate valuable insights that could inform policies and strategies to enhance HEI engagement in innovation ecosystems.

Annex 2: FGD and KII data collection instruments

Focus Group Discussion (FGD): Semi-structured Protocol

HEIs' Engagement in Innovation Ecosystem

Kenya, Indonesia, Philippines

Part I: FG identification	
Date of the FG:	Facilitator:
Time started:	Time ended:
Total # of participants: _____	# male: _____ # female _____
# of Govt representatives: _____	
# of private sector participants: _____	
# of HEI participants: _____	
# of civil society participants: _____	

RQ1: IE Outcomes/Results

We are studying the engagement of Higher Education Institutions (HEIs) in the Agribusiness innovation ecosystem in Region VII- Central Visayas. We are using the term “ecosystem” to describe the set of organizations and individuals that are involved in developing and supporting innovations related to Agribusiness in Region VII. By “innovations,” we mean the introduction, development, and operation of new value-added products, services or new and improved processes in the social and economic spheres.

I would like to focus on your perceptions of the goals and purpose of the involvement of HEIs on the Agribusiness sector in Region VII innovation ecosystem. There are no right or wrong answers, rather we are interested in hearing your perspective on these topics.

1.1. How would you characterize the stage of development of the agribusiness innovation ecosystem in Region VII- Central Visayas?

Probe: Would you say this innovation ecosystem is vibrant and well-developed; or medium and growing, or perhaps small and underdeveloped?

Examples of indicators you will collect:

- *Ecosystem size: small, medium, large*
- *Ecosystem potential: growing, stagnant, underdeveloped*
- *Ecosystem time: nascent, long-lasting*

1.2. When you look toward the next ten years, what do you see as the key outcomes or achievements that the agribusiness innovation ecosystem in Region VII should be producing?

Probe: What are some of the key outputs you would like to see within this agribusiness innovation ecosystem within this region?

Examples of indicators you will collect:

- *Innovation outputs*
- *Relevant audiences*
- *Types of recognition*

RQ2: HEI Roles

2.1. What role do you believe HEIs should be playing in order for these outcomes to be achieved?

Probe: How can HEIs contribute to the accomplishment of these goals?

Examples of indicators you will collect:

- *Current types of HEI roles*
- *Ideal types of HEI roles*
- *Current resources that HEIs do/should provide*
- *Ideal resources that HEIs do/should provide*

2.2. What barriers or enablers will affect HEIs' accomplishment of these outcomes?

*Examples of indicators you will collect: (*Note: Use participatory ranking exercise to rank barriers or enablers in order of importance, if relevant and possible)*

- *Current barriers to HEI engagement*
- *Potential barriers to HEI engagement*
- *Current enablers to HEI engagement*
- *Potential enablers to HEI engagement*

RQ3: Relationships

3.1. To what extent are HEIs integrated into the agribusiness innovation ecosystem? Are they active participants? If so, how?

Probe: If they are not well-integrated, why not, and how can this be improved? If they are well-integrated, which factors contributed to the good integration?

Examples of indicators you will collect: Level of HEI activity: low or high

- *Roles of HEI involvement*

- *Level of partnership between HEIs and other actors: low or high*
- *Level of coordination between HEI activities and other IE activities: low or high*
- *Barriers to integration*
- *Enablers of integration*

RQ6: POLICY

6.1. How supportive is the national regulatory environment for agribusiness innovation activities? Please briefly explain your answer, providing specific examples, if possible.

Probe for regulations that are particularly helpful or those that might impede innovation. Probe for tax policies, incentives for investment in innovation, intellectual property protection, policies that provide government funding for innovation activities)

Examples of indicators you will collect:

- *Level of government support for innovation activities: low or high*
- *Types of policies: tax incentives, investment incentives, intellectual property protection, government funding, new company regulations*
- *Level of policy effectiveness: low or high*
- *Level of policy enforcement: low or high*
- *Enabling factors for policy effectiveness*
- *Detrimental factors for policy effectiveness*

6.2 How does this regulatory environment influence HEIs involvement in agribusiness innovation?

Probe: Ask for examples.

Examples of indicators you will collect:

- *Policy factors that enable HEI involvement*
- *Policy factors that prevent HEI involvement*
- *Level of policy supportiveness for HEI engagement: low or high*

RQ7: MARKET

7.1. How supportive is the economic and business environment for HEIs to engage in the agribusiness innovation ecosystem in Region VII? (Note: Take about 10 minutes for this question.)

Probe for examples (e.g., into the competitive environment, emphasis on R&D, quality of supply chains, quality of labor force, access to raw materials and production inputs, access to finance)

Examples of indicators you will collect:

- *Level of competition (nationally) with regards to financing/investment, similar products, access to materials, etc.*
- *Level of emphasis on R&D: low or high*
- *Quality of supply chains: underdeveloped, developed*
- *Quality of labor force: low or high*
- *Quantity of labor force: insufficient, sufficient*
- *Access to raw materials and production inputs: availability, affordability, competition*
- *Access to finance: accessible, inaccessible*

RQ8: CULTURE

8.1. Are HEIs interested in engaging in agribusiness innovation ecosystem? Why or why not?

Probe: What expectations, perceptions, or values surrounding HEIs affect their engagement in the agribusiness innovation ecosystem? (Note: HEIs mean both institutions and faculty/researchers in them.)

Examples of indicators you will collect:

- *Perceptions of HEI effectiveness*
- *Perceptions of HEI relevancy*
- *Differences in perception across stakeholder type, across HEI type*

8.2. What are the current practices of HEIs regarding their engagement in the agribusiness innovation ecosystem? How do these practices influence their tendencies to engage in the agribusiness innovation ecosystem?

Probes: norms around faculty, staff, and student behaviors (e.g., emphasis on teaching rather than research), norms around access to university resources/opportunities, incentives or disincentives.

Examples of indicators you will collect:

- *Norms around faculty, staff, and student behaviors*
 - *Norms around access to university resources/opportunities*
 - *Norms around intellectual property*
 - *Norms around connections between innovation activities and HEI financing*
 - *Level of trust between HEIs and others*
-

Key Informant Interviews: Semi-structured Protocol for HEI
HEIs' Engagement in Innovation Ecosystem
Kenya, Indonesia, Philippines

Interview Date:

Interviewer name:

Respondent name:

Respondent gender:

HEI:

Role-position within HEI:

Introduction

We are studying the engagement of Higher Education Institutions (HEIs) in the agribusiness sector innovation activities in Region VII. We are using the term “ecosystem” to describe the set of organizations and individuals that are involved in developing and supporting innovations related to Agribusiness in Region VII. By “innovations,” we mean the introduction, development, and operation of new value-added products, services or new and improved processes in the social and economic spheres.

RQ2: HEI's roles

2.1. How would you describe the level of contribution of this HEI to the agribusiness innovation ecosystem? Is it a significant or a not-so-significant contributor? Why?

Probe: What is the extent of the contribution of the HEIs you have listed towards the agribusiness innovation ecosystem?

Examples of indicators you will collect:

- *Level of HEI contribution to the innovation ecosystem*

2.2. What are the ways in which [NAME OF HEI] engage with or contribute to agribusiness innovation activities in Region VII?

Probe: What role can the HEI play in the agribusiness in Region VII?

Examples of indicators you will collect:

- *Function of the HEI in the agribusiness*
- *Ideal types of HEI roles*
- *Current resources that HEIs do/should provide*

- *Ideal resources that HEIs do/should provide*

2.3. What do you see as the most important contribution of [NAME OF HEI] to the agribusiness innovation ecosystem in Region VII? By contribution, we mean Innovations outputs knowledge transfer, partnerships and collaborations, and resources.

Probe: What kind of input does the HEI bring into the agribusiness?

2.4. What key factors have enabled the HEI to contribute to the agribusiness innovation ecosystem?

Probe: What other potential enablers, such as resources and collaborations, can further expand the HEI's contribution to agribusiness innovation ecosystem?

Examples of indicators you will collect:

- *Current enablers to HEI engagement*
- *Potential enablers to HEI engagement*
- *Resources*
- *Collaborations*

2.5. In your opinion, in what areas can [NAME OF HEI] do a better job for supporting the agribusiness innovation ecosystem in Region VII- Central Visayas?

Probe: How can HEIs further contribute to supporting agribusiness?

Examples of indicators you will collect:

- *Emerging HEI roles*
- *Ideal resources*
- *Ideal collaborations*

2.6. What key barriers prevent [NAME OF HEI] in supporting agribusiness innovation activities in Region VII- Central Visayas?

Probe: What challenges have the HEI faced that prevented their engagement in the (name of innovation domain)?

Examples of indicators you will collect:

- *Current barriers to HEI engagement*
- *Potential barriers to HEI engagement*

RQ3: Relationships

3.1. How would you describe the level of collaboration between your HEI and other actors in the agribusiness innovation ecosystem in Region VII?

Probe: If collaboration is not happening, why not, and how can this be improved? If collaboration is strong, which factors contributed to these strong collaborations?

Examples of indicators you will collect:

- *Level of HEI activity: low, medium, high*
- *Roles of HEI involvement*
- *Level of partnership between HEIs and other actors: low, medium, high*
- *Level of coordination between HEI activities and other IE activities: low, medium, high*
- *Barriers of integration*
- *Enablers of integration*

3.1.a. In your view, how important is it for your [NAME OF HEI] to collaborate with other actors in the agribusiness innovation ecosystem in Region VII- Central Visayas to achieve its innovation goals? And why?

Probe: By actors we mean, trainers, knowledge sharers, funders, generators, regulators, users, conveners, translators, etc. Was it very important, moderately important, or less important? What were the motivations and objectives of these collaborations?

Examples of indicators you will collect:

- *Level of importance of collaboration: high, medium, low*
- *Motivations for collaboration*
- *Objectives of collaboration*

RQ5: Resources provided by HEIs

5.1. Let's talk about resources. What resources does [NAME OF HEI] provide to this ecosystem? By resources we mean money, materials, infrastructure, human capital, or any other assets that contribute to the functioning of the innovation ecosystem.

Probe: What are the ways or channels through which these resources are distributed or allocated?

Examples of indicators you will collect:

- *Types of resources*
- *Channels of resource allocation*

5.2. By incentives, we mean monetary (e.g., cash rewards/grants) or non-monetary (e.g., tenure, prestige, additional staff)

Examples of indicators you will collect:

- *Incentives*
- *Resources*
- *Infrastructure availability*

5.3. When you consider the graduates from [NAME OF HEI], how would you describe the level and relevance of their skill sets to contribute to agribusiness innovation activities?

Probe: What types of skills do they have related to agribusiness innovation?

Examples of indicators you will collect:

- *Skill sets of graduates (Specific skills, if possible)*
- *Level of skill*

RQ4: Resources needed by HEI

4.1. What resources do HEIs have to engage effectively in the agribusiness innovation ecosystem in Region VII? By resources we mean financial resources, materials, infrastructure, human capital, or any other assets. How have these resources enabled engagement? What additional resources are still needed?

Probe into resources related to staffing, infrastructure availability, equipment technology, expertise, intellectual property --- if respondent indicates 'financial resources', ask what the money is needed for.

Examples of indicators you will collect:

- *Required resources*
- *Desired resources*
- *Availability of resources*
- *Limitations related to resources*

4.2. What funding sources (internal and external) are currently supporting your HEI's engagement in agribusiness innovation activities in Region VII? How adequate are these funding sources?

Probe: What works and what does not work? What can be done to improve funding mechanisms?

Examples of indicators you will collect:

- *Sources of funding*
- *Gaps in funding*
- *Challenges related to funding*
- *Recommendations on funding*

RQ8: Policy

8.1. In general, how does the national regulatory environment/policy affect the engagement of HEIs in agribusiness? Please briefly explain your answer, providing specific examples if possible. Regional and HEI-level policy as well.

Probe: Can you give examples of specific policies that encourage or discourage HEI engagement in agribusiness innovation ecosystems? What policies are needed to strengthen HEI engagement?

Examples of indicators you will collect:

- *Policies that support HEI engagement*
 - *Gaps in policies for HEI engagement*
 - *Challenges in policy*
 - *Recommendations for policies on HEI engagement * Need to include examples to provide to the interviewee*
-

Key Informant Interviews: Semi-structured Protocol (non-HEI)

HEIs' Engagement in Innovation Ecosystem

Kenya, Indonesia, Philippines

Interview Date:

Interviewer name:

Respondent name:

Respondent Organization/Affiliation:

Organization type (government, business, CSOs):

Gender:

A. Introduction

We are studying the engagement of Higher Education Institutions (HEIs) in the (name of innovation domain) innovation ecosystem in (region). We are using the term “ecosystem” to describe the set of organizations and individuals that are involved in developing and supporting innovations related to Agribusiness sector innovations in Region VII- . By “innovations,” we mean the introduction, development, and operation of new value-added products, services or new and improved processes in the social and economic spheres.

A.1. What are the primary ways in which you engage with or contribute to HEI involvement to Agribusiness sector innovation activities in Region VII?

B. Identifying HEIs

B.1. Which HEIs play a key role in leading or supporting the development and dissemination of Agribusiness sector innovations in Region VII?

a. _____

b. _____

c. _____

d. _____

e. _____

You have identified these as the main HEIs: read out the names of HEIs. We will go through each HEI and I will ask you some questions about their engagement in Agribusiness sector innovations in Region VII. For each HEI listed by respondent under question 1, ask the following questions:

RQ2: HEI's roles

2.1. How would you describe the level of contribution of this HEI to the agribusiness innovation ecosystem? Is it a significant or a not-so-significant contributor? Why?

Probe: What is the extent of the contribution of the HEIs you have listed towards the agribusiness innovation ecosystem?

Examples of indicators you will collect:

- *Level of HEI contribution to the innovation ecosystem*

2.2. What are the ways in which [NAME OF HEI] engage with or contribute to agribusiness innovation activities in Region VII?

Probe: What role can the HEI play in the agribusiness in Region VII?

Examples of indicators you will collect:

- *Function of the HEI in the agribusiness*
- *Ideal types of HEI roles*
- *Current resources that HEIs do/should provide*
- *Ideal resources that HEIs do/should provide*

2.3. What do you see as the most important contribution of [NAME OF HEI] to the agribusiness innovation ecosystem in Region VII? By contribution, we mean Innovations outputs knowledge transfer, partnerships and collaborations, and resources.

Probe: What kind of input does the HEI bring into the agribusiness?

2.4. What key factors have enabled the HEI to contribute to the agribusiness innovation ecosystem?

Probe: What other potential enablers, such as resources and collaborations, can further expand the HEI's contribution to agribusiness innovation ecosystem?

Examples of indicators you will collect:

- *Current enablers to HEI engagement*
- *Potential enablers to HEI engagement*
- *Resources*
- *Collaborations*

2.5. In your opinion, in what areas can [NAME OF HEI] do a better job for supporting the agribusiness innovation ecosystem in Region VII?

Probe: How can HEIs further contribute to supporting agribusiness?

Examples of indicators you will collect:

- *Emerging HEI roles*
- *Ideal resources*
- *Ideal collaborations*

2.6. What key barriers prevent [NAME OF HEI] in supporting agribusiness innovation activities in Region VII?

Probe: What challenges have the HEI faced that prevented their engagement in the (name of innovation domain)?

Examples of indicators you will collect:

- *Current barriers to HEI engagement*
- *Potential barriers to HEI engagement*

RQ3: Relationships

3.1. How would you describe the level of collaboration between your HEI and other actors in the agribusiness innovation ecosystem in Region VII?

Probe: If collaboration is not happening, why not, and how can this be improved? If collaboration is strong, which factors contributed to these strong collaborations?

Examples of indicators you will collect:

- *Level of HEI activity: low, medium, high*
- *Roles of HEI involvement*
- *Level of partnership between HEIs and other actors: low, medium, high*
- *Level of coordination between HEI activities and other IE activities: low, medium, high*
- *Barriers of integration*
- *Enablers of integration*

3.1.a. In your view, how important is it for your [NAME OF HEI] to collaborate with other actors in the agribusiness innovation ecosystem in Region VII to achieve its innovation goals? And why?

Probe: By actors we mean, trainers, knowledge sharers, funders, generators, regulators, users, conveners, translators, etc. Was it very important, moderately important, or less important? What were the motivations and objectives of these collaborations?

Examples of indicators you will collect:

- *Level of importance of collaboration: high, medium, low*
- *Motivations for collaboration*
- *Objectives of collaboration*

RQ5: Resources provided by HEI

5.1. Let's talk about resources. What resources does [NAME OF HEI] provide to this ecosystem? By resources we mean money, materials, infrastructure, human capital, or any other assets that contribute to the functioning of the innovation ecosystem.

Probe: What are the ways or channels through which these resources are distributed or allocated?

Examples of indicators you will collect:

- *Types of resources*
- *Channels of resource allocation*

5.2. By incentives, we mean monetary (e.g., cash rewards/grants) or non-monetary (e.g., tenure, prestige, additional staff)

Examples of indicators you will collect:

- *Incentives*
- *Resources*
- *Infrastructure availability*

5.3. When you consider the graduates from [NAME OF HEI], how would you describe the level and relevance of their skill sets to contribute to agribusiness innovation activities?

Probe: What types of skills do they have related to agribusiness innovation?

Examples of indicators you will collect:

- *Skill sets of graduates (Specific skills, if possible)*
- *Level of skill*

Annex 3: Disclosure of any conflicts of interest

Name	Francis Mark A. Quimba
Title	Senior Research Fellow
Organization	Philippine Institute for Development Studies
Evaluation Position	<input checked="" type="checkbox"/> Team Leader <input type="checkbox"/> Team member

Evaluation Award Number <i>(contract or other instrument)</i>	
USAID Activity(s) Evaluated <i>(Include activity name(s), implementer name(s) and award number(s), if applicable)</i>	
I have real or potential conflicts of interest to disclose.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to:</i> <ol style="list-style-type: none"> 1. Close family member who is an employee of the USAID operating unit managing the activity(s) being evaluated or the implementing organization(s) whose activity(s) are being evaluated. 2. Financial interest that is direct, or is significant though indirect, in the implementing organization(s) whose activities are being evaluated or in the outcome of the evaluation. 3. Current or previous direct or significant though indirect experience with the activity(s) being evaluated, including involvement in the activity design or previous iterations of the activity. 	
CONTINUED If yes answered above, I disclose the following facts: <i>Real or potential conflicts of interest may include, but are not limited to:</i> <ol style="list-style-type: none"> 4. Current or previous work experience or seeking 	

<p>employment with the USAID operating unit managing the evaluation or the implementing organization(s) whose activity(s) are being evaluated.</p> <p>5. Current or previous work experience with an organization that may be seen as an industry competitor with the implementing organization(s) whose activity(s) are being evaluated.</p> <p>6. Preconceived ideas toward individuals, groups, organizations, or objectives of the particular activities and organizations being evaluated that could bias the evaluation.</p>	
--	--

I certify (1) that I have completed this disclosure form fully and to the best of my ability and (2) that I will update this disclosure form promptly if relevant circumstances change. If I gain access to proprietary information of other companies, then I agree to protect their information from unauthorized use or disclosure for as long as it remains proprietary and refrain from using the information for any purpose other than that for which it was furnished.

Date	November 20, 2024
Signature	(Originally signed)

Annex 4: Additional tables

Table A1. Total Number of Projects and Disbursed Funds of NICER, CRADLE, and RD Lead Projects by Region: 2017-2022

REGION	NICER projects	NICER Disbursed Funds (in PhP)	CRADLE projects	CRADLE Disbursed Funds	RD Lead projects	RD Lead Disbursed Funds (in PhP)
BARMM	3	55,986,353.29		-	3	1,433,684.88
CAR	7	62,185,256.28		-	3	936,624.31
01 - Ilocos Region	9	77,376,462.43		-	3	1,540,022.76
02 - Cagayan Valley	10	95,358,640.56	3	14,305,378.65	4	2,244,678.44
03 - Central Luzon	9	75,125,133.56	6	29,910,362.19	3	1,706,663.37
04A - Calabarzon	8	58,946,801.69	12	51,618,558.85	7	2,322,951.39
04B – Mimaropa	1	20,717,559.36		-	4	1,978,009.19
National Capital Region	33	464,077,191.57	43	171,769,092.95	11	5,682,118.51
05 - Bicol Region	13	63,319,791.21		-	3	1,095,090.63
06 - Western Visayas	1	50,933,716.82	8	28,458,014.69	4	2,833,499.25
07 - Central Visayas	9	62,277,594.41	2	7,724,382.79	4	2,245,414.50
08 - Eastern Visayas	3	23,592,376.10	1	4,894,956.80	6	3,035,587.70
09 - Zamboanga Peninsula	3	28,106,378.64		-	1	159,501.25
10 - Northern Mindanao	10	203,747,782.90	1	4,650,594.24	3	890,152.00
11 - Davao Region	12	132,198,852.51	7	24,721,672.51	5	3,283,993.44
12 – Soccsksargen	4	31,091,817.00		-	3	1,629,713.13

Caraga	6	28,235,406.97	3	14,499,766.93	4	2,407,627.63
Grand Total	141	1,533,277,115.30	86	352,552,780.60	71	35,425,332.38

Source: DOST (n.d.)

Table A2. List of HEI FabLabs in Central Visayas

Province	City/ Municipality	Cooperator/ Name of FabLab
Cebu Province	Cebu City	UP SSF for Enabling the Creative Industry in Cebu with Innovative Public Service Facilities Services: – Ideation / Prototyping – Research and Development – Access to digital fabrication equipment – Trainings, Seminars, Workshops
Cebu Province	Cebu City	CTU Main Campus (CTU Funded)
Cebu Province	Argao	CTU Argao SSF for the Digital Fabrication Laboratory (Fablab) in CTU-Argao
Cebu Province	Tuburan	CTU Tuburan SSF on Product Innovation Through Vacuum Forming Machines for Cebu Fablabs and Digifab
Cebu Province	Danao City	CTU Danao SSF for the Digital Fabrication Laboratory in Cebu Technological University (CTU) – Danao Campus (FabLab CTU-Danao)
Negros Oriental	Dumaguete City	FabLab Negros Oriental (NORSU)
Siquijor	Larena	Fablab Siquijor (SSC) SSF for Digital Fabrication (mini fablab) & Rapid Prototyping Center

Source: DTI (n.d.)

Table A3. Information Sources Rated with “High” Importance by Businesses: 2015

Information source rated with “high” importance		MSM Es	Large firms	All firms
1. Internal	a. Within your establishment or enterprise	9.1%	32.3%	10.2%
2. Market source	a. Suppliers of equipment, materials, components, or software	7.5%	16.1%	7.9%
	b. Clients or customer	14.1%	19.8%	14.3%
	c. Competitors or other enterprise in your sector	8.7%	9.0%	8.7%
	d. Consultants, commercial laboratories, or private R&D institutes	3.5%	6.7%	3.6%
3. Institutional source	a. Universities or other HEIs	1.9%	3.7%	1.9%
	b. Government or public research institutes	1.1%	2.6%	1.2%
4. Other source	a. Conferences, trade fairs, exhibitions	5.9%	10.8%	6.2%
	b. Scientific journals and trade/technical publications	2.0%	7.1%	2.2%
	c. Professional and industry associations	3.5	8.7	3.8

Source: Albert et al (2018)