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International Journal of Academe and Industry Research (IJAIR) is an open-access peer-reviewed quarterly journal focused on business education, industry research and the connection between them. The interconnectedness of the industry and academic institutions needs a platform that aligns their respective research needs. From the academic perspective, the business-related program management and the teaching and learning had been dramatically influenced by the industry trends and needs, collaborative approaches and internationalization. From there comes the indispensable role of the industry as they become partners to the academic institutions in producing quality workforce and entrepreneurs. Along these areas are the interesting topics for academic and industry researchers.

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- Current issues and trends in business education such as experiential learning, work training, community immersion, technical education and the 21st century skills;
- Internationalization and management of business-related programs;
- Management and operation of programs in business management, accounting, tourism and hospitality, agriculture, office administration, health administration and business analytics;
- Teaching and learning, curriculum development and student experience in the business-related and industry-inclined programs;
- Development and application of the 21st century skills;
- Assessment of program quality, institutional services and student satisfaction;
- Evaluation of student experience, skills development and training development;
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- Linkage and collaboration of schools, colleges and universities.

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The alignment between internship tasks and academic qualifications

[1]Oratilwe Penwell Mokoena & [2]Solly Matshonisa Seeletse

Abstract

This study examined the alignment of internship tasks with the interns' academic qualifications, highlighting instances where interns are either appropriately matched or tasked with duties unrelated to their expertise. This is a qualitative study which used an exploratory study design. To select participants for face-to-face interview, purposive and snowballing sampling techniques were employed. A total of six (6) statistics graduates were the participants in the study. The study found that statistics interns placed in roles aligned with their qualifications felt more prepared for the workplace, while those facing misalignment encounter challenges varying from boredom to frustration. Furthermore, the study uncovered issues of nepotism, lack of mentorship, and potential autocratic practices within some organizations hosting statistics interns. Since the study has a relatively small sample size and focused only on a very narrow group of students, the results cannot be generalized. However, the results have implications to various stakeholders, highlighting collaboration between higher education institutions and organizations through formal agreements to enhance the effectiveness and standardization of internship experiences for students and graduates. Moreover, there is a need for the establishment of structured internship programs with well-defined key performance areas.

Keywords: *internship programs, statistics graduates, skill alignment, workplace experiences*

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1. Introduction

In South Africa, over 18 million people live in extreme poverty, of which approximately over 60% of are the youth aged between 15 and 35 (STATSSA, 2018). This is due to the high youth unemployment of over 30% in 2022 (STATSSA, 2022). The educational inequalities between private and marginalized public schools divide learners post high school (Ewulley et al., 2023), those who received private education are already acquainted with some of the soft and technical skills required in the industry while some of those with public school education are disadvantaged due to little to no resources in their schools. For example, in Sefako Makgatho Health Sciences University (SMU) most of the students in the statistical sciences are from previously disadvantaged backgrounds, without soft and technical skills required in the current industrial revolution. Moreover, the institution also lacks necessary resources to equip students with some of the vital skills needed in industry. Hence, some of the graduates' struggle to compete in industry due to deprivation of needed skills and qualifications.

Internship is a crucial component of the undergraduate curriculum by providing valuable practical experience that complements students' academic qualifications (Grillo, 2023). Hypothetically, integrating high-quality internships as a core component of undergraduate programs is crucial for preparing students for successful careers. By combining rigorous academic training with practical, hands-on experience, programs can ensure their graduates are well-equipped to thrive in the dynamic, data-driven job market. Researches (Galbraith & Mondal, 2020; Nunley et al., 2016; Saltikoff, 2017; Townsley et al., 2017) showed that students who complete multiple internships are twice as likely to find employment within six months of graduation compared to those without any internship experience. Moreover, employers also place significant weight on internship experience when evaluating recent graduates, often viewing it as more important than academic credentials alone. According to Li (2023), certain industry specific core requirements are neglected in college curriculum putting the graduates at a disadvantage to secure employment. While Chandra and Jin (2023) highlight that relying on the text-book style approach impedes the students from surpassing basic knowledge, Basile and Azevedo (2022) argue that students who are ill-equipped cannot tackle complex modern problems. Thus, integrating high-quality internships into undergraduate programs can prepare students for successful careers.

In the institutional context, most undergraduate degree programs (Healthcare Sciences, Oral Healthcare, and Medicine) in SMU requires graduates to do an internship program or community service prior to actual employment, and government assists by placing graduates in various healthcare facilities to be equipped with needed skills set to secure employment post internship or community service (Balay-Odao et al., 2023; Carlsson et al., 2023; Mirchandani & Bhutani, 2023). In the context of statistics and other non-health sciences degree program, such is not the case. For instance, there is no alignment between undergraduate curriculum and industry-related work. In addition, statistics graduate interns struggle with adapting to new technologies, effective communication, and navigating unfamiliar work environments when transitioning to the professional workplace. Hence, they need to do certification not embedded within their course to increase their chances of securing internships and graduate programs.

Studies on internships and alignment with their qualifications revealed that students who do internships are more aligned to their course and tend to thrive in the market. In the law programme, for example, internships are part of the course curriculum assisting students in knowledge acquisition, personal and professional development, and integration of curriculum content and real-world experiences (Blanka et al., 2023). Similarly, in undergraduate nursing, students upon completion of their degree were placed in different hospital to blend theory and practice, and discover their favourite field of work (Balay-Odao et al., 2023; Jahromi et al., 2023), while in Accounting, internships help student to improve cognitive and psychomotor domain competencies (Zulkarnain & Mujahidin, 2023). In the dynamic, data-driven job market statistics is critical to operational functioning, however, statistics graduates struggle to thrive in internships due to negligence of rigorous academic training with practical, hands-on experience not embedded within their qualification, resulting in misalignment between qualification and work activities. Furthermore, in South Africa, most university graduates complete qualifications in their institutions without work experience related to their area of study (Molele et al., 2024; Meyer & Mncayi, 2021; Winterton & Turner, 2019), this includes statistics graduates. As work experience can only be gained by performing duties in a work environment, for which internships provide such an opportunity, this study explores the congruence between the tasks performed during internships and the knowledge and skills acquired during academic studies for stats graduate interns.

2. Literature review

Internship practices can be considered as a method of undertaking experiential learning activities, field of workshop, practical work experience, professional placement or work integrated learning (Valencia-Forrester, 2020). According to Jackson and Bridgstock (2021), internship can be viewed as cooperative education, experiential learning, and work-based learning, mainly because it intertwines practical work experience with theoretical learning. Internship, therefore, is to prepare graduates to be work-ready. In agreement, several authors (Chavan & Carter, 2018; Kroon & Franco, 2022) also refer internship as a programme for new graduates who have just completed their academic theory and still lacking work experience and exposure. Thus, internships are short-term development programmes initiated to prepare graduates to acquire relevant and valuable job experiences and exposure in the fields of their interest.

According to Guzey et al. (2014), blending academic training and real-world experience is instrumental in preparing statistics graduate students for successful careers. Statistics graduate interns are characteristically required to have formidable academic qualifications (Hauber et al., 2016; Smeeton & Sprent, 2016), including enrolment in a qualifying statistics program and familiarity with statistical methodologies. According to Taylor and Bobadilla-Sandoval (2024), the key benefits of internships for statistics students include opportunity to apply classroom concepts to real-world data and research projects, allowing them to develop essential skills like data cleaning, analysis, and communication that are difficult to gain solely through coursework. Exposure to multidisciplinary teamwork and professional communication, which are vital in the field of statistics, increases confidence in their abilities and knowledge of industry expectations, making them more competitive job applicants after graduation. Interns have an opportunity to obtain generic employability skills such as communication, enterprise and abilities to problem solving and persuasion initiative, human relations, leadership, presentation, relationship building, teamwork, the ability to take criticism, and time management (Chalupa & Chadt, 2021; Dhyani et al., 2020; Urbancová & Vrabcová, 2020).

Internship programmes that are aligned to qualifications acquired provide experiences for actual workplace (Helyer & Lee, 2014; Sobri et al., 2023). Consequently, interns who are placed in tasks that are in line with their qualifications find themselves to be ready and prepared

for the workplace. In addition, Schambach and Dirks (2022) found that internships yielded great experience for students and impacted their learning and understanding of the real-world issues and environments. Others studies reported that interns found challenges that were interesting and enlightening as they stretch from new exposures (Kapareliotis et al., 2019; Plant et al., 2019).

According to Blanka et al. (2023), internships enable graduates to expand on knowledge, improve career readiness and choices, offer networking opportunities, and increase graduate leadership skills, among others. Zulkarnain and Mujahidin (2023) found that having internship activities embedded within the course curriculum through course inversion (including business and professional ethics courses) can improve students' affective domain. For example, in the undergraduate nursing programme, Balay-Odao et al. (2023) found that nursing internships expose students to different hospital wards which require different skill sets and thinking, hence, interns could identify their knowledge gaps and develop passion for specific wards in the hospital. Similarly, Jahromi et al. (2023) reported that nursing interns, through their internship, were able to understand staff fatigue and workplace conditions, acceptance by colleagues as a nurse and effective interaction. However, this is not the case for statistics graduates. According to Baird and Mollen (2023), statistics graduate interns face numerous challenges including adapting to new technologies and operating systems, learning to communicate effectively, and overcoming unfamiliar working environments when transitioning from the academic settings to the professional workplace. These critical professional skills are not embedded within the undergraduate statistics curriculum. Other challenges during internship are dissatisfaction on the underutilization of acquired skills, limited room for development, workload issues, and the fear of asking questions (Ainslie & Huffman, 2019; Bran et al., 2024; Downs et al., 2024). Furthermore, interns also showed boredom and frustration in some internship activities (Mensah et al., 2021), which may be attributed to the lack of incentives for trainees (Arias & Pirofski, 2024). Moreover, internships are branded by limited autonomy, minimal influence during decision making, limited co-worker support and deficient cooperation (Oyetunde et al., 2024). Of these challenges, Irawan et al. (2024) suggest that effective communication during internship is a key factor.

3. Methodology

A qualitative exploratory study design was followed to address issues that the statistics graduates were encountering in the internship spaces. Participants were statistics graduates who were serving as interns, or who had served as interns in the previous three (3) months. Participants were selected purposively and snowballed. Althubaiti (2022) defines the sample size (n) as the number of subjects to be included in a study from a population. Qualitative samples usually require small samples (Indrayan & Mishra, 2021; Vasileiou et al., 2018). Rosenthal (2018) states that the qualitative sample size should be large enough to allow addressing of the study phenomenon but sufficient as dictated by saturation, which refers to the point in data collection when no additional insights are identified (Saunders et al., 2018). In addition, Keshoofy et al. (2023) argue that there is no consensus on the minimum sample size for qualitative studies; keystones for qualitative sample sizes are data adequacy and saturation. On saturation, data begin to repeat so that further data collection is redundant, signifying that an adequate sample size is reached. Therefore, in this study, the sample size (n = 6) was determined by saturation at the data collection stage. That is, the researchers continue interviewing the interns until no newer useful data emerged.

The researchers contacted the participants using Microsoft Teams and Zoom to conduct in-depth interviews. Data were collected using a semi-structured interview guide. The guide included questions related to participant demographics such as participant gender, race, level of education, internship role, and duration of internship. To gain a clearer understanding of the experiences of interns, the following four open-ended questions were asked: which tasks were assigned to you?; are you ready for the work environment?; did you apply theory into practice?; and is your internship aligned to your qualification? Though straightforward as it sounds, the guide was given to experts in the field for content validation and piloted before the actual data collection.

The analysis was performed using the thematic content analysis technique, which is a descriptive presentation of qualitative data (Braun & Clarke, 2006; 2012). Firstly, the researchers read through the transcripts several times to identify emerging themes that provided an understanding of the experiences of interns. After reading all transcripts, a list of similar topics was compiled, grouped per the theme.

Anonymity of the participants, confidentiality of their individual responses, voluntary participation, no harm to participants, and informed consent were ethical considerations adhered to in this study. Similarly, Kyngäs et al. (2020) and Shufutinsky (2020) principles to ensure trustworthiness in the qualitative study were applied. Credibility was ensured through prolonged engagement with the graduate interns to enable them to correct or change what they viewed to be a wrong interpretation of their contributions. To ensure the dependability of the study findings, consistency was upheld in the detailed study methodology, such as data collection, which was checked for conveying a common message. Confirmability was also confirmed by using multiple researchers to evaluate the results, interpretations, and recommendations.

4. Findings and Discussion

4.1 Findings

The study included six interns who were all black African male statistics graduates. The interns were based at various institutions, banking (n = 4) and petroleum industry (n = 2).

Verbatim responses from the participants:

> *"I did statistics, so, I thought I wanted to be given data collection and analysis tasks. I was given some tasks in these aspects, but the internship was much more beyond that. We were exposed to the physical environment of the organisation, how our work impacts on the other tasks and how it helps the organisation. So, we were being trained to relate with other divisions in the organization. We were encouraged to do our best, as they showed us how our bad approaches and our underperformance can harm the organisation. Our activities were data collection, analysis, training, and of course some sundry administrative tasks. It was sometimes boring because there was no work to do, and we were not allowed to ask to do something in the divisions located close to our workstations."* ***(Participant 1)***

> *"I have a degree in statistics. I was hoping to be given tasks related to my field, but they exposed me to nothing on pure statistics. Instead, I did economics. They called me with a letter of offer that I would be in statistics. When I arrived, they told me that I had been reallocated to another division, but that I would be trained and supported. We were also introduced to permanent staff of other departments in the organisation. We were given pamphlets to read to familiarise ourselves with partners and other stakeholders outside the organisation. We were promised to*

collaborate and communicate with different divisions within the company. We were encouraged to do our best, as they would only how poor performance could impact the organization. As interns we were promised support, but managers did not even look at us. When there seemed to be lacking tasks, the permanent staff assigned us tasks, petty type, and we were even at some point given instructions to perform manual jobs. When I reported, it came out that the message was not delivered, and that the interns were given instructions by some administrative staff who did not even complete the level of junior secondary." ***(Participant 2)***

"They told us to apply for a stats intern position, but they placed me in finance. Though the tasks were not aligned to stats, my understanding of numbers was helpful. I did not argue when they said I go to finances, except to ask how I was expected to handle finance with a stats background. I think they had made a mistake, but they said it was because of shortage in finances and my performance in third year stats. It took me some time to settle in the tasks, but as I wanted a job, I worked extra hard to earn a space. I had to read reports, books, and consult the internet for some study material related to the work in finance as required on-site. The frustrating part was when sitting admin staff send me to make photocopies or to make coffee or, and they had no decent qualification. I had to ask the mentor about my scope, and clarified the time wasted on me by tea/coffee stuff." ***(Participant 3)***

"The organisation in which I was placed have no mentors of worth, generally. First, the manager of the department where I was placed refuse to take me, apparently as she had not been told and she wanted to bring her own intern. She told me that I wanted her brother's job, so I would suffer. When I reported to the senior manager who allocated me, she refused and resigned to leave the organization. I was told to find fit anywhere. There were some departments that were involved on external projects, but they would not involve me because I was an outsider from another company, and that participants in the projects had been trained and I was not. I then volunteered to be a tea/coffee maker for internals staff. I ended up learning software packages all of the afternoons. I did not grow in the subject at all, but I learned interpersonal relationships. Collaboration, networking, and less of a statistician." ***(Participant 4)***

"I was given an opportunity to become an intern. What a sad story. The department in which I was placed is statistics. The department was headed by a non-statistician, and I was placed there with non-statisticians. I was not told what I was joining them for, and they did not tell me, but I was there. There was a big book which explained what each department's mandate was, and what our

> *department was required to do. The staff that I was working with, told me that they were happy with the workload of making tea for their bosses, and then leaving their workstations to go and gossip. I sometime saw an advert of work that our department was required to do, so I approached my manager to discuss it with him and explain what we could do and how we were going to benefit. She made me a project manager immediately, as she was happy that the department was going to do work what it was assigned to do. She also forced me to assign members in the company, despite them not fitting. I came close to resigning but endured as a result. The project failed, dismally. I was blamed for the failure, accepted the blame, and I was fired."* ***(Participant 5)***

> *"I got an opportunity as an intern. The department in which I was placed is statistics, but it was staffed with non-statisticians. It was challenging. I was working with different type of people with different type of personalities and characteristics. The mentor I was assigned to, did not know what I was expected to do as an intern. I was not exposed to anyone, and I was not even introduced to other people. I approached managers in other divisions, and I also wrote a letter requesting another deployment, I was not allowed to make a shift to another department. I was not trained in anything. Opportunities were there but tempered upon. I learned to cope with stress. That internship gave me stress. No one showed me anything, even when I volunteered, they ignored me. For 11 months I was a loner. I was wasted."* ***(Participant 6)***

Tasks assigned to interns. There were mixed responses regarding tasks assigned to interns where some participants were placed in areas where statistics is the focus of the work and statisticians leading the division while others were placed in areas where statistics was not being done. The latter includes a division with statistical function but manager and staff have limited knowledge and skills of statistics. Interns also had expectations of their own concerning tasks to be assigned as one of the respondents said "*I did statistics, so, I thought I wanted to be given data collection and analysis tasks. I was given some tasks in these aspects, but the internship was much more beyond that*", supported by another intern saying, *"I have a degree in statistics. I was hoping to be given tasks related to my field, but they exposed me to nothing on pure statistics. Instead, I did economics."* Tasks vary according to different departments in different industries, and interns should understand the culture of the industry to anticipate which tasks might be given to them. Another intern placed in the finance division said *"though the tasks were not aligned to stats, my understanding of numbers was helpful"*. Thus, when

student understand the theory taught in the class and can connect with industry expectations, they can thrive in any division. In some cases, the interns were also trained in other aspects involving work environment such as communication and other value adding activities. Another intern quips *"I did not argue when they said I go to finances, except to ask how I was expected to handle finance with a stats background"*. While one intern was assigned tasks aligned to his qualification*, "our activities were data collection, analysis, training, and of course some sundry administrative tasks*," interestingly, the study revealed that some of the interns and other employees within the industry were asked to prepare tea/coffee for other staff members or their bosses, *"I then volunteered to be a tea/coffee maker for internals staff."* Another intern said, *"the staff that I was working with, told me that they were happy with the workload of making tea for their bosses, and then leaving their workstations to go and gossip*." Evidently, the findings demonstrate that interns' task deployment can be unmatched with their qualifications. A task that is not aligned to the learned skill from the academic qualification may be frustrating. Similarly, some interns find their internship programs boring, *"it was sometimes boring because there was no work to do, and we were not allowed to ask to do something in the divisions located close to our workstations*". Interns may become frustrated when the internship programme is not satisfying and rewarding.

Readiness for work environment. Readiness of statistics interns for work environment also revealed mixed effects. For example, the case of an intern being exposed to data collection and analysis, as well as other tasks that are related to working with others, showed workplace situations beyond the classroom that require readiness. Similarly, the interns placed in finance requires soft skills. While students' preparedness for work environment is in question, some industries provide support. However, one intern said, *"as interns, we were promised support, but managers did not even look at us"* and another said *"it was sometimes boring because there was no work to do, and we were not allowed to ask to do something in the divisions located close to our workstations."* Moreover, some of the managers refused to take interns in their division due to nepotism and favoritism. The case for one intern shows that, *"the organisation in which I was placed have no mentors of worth, generally. First, the manager of the department where I was placed refuse to take me, apparently as she had not been told and she wanted to bring her own intern."* The experiences of the interns indicate preparedness for the hands-on experiences provided by the internship programme while others are below expectations of making the interns ready for work environments. In addition, corruption and

favoritism is still present even with the internship programme.

Alignment of internship programmes to qualifications. The placement of the graduates into different divisions shows differing arguments on the alignment of qualifications. For instance, those were placement oversee the statistics department had both technical and soft skills development to make them work ready. However, they were not given mentors and supervisors that are experts in their fields, *"the department was headed by a non-statistician, and I was placed there with non-statisticians."* Similarly, the placements in economics and finance are not aligned, although some similar tasks may arise. Being placed in a non-statistic division with no statistician involved in mentoring is a clear misalignment.

Applying theory to intern activities. The placements on economics, finance, and non-statistics departments are clear indications of not applying statistics theory and concepts learned from the classroom. Similarly, the lack of statistics experts as managers and mentors showed poor application of specialised knowledge, *"the department in which I was placed is statistics, but it was staffed with non-statisticians."* As the case of one intern, *"I was not allowed to make a shift to another department,"* shows the irrelevance of the internship tasks to their specialisation. Moreover, staff shortfall contributes to the misalignment as interns were placed in fields to compensate with the limited workforce, *"I did not argue when they said I go to finance, except to ask how I was expected to handle finance with a statistics background. I think they had made a mistake, but they said it was because of shortage in finance and my performance in third year statistics."*

4.2 Discussion

Concerning tasks assigned, interns whose tasks were in line with their learned skills and acquired qualifications were motivated and better prepared for actual workplace. However, more interns seem to have been required to do jobs that require skills not aligned with the qualifications. Internship programmes that are aligned to the qualifications acquired provide experiences for the actual workplace (Helyer & Lee, 2014; Sobri et al., 2023). Moreover, internship challenges pose interest and enlightenment as they trained interns through actual workplace scenarios they are exposed to (Kapareliotis et al., 2019; Plant et al., 2019). However, as the interns in this study narrated, the internship tasks create boredom and frustration due to activities that were not challenging their thoughts (Mensah et al., 2021; Karunaratne & Perera, 2019) and misaligned tasks that waste the interns' time (Woo et al., 2017).

On the preparedness of interns for the actual workplace, many misaligned interns showed lack of confidence on being work ready indicating no actual activities that are within their specialisations that made them prepared. The findings were inconsistent with the reports of Schambach and Dirks (2022) that internships yielded great experience for students and impacted their learning and understanding of the real-world issues and environments. While Galbraith and Mondal (2020) argue on the importance of internships in increasing the employability of graduates and preparing them for their career, Kapareliotis et al. (2019) pinpoint on the internship experience aligned well with the demands of the employer at work and can integrate course content with real-world scenarios to make informed decisions. Similar with the findings of Zehr and Korte (2020), interns in this study failed to look for connections between work environment and classroom content and this constrained them to put knowledge into practice. Moreover, supervisors were also ill-prepared to guide interns during their internship.

Interns also revealed mixed views on the alignment of daily tasks with their qualifications. Some of them asserted working on tasks with little relevance to their qualifications while others exposed performing not within their line of specialisations. In their work stations, some mentors and supervisors do not conform with the interns' job descriptions giving other institutional tasks whenever personnel are not available. This is the similar findings of Thi Ngoc Ha and Dakich (2022) that interns are normally given workplace assignments beyond their job descriptions, which Wan et al. (2023) further highlighted due to interns' frustrations on tasks indicated and agreed in the internship agreement but were not the actual tasks performed during the internship programme.

The study findings also highlighted refusal of some managers to full assist and support interns, such as not properly guiding and informing about their tasks, not given a mentor or immediate supervisor, which are the same concerns emphasized by Gumba (2020), To and Lung (2020) and Covaleski et al. (2021) and giving preference to relatives of permanent staff, which raises question on nepotism, granting advantages to relatives or close friends in various fields (Gusman, 2024). This actually resulted to the placement of non-statistical personnel in the statistics department, creating mismatch in the workplace that eventually affected the misalignment of the interns. On the other hand, the refusal of the manager to accept an already hired intern raises question on human resource and leadership practices. Moreover, the

question of autocracy seems to apply. According to Baturo and Tolstrup (2024), autocracy is a form of authority where one leader holds absolute control and decision-making power over all matters of organisation and the personnel, the leader being not accountable to anyone. In this case, the attempt to use autocracy compromised the appointed intern. Similarly, there seems lack of performance measurement on the key areas of intern development as well as internship programme policy. However, the experiences of the interns raise doubts on the occurrence of internship agreement between the higher education institutions (HEIs) and the organisations accepting student-interns. If the memorandum of agreement has been signed, it could have outlined the roles and responsibilities of each party, as well as the expected outcomes and performance standards for the interns. In this case, the HEIs also need to implement robust policies and monitoring mechanisms to ensure that internship tasks are aligned with the interns' qualifications and that the internship experience is truly beneficial for the interns' professional development.

5. Conclusion

While internship programs provide valuable, work-related experiences for interns, this study pointed out some cases of misaligned internship experiences with interns' qualifications and skills. The study argues that relevant and aligned internship programme develops and prepares the interns for work placement. However, majority of the interns in this study had irrelevant experiences to their area of specialisation. Hence, many of them felt that the internships did not adequately prepared them for the workplace.

In the light of the revelation of the interns, it highlighted the lack of communication and coordination between HEIs and organizations regarding the internship program, as well as a lack of clear policies and performance monitoring to ensure the quality and effectiveness of the internship experience. Hence, clear agreements and memorandums of understanding regarding the internship program are highly recommended, outlining the roles and responsibilities of each party, as well as the expected outcomes and performance standards for the interns. Similarly, the study recommends setting of clear objectives and task alignment, comprehensive onboarding to align interns with company culture and offering training sessions for growth and empowerment. Furthermore, interns should be given mentors, monitored, and provided with feedback for their given tasks.

While the results clearly emphasised the interns' actual experiences, it has limited number of participants, which could not be generally taken as the same experience of all the interns in other departments and industries. Similarly, the limited opportunities for the interns specialised in statistics might have affected the misalignment. Hence, further studies can increase the number of participants and compare internship experiences in different programmes.

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Carbon emissions disclosure and firm value: A study of firms in Indonesia

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Abstract

This study aims to examine the effect of carbon emissions disclosure on firm value in Indonesia using statistical analysis methods. This research uses panel data which consists of a combination of time series and cross section. A total of 1,830 data from 366 Indonesian companies were collected from annual reports and sustainability reports for an observation period from 2018 to 2022 as a sample of the research. Firm value is measured using Tobin's Q. The results showed that the disclosure of carbon emissions had an effect on firm value. It was also figured out that a control variable, leverage, affected firm value. These results indicate that information about carbon emissions promotes firm value. The disclosure of carbon emissions by the company will affect investors' decisions. This is consistent with the stakeholder theory, according to which investors have the right to obtain information about the company's activities from annual reports and sustainability reports. Companies are encouraged to foster the initiative to disclose carbon emissions as an effort to reduce the threats of global warming and strengthen stakeholders' trust in making investment decisions.

Keywords: *carbon emissions, disclosure, firm value, stakeholder, Indonesia*

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1. Introduction

Climate change, carbon emissions, and global warming are of global concern as they continue to intensify and adversely affect the environment. According to the Intergovernmental Panel on Climate Change (IPCC, 2022), countries around the world are experiencing an elevated global surface temperature, which results in extreme climate change. As stated by NASA, since the beginning of the industrial era in 1750, human activities have caused the concentration of CO_2 in the atmosphere to increase by about 50%. In light of this issue, corporate stakeholders need to raise human awareness to reduce the negative impacts caused by humans on the environment, including those in Indonesia.

The risk and damage from climate change are mounting as global warming escalates. Environmental problems occur as a result of industrialization activities, including uncontrolled corporate activities that depletes the ozone layer, excessive natural resources extraction, global warming, and hazardous waste pollution. Not only Indonesia, countries such as China, the U.S., Japan, and Mexico are currently also experiencing the boiling temperature of the Earth (Bisset, 2023). Such is the effect of climate change that arises from the accumulation of carbon emissions in the atmosphere. In response, various sectors are now competing to find alternatives to reduce carbon emissions (Ardhi, 2023). Some companies claimed that their products are environmentally friendly, but industrial entities have provided no sufficient explanation of their efforts to reduce the impact of environmental damage. Such an environmental problem provides an impetus to the rise of social and environmental accounting (Suaryana et al., n.d.).

According to data from the Energy Institute, a total of 34.37 billion tons of CO_2 was emitted from the global energy sector in 2022, the highest in history (Muhamad, 2023). The Global Atmospheric Research (EDGAR) reported that in 2022, China ranked first as the largest carbon emitter in the world, while Indonesia ranked seventh by emitting 1.24 Gt CO_2, an increase from 2021's CO_2 emissions of 1.12 Gt (Martin & De Melo, 2023). Disclosure of carbon emissions provides a means of dialog between the company and stakeholders (Adams & McNicholas, 2007). Environmental disclosure can help enhance the trust of the company's stakeholders and minimize idiosyncratic risk (Hasseldine et al., 2005). Benlemlih and Girerd-Potin (2017) and Jo and Na (2012) also stated that an increase in corporate social responsibility (CSR) disclosure will reduce idiosyncratic risk, but Humphrey et al. (2012) found no

correlation between the two of them. Carbon emissions disclosure (CED) facilitates stakeholders' decision-making pertaining to the company's carbon emissions and mediates the relationship between public ownership and firm value (Ng et al., 2022).

Previous research explains that CED made by CDP does not affect the increase in firm value (Najah, 2012), but (Matsumura et al., 2014) found that carbon emissions are negatively related to firm value. Market reaction is diminished in companies that have poor environmental performance. Investors are concerned about the costs incurred by the company to deal with global warming. Additionally, Broadstock et al. (2014) found that the level of carbon emissions, company size, and the quality of company management affect CED; the larger the company size, the more likely it is to disclose carbon emissions.

Rahmawati et al. (2022) concluded in a study that attention to every aspect of company activities affects company value. It has been found that the better the company value, the higher the company profitability. In addition to making it easier for companies to gain support from stakeholders, disclosure of carbon emissions is also able to influence company value. Disclosure of carbon emissions is therefore no longer seen as a burden because it can enhance company value and the government's favorable image (Hardiyansah et al., 2021). Not only the government, businesses are also starting to consider environmental issues when making business decisions. According to Lash and Wellington (2007) and Kolk and Pinkse (2005), the issue of climate change has become one of the top priorities to be resolved in recent decades.

According to Botosan et al. (2000), businesses with high levels of disclosure will have a lower cost of equity (COE). Hence, adopting CED will increase firm value. Hail et al. (2008) found strong evidence that cross-listing firms on U.S. exchanges lowers the cost of equity and accounts for more than half of the increase in firm value. In addition, Sindy (2017) argues that carbon emissions disclosure is a component of sustainability reporting that is expected to provide information to stakeholders. The inclusion of carbon emissions disclosure in financial statements is important as part of corporate responsibility. The CED can be used by investors as a benchmark for decision-making (Bahriansyah & Ginting, 2022). In other words, the company's efforts to reduce carbon emissions are in line with the concept of CSR. By implementing carbon accounting in the industry, the level of greenhouse gas air pollution, which is a factor of global warming, can be lowered. In addition, carbon accounting also has the benefit of adding value to the company.

Research by Anggraeni (2015), Clarkson et al. (2011), Al-Tuwaijri et al. (2003), and Krishnan (2003) concluded that companies in Indonesia have low levels of CED, but it was found that CED affects firm value, suggesting that the market responds to information provided by CED. As such, companies take a deeper interest in improving the quality of information about their carbon emissions as this will have an impact on firm value.

The Sustainable Development Goals (SDGs) include 17 goals from various aspects to address changes in sustainable development. This research relates to 5 goals points of the Sustainable Development Goals (SDG) including: (7) Affordable and Clean Energy, (8) Decent Work and Economic Growth, (9) Industry, Innovation, and Infrastructure, (10) Sustainable Cities and Communities, (11) Responsible Consumption and Production(SDGs Indonesia, n.d.). Previous research examining the manufacturing sector in Indonesia by Kurnia et al. (2021) showed that disclosure of carbon emissions affects company value, as environmental responsibility increases competitive advantage and investor confidence and creates good corporate governance, keeping in mind that investors consider environmental aspects as well, especially carbon emissions. Disclosure of carbon emissions can drive stock prices and firm value up because investors care about environmental issues (Berthelot et al., 2011), and failure to integrate climate change and business can reduce firm value (Matsumura et al., 2014). Anggraeni (2015) found that disclosure of carbon emissions affects business value, while Saka and Oshika (2014) combined voluntary disclosure with carbon emissions to assess firm value. The market welcomes the publication of sustainability reports and social and environmental disclosures (Guidry & Patten, 2010). However, in view of the gap in existing research findings that are restricted only to companies engaged in the manufacturing sector, this study aims to determine how carbon emissions disclosure impacts firm value in all sectors in Indonesia.

2. Literature review

2.1. Stakeholder Theory

The stakeholder theory describes which parties are responsible for the company's actions (Freeman, 1983). According to Kelvin et al. (2017), companies must maintain relationships with their stakeholders by fulfilling their wants and needs. One way to do so is by issuing sustainability reports that convey information about the company's economic,

social, and environmental performance to all its stakeholders, and it is expected that such sustainability reports include disclosure of carbon emissions. According to the stakeholder theory, companies must provide benefits to stakeholders, including shareholders, creditors, consumers, suppliers, the government, communities, and analysts, to name a few. Among their interests in the company are matters related to the environment (Salbiah & Mukhibad, 2018). Since support from stakeholders determines the running of a company, it is important that companies seek stakeholder support (Chariri, 2007). The better the company adaptability, the stronger the stakeholders. The company's effort to communicate these matters with stakeholders is regarded as a part of social disclosure.

As revealed by Epstein and Freedman (1994), information provided voluntarily in corporate annual reports attracts individual investors. This information encompasses corporate social and environmental information. Therefore, investors are expected to give a better valuation to companies with good disclosure practices, including in disclosing carbon emissions.

2.2. Carbon Emissions

According to Roy (2022), carbon-emitting industrial activities that do not consider the environment increase the atmospheric carbon dioxide concentration and hinder carbon dioxide absorption by nature. This condition has escalated since the outset of the industrial revolution, with most of carbon emissions originating from production machines, ultimately leading to global warming. As human activities elevate carbon dioxide levels, nature can no longer absorb the entire amount of carbon dioxide available (Kelvin et al., 2017).

Developing countries consider carbon emissions disclosure as novelty, so not many companies practice it (Irwhantoko & Basuki, 2016). According to Akadiati et al. (2023), sustainability reporting in Indonesia is voluntary. Sustainability reports were made mandatory in 2019 in Indonesia, but the implementation has been postponed to 2021 and 88% of companies in Indonesia had disclosed their sustainability reports (Andy, 2023). The Indonesian Institute of Accountants (IAI) publishes transparency and social responsibility regulations for companies in Indonesia which are regulated in PSAK No.1 Paragraph 9; this can indirectly encourage companies to disclose their environmental responsibilities. Therefore, disclosure reports are not only used for investors, but can also be used by companies to maintain the image and value of the company. Based on Presidential Regulation No. 61 of 2011 on the National

Action Plan for Greenhouse Gas Reduction, which is still voluntary, Indonesia has committed to reducing the level of carbon emissions. Voluntary social and environmental disclosure is still carried out by companies to maintain the company's reputation and maintain the company's image in the eyes of the public. As explained in article 4, business actors contribute to GHG reduction. One of the efforts that companies can make is to disclose carbon emissions.

Disclosure of carbon emissions is deemed crucial as it contains information needed by stakeholders. Investors want to know the environmental risks of the company's operations, as well as the company's sustainable development activities and environmental protection efforts (Sudibyo, 2018). Walley and Whitehead (1994) argued that a firm should not take only a value-based approach that allows for an information exchange on environmental costs and benefits. This research discusses the impact of carbon emissions on firm value by estimating the impact of carbon emissions disclosure on firm value.

2.3. Firm Value

Firm value can be defined as the value of the company's share price or the value of the company's assets when the company is sold (Agustia et al., 2019). The prosperity of shareholders and the company value will grow along with the increase in share prices (Iskandar et al., 2016). Tobin's Q ratio is used to measure firm value, obtained by multiplying the closing price of a stock by the number of shares outstanding, adding it to the total book value of liabilities, and dividing it by the total book value of assets. A high firm value (above 1) indicates that the value of the stock price is higher than the replacement value of the assets (Kurnia et al., 2021). According to Eko et al. (2013) maximizing company value is the main goal of the company. Firm value can be broken down into liquidation value, book value, intrinsic value, nominal value, and market value (Christiawan & Tarigan, 2008).

Disclosure of carbon emissions made by companies with good corporate governance can increase the companies' value because investors consider environmental issues, especially carbon emissions (Tang, 2016). Investors prefer businesses that are environmentally responsible, especially in situations where climate change occurs (Berthelot et al., 2011). Businesses' carbon emissions can cause their stock price and company value to decline. Reducing carbon emissions will involve investor costs (Kurnia et al., 2021). When firm value is high, it can have an impact on market confidence, both for current performance and future

prospects (Salvatore, 2005). This is because shareholder prosperity is positively correlated with stock prices (Zuhrufiyah & Anggraeni, 2019).

2.4.Carbon Emissions Disclosure and Firm Value

The relationship between carbon emissions disclosure and business value is in line with the stakeholder theory and the signal theory, where the company discloses information as a sign that it is successfully carrying out its operations. These signals are sure to be well-received by the parties involved, especially shareholders, which will increase their trust in the company and in turn boost the stock price and company value (Zuhrufiyah & Anggraelni, 2019).

From where investors stand, firm value is of the utmost importance because it reflects how the market values the company as a whole. Firm value can increase the profits of the company's shareholders, where shareholders' prosperity is proportional to the share price; the higher the share price, the higher the prosperity of shareholders. Investors generally leave the company's management in the hands of managers or commissioners to take care of the company value (Zuhrufiyah & Anggraelni, 2019).

Carbon emissions disclosure assesses the company's carbon emissions and sets emissions reduction targets (Sari & Budiasih, 2022). According to the Statement of Financial Accounting Standards (PSAK) No. 1, "*companies shall provide additional reports concerning the environment (or added value), especially for industries whose primary resources pertain to the environment (or employees and other stakeholders are important financial statement users)*". The fact that stakeholders need information about carbon emissions makes this disclosure imperative. They want to know about the environmental risks of the company's business operations and the company's sustainable development activities and environmental protection efforts (Sudibyo, 2018). Given that carbon emissions disclosure is a novel concept in developing countries, many companies have yet to make any carbon emissions disclosure. In addition, companies in developing countries lack funds for disclosure as compared to companies in developed countries. For instance, Indonesia is a developing country where carbon emissions disclosure is not mandatory; however, companies may disclose carbon emissions voluntarily (Irwhantoko & Basuki, 2016). Although it is not compulsury, companies often choose to disclose carbon emissions in their accountability reports to inform

stakeholders. Investors also favor businesses that provide environmental information (Roy, 2022).

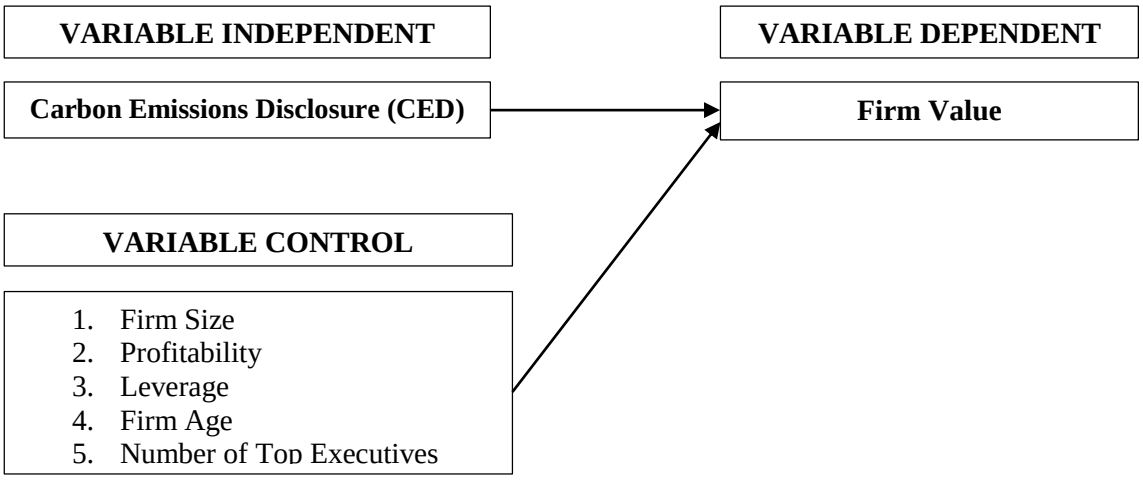
Several previous studies have examined the disclosure of carbon emissions of companies in Indonesia (Anggraelni, 2015b; Clarkson et al., 2011; Al-Tuwaijri et al., 2003). Krishnan (2003) concluded that companies in Indonesia have a low level of CED but it is also found that CED affects firm value. Therefore, companies take a deeper interest in improving the quality of carbon information as this will have an impact on firm value. Griffin et al. (2012) stated that the positive market reaction to the disclosure of carbon emissions is due to investors' belief that the management has the ability to control the environmental impact of business operations.

Previous research has yielded inconsistencies in findings. Some studies discovered that disclosure of carbon emissions information has an influence on firm value (Hanifah, 2017; Elmpiris et al., 2021), while one study found that CED is regarded as "bad news" and causes anxiety as to potential costs that companies must incur to address global warming (Lelel et al., 2015). Thus, the hypothesis in this study is:

H1: Disclosure of carbon emissions affects firm value

Figure 1

Research framework



3. Methodology

3.1. Population and Sample

The population in this study consisted of IDX-listed Indonesian companies. Secondary data were collected using the documentation method by tracing the annual reports and sustainability reports of the sample companies, aided by the Stata computer program. A total of 1,830 data were retrieved from 366 Indonesian companies for the 2018–2022 observation period. The inclusion criteria used in this study were that the companies must have published annual reports and sustainability reports on the IDX's website (www.idx.co.id) from 2018 to 2022 and that the companies must have been listed on the Indonesia Stock Exchange (IDX) in the period from 2018 to 2022.

3.2. Variable Operationalization

The dependent variable used in this study was firm value. Several indicators adopted from Hel et al. (2021) were used to measure the value of CED to prove whether the disclosure of carbon emissions has an effect in future firm value. The formula used to measure firm value (Olayinka & Oluwamayowa, 2014):

$$\textbf{Tobin's Q} = \frac{\textbf{Total Market Value} + \textbf{Total Book Value of Liabilities}}{\textbf{Total Book Value of Assets}}$$

where total market value is the market capitalization of the company, while market capitalization is the share price multiplied by the number of shares outstanding.

CED was an independent variable which measured carbon emissions. The operational formula for this variable is as follows (He et al., 2021):

$$\textbf{SCORE}\ (\textbf{CED})_{\mathbf{j}} = \sum_{\mathbf{i=1}}^{\mathbf{8}} \textbf{Score}\ (I^{i}_{j}).$$

Table 1

Carbon emissions disclosure index

Category	Indicator
Carbon emissions disclosure (CED)	CED-1 : Emissions reduction targets and results
	CED-2 : Energy consumption of total operations in the reporting year
	CED-3 : Carbon emissions measurement method
	CED-4 : Direct greenhouse gas emissions
	CED-5: Indirect greenhouse gas emissions of energy

This research uses panel data as a regression model. Panel data consists of a combination of time series and cross section. This study aims to examine the effect of carbon emissions disclosure on firm value in Indonesia using panel data regression. The control variables in this study were company size, profitability, leverage, company age, and number of top executives. Table 2 provides descriptions of these control variables:

Table 2

Variable operationalization

No	Control Variable	Description
1	Firm Size	Calculation of the natural logarithm of total assets in this study was carried out to normalize the distribution of the values of the company size Choi elt al. (2013). Environmental accounting literature indicates that large companies play an important role in reducing corporate carbon emissions and in disclosure (Freleldman & Jaggi, 2005).
2	Profitability	**ROA =** $\frac{EBIT}{TA}$ X **100** where ROA is the return on assets, EBIT is earnings before interest and taxes, and TA is total assets (Choi et al., 2013; Nirelsh & Vellnampy, 2014).
3	Leverage	Leverage is a corporate financial ratio that compares total debt against total corporate assets (García-Telruell et al., 2009). $Leverage = \frac{Total\ of\ Liabilities}{Total\ of\ Asset}$.
4	Firm Age	The age of the company reflects how long the company has survived. Companies that have been established for a long time have higher profitability than companies that have just been established. This is because older companies have a more stable level of sales and have established a name for themselves among society. The age of the company was calculated by subtracting the year the company was founded from 2022.
5	Number of Top Executives	Top management is the highest group of executives in the company who have the responsibility of making strategic decisions for the company. Their contributions include devising strategies, making key decisions, monitoring performance, and establishing external relationships. Top-level management is the highest position within the company. The managing director, finance director, and marketing director are some of the said executives. The number of top executives was calculated from the board structure revealed in the annual report.

4. Findings and Discussion

4.1. Findings

This section provides a statistical data description that includes the mean, standard deviation, minimum, and maximum values of all variables in this study. A total of 1,830 data from the financial reports, annual reports, and official websites of 366 Indonesian companies included in this study were observed.

Table 3

Statistical data description

Var	N	Mean	Std. Dev	Min	Max
FV	1.830	0.591	9.413	-233.200	10
CARDIS	1.830	1.730	2.076	0	5
LEV	1.830	1.185	2.781	-34.930	50.189
PROF	1.830	0.241	2.819	-11.758	61.782
TMTSZ	1.830	8.024	3.661	2	29
AGE	1.830	34.803	19.289	4	116
SIZE	1.830	17.267	6.649	1.853	30.412

Descriptive statistical analysis was intended to provide a statistical data description that covers the mean, standard deviation, minimum, and maximum values of all variables in this study. The variables were company value (FV), carbon emissions disclosure (CED), leverage (LEV), profitability (PROF), number of top executives (TMTSZ), company age (AGE), and company size (Size). These variables were observed for a five-year period from 2018 to 2022.

Based on table 3, the independent variable in this study, disclosure of carbon emissions, had a mean value of 1.730 and a standard deviation value of 2.076 (mean < SD). The dependent variable firm value had a mean value of 0.591 and a standard deviation value of 9.413 (mean < SD). The statistics for the five control variables are as follows: leverage had a mean value of 1.185 and standard deviation value of 2.781 (mean < SD), profitability had a mean value of 0.241 and a standard deviation value of 2.819 (mean < SD), number of top executives had a mean value of 8.024 and a standard deviation value of 3.661 (mean > SD), company age had

an average value of 34.803 and a standard deviation value of 19.289 (mean > SD), and company size had an average value of 17.267 and standard deviation value of 6.649 (mean > SD).

Mean values that were smaller than the standard deviation values for the variables leverage and profitability indicate that the data for these variables had heterogeneous distribution. It shows that the data deviation was greater and it could be concluded that the variables, leverage and profitability, have unequal distribution. This occurs because the data on the leverage and profitability variables have a large enough gap between the data. The other variables, number of top executives, company age, and company size, had mean values that were greater than the standard deviation values, suggesting that the data for these variables had homogeneous distribution. It also shows that the data deviation was smaller; it could be concluded that the variables number of top executives, company age, and company size are equally distributed. The variables have a set of data that does come from variations that are not much different.

Table 4

Total carbon emissions disclosure

Category	Indicator	Number	Percentage
Carbon Emissions Disclosure (CED)	CED-1	647	21%
	CED-2	763	25%
	CED-3	482	16%
	CED-4	623	20%
	CED-5	590	19%
Total		**3,105**	**100%**

The independent variable CED refers to voluntary disclosure related to the company's carbon emissions. This variable was measured using five indicators adopted from the research of Hel et al. (2021). Table 4 shows that CED-3 had the lowest percentage (16%), while the highest was obtained b CED-2 (25%).

Table 5

Best model selection results

F stat PLS	0.00000
F stat FEM	0.00000
F stat REM	0.00000
Chow's test on H1	**FEM**
LM test on H0	**REM**
Hausman's test	**REM**
Model selected	**REM**

Table 5 presents the regression results for the Fixed Effects Model and Random Effects Model, as well as results of best model testing by Chow's test, Hausman's test, and LM test. The Fixed Effects Model was selected once based on Chow's test results, while the Random Effects Model (REM) was selected twice based on the LM and Hausman's test results. In conclusion, the Random Effects Model (REM) was selected for the research.

Table 6

Hypothesis test results

Variable	Coef.	T	p > [t]
Carbon emissions disclosure	-0.352	-3.07	0.002
Leverage	-0.307	-4.31	0.000
Profitability	0.005	0.07	0.943
Number of Top Executives	0.091	0.63	0.532
Firm Age	-0.025	0.24	0.807
Firm Size	0.000	0.00	0.999
C	1.705	0.37	0.715

Based on table 6, the variable CED had a regression coefficient value of -0.352 and a probability level of 0.002, which was smaller than α (0.05), showing that CED had a significant effect on firm value. Therefore, the hypothesis proposed in this study was accepted. This finding is in line with the research by Anggraelni (2015b), Gabrielllel and Toly (2019), Rahmanita (2020), and Zuhrufiyah and Anggraelni (2019).

The first control variable, leverage, had a regression coefficient value of -0.307 and a probability level of 0.000, which was smaller than α (0.05). This shows that leverage had a significant effect on firm value. This finding supports the results of research by Gabrielllel and Toly (2019) and Rahmanita (2020). The results demonstrated the company's ability to fulfill its debt obligations with its total assets. The higher the leverage, the higher the company value; vice versa, the lower the leverage, the lower the company.

The second control variable, profitability, had a regression coefficient value of 0.005 and a probability level of 0.943, which was greater than α (0.05). This value indicates that profitability had no effect on firm value. This finding does not support the results of research by Irwhantoko and Basuki (2016a) and Zuhrufiyah and Anggraelni (2019) that profitability has a significant effect on firm value.

The third control variable, number of top executives, had a regression coefficient value of 0.091 and a probability level of 0.532, which was greater than α (0.05). This shows that the number of top executives had no effect on firm value. The fourth control variable, company age, had a regression coefficient value of -0.025 and a probability level of 0.807, which was greater than α (0.05). This shows that company age had no effect on firm value. The last control variable, company size, had a regression coefficient value of 0.000 and a probability level of 0.999, which was greater than α (0.05). This shows that company size had no effect on firm value, which is in line with the results of research by Gabrielllel and Toly (2019) and Rahmanita (2020).

4.2. Discussion

This study aims to prove the effect of carbon emissions disclosure on firm value, with company size, profitability, leverage, company age, and number of top executives serving as control variables. The subjects in this study were companies listed on the Indonesia Stock

Exchange (IDX). A total of 1,830 data from 366 Indonesian companies during the period from 2018 to 2022 was used.

The results of this study indicate that information about carbon emissions has the ability to increase firm value. This means that the disclosure of carbon emissions made by the company can influence investors' decisions in making investment decisions. The results of this study provide evidence that CED affects firm value. A regression coefficient of -0.352 and significance probability of 0.002, which is smaller than 0.05. The disclosure of carbon emissions reflects good corporate governance and superior carbon performance that can increase firm value. Enhanced corporate environmental disclosure can benefit the firm by increasing its value through reduced cost of capital or increased cash flows or both.

Relationships with stakeholders can be maintained by delivering sustainability reports, which can also include carbon emissions disclosure, to all stakeholders. According to the stakeholder theory, investors have the right to obtain information about company activities from annual reports and sustainability reports. The main foundation of stakeholder theory is that for a company to survive, it must maintain good relationships with its key stakeholders in an appropriate manner (Rizkika Alfaiz & Aryati, 2019). It has been discovered in this study that CED has a low level of influence on firm value. The company must have a good relationship with stakeholders, one of which is by fulfilling their wants and needs because of their role in influencing the availability of resources needed for business operations (Hörisch et al., 2014).

According to the results of this research, carbon emissions and leverage affected the disclosure of carbon emissions and firm value. The positive relationship between leverage and firm value can be seen from the company's ability to repay its debts with its assets. It was found that the higher the level of leverage, the higher the company value; vice versa, the lower the level of leverage, the lower the company value. Debt policy favors firm value; in other words, the higher the debt capital structure, the higher the firm value (Sudiyatno et al., 2010). The other variables, company age, profitability, number of top executives, and company size had no effect on the disclosure of carbon emissions and firm value. In other words, company value in the case of non-financial companies in Indonesia is not influenced by company age, company size, profitability, and the number of top executives.

5. Conclusion

This study concludes that the firm value of non-financial companies in Indonesia is influenced by the disclosure of carbon emissions. This indicates that the disclosure of carbon emissions has a crucial role in the long-term sustainability of the company. However, the implementation of CED in companies in Indonesia is still relatively low, which is caused by the lack of awareness of companies in disclosing their carbon emissions openly through sustainability reports. The implementation of corporate sustainability, a strategy in which companies provide goods and services in an environmentally friendly manner and support their economic growth, is still relatively low in Indonesia (Laskar, 2018). Based on Law No. 40 of 2007 on Limited Liability Companies, Article 66c, companies are required to incorporate social and environmental responsibility reports in annual reports. In addition, Circular Letter of the Financial Services Authority (OJK) No. 30/SEOJK.04/2016 requires issuers or public companies to include social and environmental responsibility reports in annual reports or sustainability reports.

This study has practical implications for resolving the rampant issue of climate change through policy-making in relation to carbon emissions disclosure by the Indonesian government, keeping in mind its impact on firm value and corporate sustainability. It is expected that new policies will be able to raise Indonesian listed companies' awareness of the importance of making environmental disclosures, especially carbon emissions disclosures. Based on the results of this study, companies are advised to include the disclosure of carbon emissions in financial statements. Investors are also expected to consider the disclosure of carbon emissions made by companies in making investment decisions. Carbon emissions disclosure also has a valuable role in informing the government's law-making.

This study has limitations in terms of the carbon emissions disclosure index used. The index has not been able to describe all information that can comprehensively reflect the quality of carbon emissions disclosure by companies. It is expected that these limitations pertaining to the carbon emissions disclosure index can be addressed in future research.

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The nexus between socio-demographic factors and participation of special groups in public procurement of works in local government authorities

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Abstract

Examining the nexus between socio-demographic factors and the participation of special groups in the public procurement of work is essential to inform policymakers and stakeholders in the Local Government Authorities (LGAs) in Tanzania about the need for targeted initiatives to promote and enhance the participation of youths, women, the elderly and people with disabilities who are considered as special groups in public procurement. In this study, a cross-sectional research design was used, and a simple random sampling technique was applied to select 164 respondents. A questionnaire survey was conducted among employees in LGAs, drawing insights from Dodoma, a city in Tanzania. The data were analyzed using descriptive and binary logistic regression analysis. The findings revealed a low level of participation of special groups in the public procurement of works. Further analysis showed that sex and age are significantly associated with the participation of special groups in the public procurement of works. The study recommends that LGAs provide targeted support to special groups to help them participate in public procurement of works. This can include training and capacity-building programs and financial support to help them meet the procurement requirements of works. In addtion, it is recommended that policymakers take a leading role in reviewing and strengthening the existing legal framework and policies related to participation in public procurement in Tanzania. This includes ensuring that the laws and regulations explicitly promote the participation of special groups.

Keywords: *socio-demographic factors, participation, special groups, public procurement, local government authorities*

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1. Introduction

Public procurement plays a crucial role in the development and functioning of societies. It involves the acquisition of goods, services, and works by public entities, such as governments and public institutions. Thus, procurement policies and laws must promote transparency, fairness, equity, and efficiency in allocating work (Huka et al., 2018). However, when it comes to the participation of special groups in the public procurement of works, there are debates among scholars regarding its usefulness. The idea of special groups, which is articulated in the Sustainable Development Goals, includes women, youth, children, elderly, and individuals with disabilities (United Nations, 2015). Research asserts that promoting the involvement of special groups leads to increased economic opportunities, job creation, and social inclusion (Longo & Samson, 2023; Malanga, 2020; Mohamed, 2020). Scholars add that by providing equal access to procurement contracts, governments can address these groups' historical disadvantages and promote a more equitable society (Lyimo & Mrema, 2022).

Some critics (Nduta et al., 2015; Karani & Moronge, 2017) see potential negative consequences of preferential treatment for special groups in public procurement, particularly in policy action. It is argued that preferential policies for special groups may lead to inefficiencies, reduced competition, and compromised value for money (Oluka et al., 2021). Critics also question the effectiveness of these policies in achieving their intended goals. The critics add that instead of focusing on preferential treatment, efforts should be directed toward capacity building and creating an enabling environment for all businesses to compete fairly (Nduta et al., 2015). Despite these debates, it is widely recognized that special groups have had limited access to procurement opportunities such as works (Mohamed, 2020; Leticia, 2018). Thus, efforts to promote their inclusion have been implemented in many countries, including Tanzania, by enacting various preferential policies and programs. The policies and program initiatives aim to level the playing field and create equal business opportunities. Furthermore, studies (Lagat et al., 2016; Mamiro, 2017; Leticia, 2018; Malanga, 2021) have shown that effective preferential policies, such as those promoting the participation of special groups in the procurement of works, can lead to positive outcomes. Research has highlighted success stories where increased participation has resulted in economic growth, job creation, and

improved social well-being (Longo & Samson, 2023; Tesha & Nsimbila, 2022). These findings provide evidence for the potential benefits of inclusive procurement.

Given the relevance of special groups in procurement, Tanzania revised the Public Procurement Act of 2011 to emphasize the participation of special groups in procurement (Tesha & Nsimbila, 2022). In addition, Tanzania Procurement Regulations 2013 were amended in 2016 to allow the allocation of 30% of government funds to businesses owned by special groups (Changalima et al., 2023). Thus, the amended Public Procurement Act of 2016 emphasizes that every procuring entity should save 30% of its budget for the special groups. The amendment law encouraged participation in public procurement by youth, women, and people with disabilities. Thus, amended regulations promote inclusive economic growth by ensuring these groups have better access to government contracts. Furthermore, Tanzania established the Public Procurement Regulatory Authority in 2005 to regulate and oversee procurement compliance (Namusonge, 2017). Despite such milestones, special groups are still not given adequate opportunities to participate in public procurement activities (Tesha & Nsimbila, 2022; Malanga, 2021; Leticia, 2018). The inadequate opportunities of the special group from public procurement opportunities limit their access to government contracts, which can hinder their ability to grow their businesses and create jobs. Thus, it can perpetuate poverty and inequality, as the special group may not have the same opportunities as other groups to participate in the economy.

Studies noted that the procurement of works in Tanzania faces several challenges that include limited adherence to the established regulations by the procuring entities, lack of access to information about procurement opportunities, lack of financial capacity, and inadequate awareness creation on preference schemes given to special groups (Nkunda, 2022; Malanga, 2021; Leticia, 2018). Most reviewed studies in the Tanzanian context focused on challenges facing public procurement in general (Changalima et al., 2023; Kiula & Kinisa, 2022; Mamiro, 2017). Similarly, few other studies have focused on the determinants of special group participation, such as financial, technical, ethical, regulation, and information (Tesha & Nsimbila, 2022; Leticia, 2018). Thus, there is scant knowledge on the nexus between socio-demographic factors such as gender, education, age, and income and the participation of special groups in the procurement of work. A study on the procurement of work among special groups in Tanzania is vital to promoting fairness, equal opportunities, and socio-economic

development. Also, a study focusing on special groups must align with diversity, inclusion, and responsible governance principles. Similarly, the survey among special groups can inform policymakers and stakeholders at Local Government Authorities (LGAs) such as Dodoma City Council about the need for targeted initiatives to promote and enhance the participation of these special groups in public procurement processes based on socio-demographic information. Therefore, this study sought to examine the nexus between socio-demographic factors and the participation of special groups in public procurement of works in LGAs in Tanzania, with reference to the case of Dodoma City Council.

2. Literature Review

2.1. Procurement works

Procurement within LGAs is a multifaceted process that goes beyond mere acquisition of goods, services, or works. It involves a strategic approach to meet organizational needs, ensure value for money, and promote efficiency and transparency (Basheka, 2018). In the context of LGAs, procurement is not only about satisfying operational requirements but also about fostering socio-economic development by including marginalized groups such as women, youth, and persons with disabilities.

The procurement process in LGAs typically follows a defined lifecycle: requirement identification, sourcing and evaluation of suppliers, contract negotiation, and contract management (Lagat et al., 2016). However, the complexity of this process increases with the introduction of legal requirements and policies aimed at promoting inclusivity. The inclusion of special groups in procurement processes, as mandated by the Tanzania Public Procurement Act, poses both opportunities and challenges in implementation, particularly in ensuring that these groups are adequately represented and that their involvement leads to tangible benefits for the community.

2.2. Special group

The 2016 amendment to the Tanzania Public Procurement Act introduced a progressive approach by designating women, youth, and persons with disabilities as special groups, ensuring their involvement in public procurement. This legislation reflects a broader

commitment to inclusivity and social equity, recognizing the historical disadvantages these groups face (Basheka, 2018). However, the implementation of this act raises several critical issues. One such issue is the selection process: How are members of these special groups identified and chosen for participation in procurement activities? The law mandates their inclusion, but there is a need for a transparent and fair process to ensure that the most deserving and capable members of these groups are selected. Furthermore, representation within procurement processes requires more than just tokenistic involvement; it necessitates meaningful participation that empowers these groups economically and socially.

The types of services provided by these special groups can vary widely, ranging from construction and maintenance works to the supply of goods and administrative services. Yet, the compensation mechanisms for these groups need careful consideration. Are these groups being fairly compensated compared to other contractors? Are they given the necessary support and capacity-building to compete effectively? These questions are critical to evaluating the success of the policy in practice. In examining the implementation of the Act, one must consider both the legal frameworks and the practical challenges faced by LGAs. The Act's principles are clear: promote inclusivity, ensure fair competition, and enhance social equity. But the actual implementation often falls short due to challenges such as lack of awareness among the special groups, bureaucratic inefficiencies, and potential biases in the selection process (Lagat et al., 2016). Thus, there is a need for ongoing monitoring and evaluation to ensure that the goals of the Act are fully realized in practice.

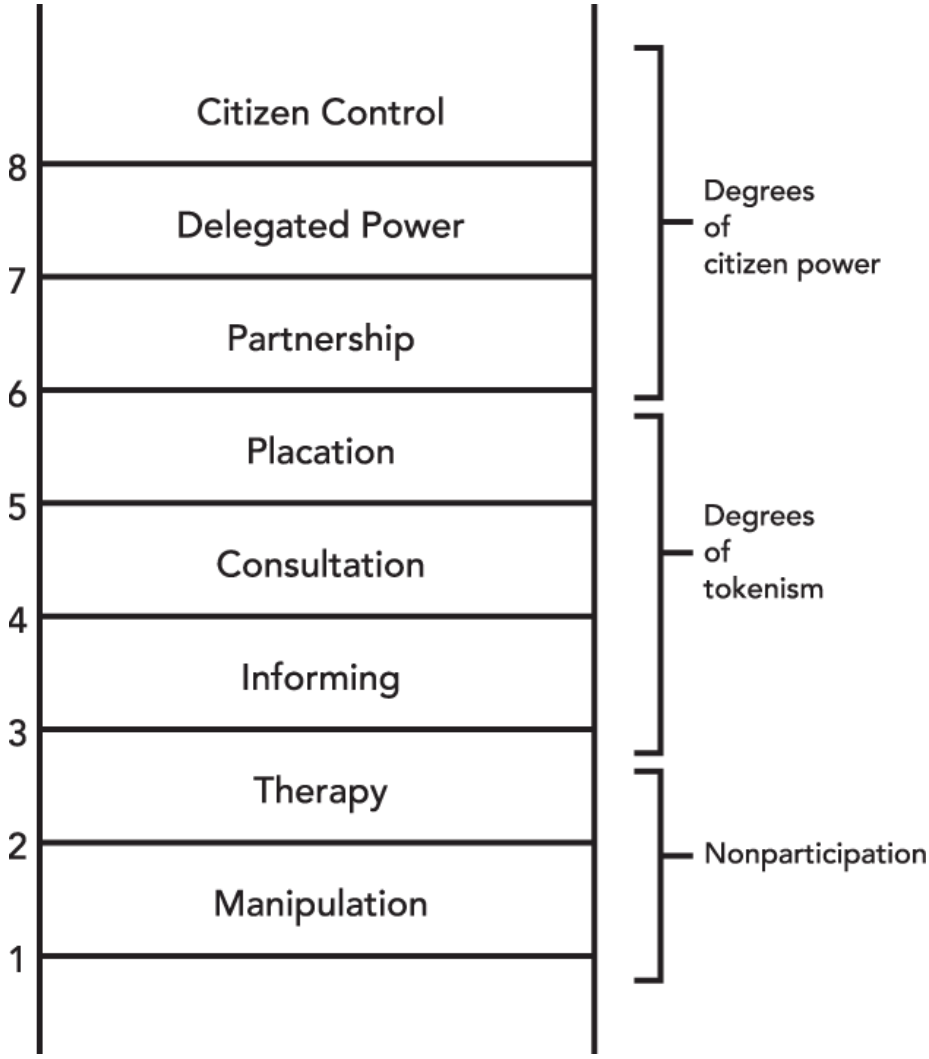
2.3. Theoretical framework

This study was guided by a ladder of citizen participation model. The model was developed by Sherry R. Arnstein in 1969 to explain the extent of participation of individuals in various issues (Arnstein, 1969), such as the procurement of works in society. Individuals participate in societal matters in eight rungs. Systematically, the rungs are manipulation, therapy, informing, consultation, placation, partnership, delegated power, and citizens' control. Also, the eight rungs are grouped into three categories, namely non-participation (manipulation, therapy), degree of tokenism (informing, consultation, placation), and degree of citizen participation (partnership, delegated power, and citizens' control). The third category is the level of participation, where citizens can decide to partner, delegate power, or take

control of their entitlements (Gaber, 2019). The model aligns with the global mission stipulated in the Sustainable Development Goals 2030 and African Development Agenda 2063 of promoting inclusive growth among less voiced groups such as special groups (African Union, 2015; United Nations, 2015). In this model, the target groups must have genuine possibilities for participation in decision-making, and those decisions must primarily affect their future growth (Sadiullah, 2006). However, the ladder of citizen participation has significant limitations, such as the uniform distribution of citizen power, as the categories utilized would imply. The racism, paternalism, and resistance of some power brokers, as well as the ignorance and disarray of many low-income communities, are some significant roadblocks that are left out (Gaber, 2019). In the real world of people and programs, there may be a need for as many as necessary to cover the variety of actual citizen involvement levels. Each group contains a variety of opposing viewpoints, deep divisions, conflicting vested interests, and fragmented subgroups (Sadiullah, 2006).

Figure 1

Adopted ladder of citizen participation (Arnstein, 1969)



This model is essential in this study as it better explains the level of participation of special groups in the procurement of work. In public procurement, certain groups may be given special consideration or advantages to promote participation and address historical barriers. This could include minority-owned, women-owned, small, or businesses owned by people with disabilities. At the bottom, they may be informed about contract opportunities but have no real say (tokenism). At higher rungs, they may be actively consulted and provide input on procurement policies and practices (citizen power). The higher up the ladder special groups can participate, the more it empowers them and addresses systematic inequities in public opportunities.

Studies applied the ladder of citizen participation model; for example, Gaber (2019), Callahan (2017 and Sadiullah (2006) believe that individuals should be given a greater voice in their pursuit of development and equitable growth, as echoed by the United Nations and African Union agenda. While there appears to be universal agreement that the participation of citizens exceptional groups in the development is a good idea, there is little agreement as to the best way to achieve meaningful participation. Thus, this study is an attempt to examine participation in the LGAs in relation to socio demographic factors.

2.4. Participation of special groups on procurement in Local Government Authorities

The execution of public procurement possibilities for special groups in Kenyan national government ministries was the subject of research by Mohamed (2020). The study used a cross-sectional survey approach that combined quantitative and qualitative techniques. An examination of the technical readiness for the execution of public procurement possibilities for special groups in Kenya's public sector served as the study's direction. The study found that because special groups cannot fulfill the prerequisites for registration, they rarely take advantage of procurement opportunities. The study also found that enterprises representing special groups have experience with public tendering procedures and that training in public procurement increases the involvement of special groups in public procurement. Although this study focused on special groups, in terms of location, it was done in Kenya, where laws and policies guiding procurement between Kenya and Tanzania might differ significantly. Similarly, the study in Kenya focused on the technical readiness of the special groups; thus, the influence of demographic factors on the participation of special groups in the procurement of works remains a niche of research in the Tanzanian environment.

Leticia (2018) carried out research to identify the barriers to the implementation of special group reservations in Tanzania. According to the report, special groups' and procurement officers' lack of expertise makes it challenging to implement particular reservation policies and participate in the government procurement market. Identifying these barriers might be very fruitful in the discussions of this study titled the nexus between the demographic factors and participation of special groups in the procurement of works.

Mamiro (2017) examined the barriers to women's involvement with government procurement in Tanzania. The study found that ineffective information dissemination on available procurement opportunities, insufficient financial support, and a lack of understanding of the procurement process all significantly negatively impact the participation of women-owned businesses in the Tanzanian procurement market. This study dealt only with women, leaving aside other special groups as cited in the Tanzanian Public Procurement Act of 2016. Thus, this study dealt with both members of special groups for comprehensive findings and policy improvement.

Based on the existing literature, it is apparent that there is a considerable focus on the challenges and barriers faced by special groups, especially women, in participating in public procurement processes. However, studies attempting to comprehensively understand individual factors' combined effects on the participation of special groups in public procurement are missing. The existing studies, such as Mamiro (2017), primarily emphasize obstacles and barriers, such as insufficient financial support and a lack of understanding of the procurement process. Thus, studies focusing on special groups are essential to align with diversity, inclusion, and responsible governance principles. Similarly, the survey among special groups can inform policymakers and stakeholders at LGAs such as Dodoma City Council about the need for targeted initiatives to promote and enhance the participation of these special groups in public procurement processes.

3. Material and Methods

The research design for this study was a cross-sectional design. Cross-sectional studies provide a snapshot of a population at a particular point in time (Oso & Onen, 2005). This study was conducted at the Dodoma City Council in Tanzania. Dodoma City Council was purposively selected from among the councils in Dodoma region because it is one of the LGAs

in Tanzania that has been implementing various initiatives, including a preference scheme under the PPRA guidelines to promote the participation of special groups in public procurement of works (URT, 2023). The scheme requires 30% of the procurement budget allocated to business-owned special groups, including women, youth, and people with disabilities. The preference scheme empowers special groups economically to access government works (Tesha & Nsimbila, 2022). Also, Dodoma City has been selected due to the availability of various construction projects, including Chamwino State House and Magufuli City, as the result of government shifts from Dar Es Salaam City to Dodoma City (Msacky et al., 2017).

The data gathering process began with obtaining necessary permissions and approvals to conduct the study. The researcher first sought authorization from the Dodoma City Council by submitting a formal request, outlining the study's objectives, methodology, and significance. This request was reviewed by the council's management, and permission was granted to access the relevant staff and conduct the survey. Additionally, ethical clearance was obtained from a recognized institutional review board to ensure that the research adhered to ethical standards. Following approval, the researcher coordinated with department heads at the Dodoma City Council to schedule the distribution of questionnaires. The process involved briefing potential respondents about the study's purpose and ensuring their voluntary participation. The questionnaires were distributed to the selected sample of 164 staff members, who were given sufficient time to complete them. The researcher ensured that the collection process was systematic, maintaining the confidentiality of the respondents' identities and responses throughout the data collection phase.

The study population involved 280 staff working at Dodoma City Council (URT, 2023). The study used the Yamane (1967) formula to calculate the sample size because it is a widely accepted and commonly used formula for determining the appropriate sample size in survey research. The formula was developed by Yamane in 1969 and has since been widely cited and utilized in various fields of study. Previous studies (Nkunda, 2022; Malanga 2021; Mwangi, 2017) used Yamane (1967) formula to calculate the sample size of their studies. Since the population of staff working at Dodoma City Council is 280, Yamane's (1967) formula is described with a confidence level of 95% and a margin of error of 5%. Then, the sample was proportionated into two strata, namely senior staff and operational staff, as shown in table 1.

Table 1

Sample size distribution

S/N	Respondents	Stratum size (Nh)	Sample size $\left({}^{(n_0 \times N_h)}/_{N}\right)$	Percentage
1	Senior staff	11	6	3.7
2	Operational staff	269	157	96.3
	Total	**280**	**164**	**100**

Source: Field Data, 2023

Table 2

Demographic features of respondents

Background information	Frequency	Percentages
Gender		
Female	78	47.6
Male	86	52.4
Age		
21-45	119	72.6
45+	45	27.4
Education level		
Bachelor	44	26.8
Diploma	48	29.3
Certificate	39	23.8
Secondary	33	20.1
Experience level		
Less than 15 Years	96	58.5
More than 15 years	68	41.5

Source: Field data, 2023

Understanding the demographic information of the sample is crucial for generalizing the findings to the target population. The demographic information is presented as frequencies and percentages for gender, age, education, and experience. Specifically, profiles show that in the gender category, 78 (47.6%) female respondents and 86 (52.4%) male respondents participated in the study, suggesting a relatively balanced gender distribution among the respondents. A previous report from the National Bureau of Statistics in Tanzania shows that males and females in the public sector vary significantly. The report shows that there are 373822 (63.1%) male employees and 218069 (36.9%) female employees in the public sector (URT, 2022). Thus, the male and female variations may trigger employees' perception of the

participation of special groups in the procurement of work. On the other hand, majority of respondents, 119 (72.6%), were aged between 21 and 45, consisting predominantly of younger to middle-aged individuals. This is the active age group in the public office who might greatly understand what impedes special groups such as youth from participating in the procurement of works. Meanwhile, the largest group of respondents, 48 (29.3%), had a bachelor's level of education, 44 (26.8%) respondents had a diploma education, 39 (23.8%) had a certificate level of education, and 33(20.1%) had secondary-level education. Thus, LGAs in Tanzania are served and administered by employees with adequate levels of education who can understand and interpret the laws, including the Public Procurement Act of 2011 and the amendment of the Public Procurement Regulation of 2016. In terms of working experience, 96 (58.5%) of respondents have less than 15 years of experience while 68 (41.5%) of respondents have more than 15 years of experience. It is assumed that people with long working experience have a high level of knowledge, understanding, and awareness of demographic factors influencing the participation of special groups in the procurement of works in the LGAs.

The study employed a simple random sampling technique to select 164 respondents. Simple random sampling ensured every respondent from each stratum had an equal chance of being selected. This helped to create a sample that was likely to represent the entire staff population. The strata of senior staff was made up mainly of heads of departments and city director’s from Dodoma. The senior staff takes part in decision-making related to procurement and monitors compliance with the established procedures in procurement. The operational staff strata includes all employees not part of the management. Thus, this study used a questionnaire to collect data from all the sampled respondents. The questionnaire collected information related to gender, age, education, and experience. Also, the questionnaire collected data from respondents concerning the participation of special groups in the procurement of works. The question was designed in a closed-ended format. To capture the participation of special groups, this part of the questionnaire was set on a five-point Likert scale, ranging from strongly disagree to agree strongly. The aspects of participation captured in the five Likert scale include accessibility of training, procurement information, engagement in decision-making, opportunities awareness and availability, participation in bidding, and collaborative bidding and partnerships. The participation of special groups aspects in the questionnaire was developed based on the comprehensive literature review and refined through pretesting by the

expert opinion from the management and procurement departments. A total of 164 questionnaires were distributed to the selected employees of Dodoma City. The questionnaire was used because it allowed for quick data collection and was more convenient (Taherdoost, 2022).

The data obtained through the questionnaire were descriptively and inferentially analyzed. The data analyzed descriptively were presented using frequency, percentage, and mean scores. The variables analyzed include the demographic features of the respondents and the participation of special groups. Also, using the mean score, the indicators of participation among special groups were split into two categories of responses. The categories were participated and not participated. Thereafter, the study used a chi-square test to examine the association between individual factors and the participation of a special group. Similarly, binary logistic regression was employed to examine the influence of individual factors on the participation of special groups. Binary logistic regression is a statistical model commonly used when the dependent variable is binary or categorical. The binary response was possible after transforming the five Likert scale aspects of participation of special groups using the overall mean score into two responses: high and low participation. Thus, binary regression allowed researchers to examine the relationship between a set of independent variables and the probability of an event occurring. The binary logistic regression model is specified as follows;

$$logit\left(\frac{p}{1-p}\right) = \frac{e^{\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4}}{1+e^{\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4}}$$

Where:

Logit = logistic link function

p = probability that there is the influence of individual factors on the participation of special groups in public procurement of works

1-p = probability that there is no influence of individual factors on the participation of special groups in public procurement of works.

β_0 = intercept

β_1– β_4 = parameter estimates or logit coefficients

y = participation of special group

X_1– X_4 = Independent variables mentioned as X_1= Educational level X_2= experience of individuals, X_3= Sex of special group, X_4= Age of special group.

Likewise, the study used Cronbach's alpha (α) test to measure reliability. Cronbach's alpha (α) is a statistical test for measuring the internal consistency of a set of test items. Thus, considering the participation of special groups in table 3, this study was reliable if a Cronbach's alpha value was equal or greater than 0.7 ($\alpha \geq 0.7$).

Table 3

Reliability test

Variable	No. of Items	Cronbach's Alpha
Participation	6	.792

***Source*:** Field data, 2023

Research ethics were rigorously adhered to throughout the study to protect the rights and well-being of all participants. First and foremost, informed consent was obtained from all respondents before they participated in the study. This was done by providing each respondent with a consent form that explained the study's objectives, the nature of their participation, and their right to withdraw from the study at any time without penalty. Additionally, the anonymity and confidentiality of all respondents were guaranteed. Data collected were anonymized, with no personal identifiers used in the analysis or reporting. The researcher also ensured that the data were securely stored, with access limited to the research team. Furthermore, the study complied with all relevant legal and institutional guidelines regarding research involving human subjects, including obtaining ethical approval from the appropriate review board. Finally, the findings were reported truthfully and transparently, with no manipulation or misrepresentation of data, ensuring that the study's conclusions are based on accurate and reliable data.

4. Findings and Discussion

This part provides a descriptive and inferential analysis of the nexus between demographic factors and the participation of special groups in the procurement of works. Also, this part shows several tests performed before embarking on binary logistic regression, including Chi-square and Lemashow.

4.1 Participation of special groups in public procurement of works in Dodoma City

The participants were asked to rate their level of agreement on the aspects that measured the participation of special groups. The elements of participation rated entail attending skill development, access to procurement information, engaging in decision-making, opportunities awareness, participation in bidding, and collaborative bidding. The findings are presented in table 4 using a mean score. The five Likert scale questionnaire was used to collect responses, with 1 indicating strong disagreement and 5 showing strong agreement. The findings reveal that most aspects were close to 1 and far from 5. The findings suggest that there is low participation of participation of special groups in the procurement of works.

Table 4

Descriptive statistics for participation of special groups

Aspects of participation	N	Min	Max	Mean	Std. Deviation
Attending skill development	164	1	5	1.26	0.690
Access to procurement information	164	1	5	2.78	0.758
Engagement in decision-making	164	1	5	2.56	0.424
Opportunities awareness	164	1	5	1.73	0.829
Participation in bidding	164	1	5	1.15	0.711
Collaborative bidding	164	1	5	1.07	0.510

***Source*:** Field data, 2023

Using the mean scores, the findings on participation of special groups were grouped into high and low involvement. The findings are presented in table 5 as frequency and percentage. The findings revealed that 90 (54.9%) respondents perceive low participation of special groups in public procurement of works. Also, the findings show that 74 (45.1%) of respondents observe a high level of participation of special groups in procuring works in Dodoma City. These findings suggest that a significant portion of the population is not engaged in public procurement of works. Thus, there is a low level of special groups in public procurement of works. The revealed level of participation of special groups may serve as the precursor to examining factors such as demographics influencing participation in the procurement of works. Understanding the participation rates of special groups in public procurement is vital for identifying potential gaps and barriers that might hinder their involvement. This information can inform policymakers and stakeholders in the LGAs about

the need for targeted initiatives to promote and enhance the participation of special groups in the public procurement of works. Nevertheless, participation of special groups in public procurement of works is a way to promote fairness, equal opportunities, and socio-economic development as stipulated in the Sustainable Development Goals (SDGs) number 1 and 10 that call for ending poverty and inequality respectively within countries (United Nations, 2015). The emphasis on participation in procuring works among special groups aligns with principles of diversity, inclusion, and responsible governance while yielding economic and social benefits. Special groups often face social and economic barriers that limit their access to business opportunities. Enacting laws and policies promoting their participation in public procurement can allow them to compete on a level playing field, gain experience, build capacity, and generate income. This can contribute to their economic empowerment and help reduce inequalities.

Several scholars provide their views regarding special group participation in public procurement. For example, Leticia (2018) stipulated that encouraging special groups to participate in public procurement can boost local economies. When these groups are awarded contracts, it helps to create jobs, generate tax revenue, and stimulate economic growth within their communities. This, in turn, can contribute to poverty reduction and overall development. Engaging special groups in public procurement can have broader societal benefits. It can help reduce social exclusion, address historical disadvantages, and promote social cohesion. Through the process of creating opportunities for underrepresented groups, public procurement can contribute to a more inclusive and harmonious society.

Table 5

Level of participation of special groups in public procurement of works

Participation	Frequency	Percentage
Low	90	54.9
High	74	45.1
Total	**164**	**100**

Source: Field data, 2023

4.2 Association between individual factors and special groups

Table 6

Chi-square test for individual factors and participation of special groups

Individual factors	Chi-square	P-value
Education level	3.527	0.474
Experience	7.630	0.106
Sex	33.077	.000*
Age	45.163	.000*

***Source*:** Field data, 2023

Table 6 presents the results of a Chi-square test of association between individual factors and the participation of special groups in public procurement of works at Dodoma City Council. The findings reveal that the education level factor yielded a chi-square value of 3.527 with a p-value of 0.474. This result suggests no significant association between education level and the participation of special groups in public procurement. Regarding the experience factor, the chi-square test yielded a chi-square value of 7.630 with a p-value of 0.106. This indicates no significant association between experience and the participation of special groups in public procurement. Also, the findings show that the sex factor yielded a chi-square value of 33.077 with a p-value of 0.000. This indicates a significant association between sex and the participation of special groups in public procurement. The p-value of 0.000 suggests that the association is statistically significant at a predetermined significance level. Similarly, the chi-square test for the age factor yielded a chi-square value of 45.163 with a p-value of 0.000. This indicates a significant association between age and the participation of special groups in public procurement. Overall, the chi-square test results suggest that while education level and experience may not have a significant association with participation in public procurement, there are significant associations between sex, age, and the participation of special groups. These findings highlight the importance of considering these factors when addressing and promoting the inclusion of special groups in public procurement processes at Dodoma City Council.

4.3 Influence of individual factors on the participation of special groups

Table 7

Logistic regression results

High (Base)		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Sex	Male	Reference category							
	Female	0.682	0.175	15.221	1	0.000	1.977	1.404	2.785
Age	45+	Reference category							
	21-45	0.624	0.179	12.096	1	0.001	1.866	1.313	2.652
	Constant	-2.307	0.821	7.893	1	0.005	0.100		

a. variable (s) entered: Sex, Age.

Model Chi-square test= 39.856, df=4 and P-value=0.000

Model summary: -2 log likelihood=185.933, Cox&Snell R^2=0.616 and Negelkerke R^2=0.789

Hosmer and Lemeshow test: Chi-square test=8.653, df=8 and P-value=0.372

Classification table: model classification percentages is 70.1

***Source*:** Field data, 2023

Table 7 presents the binary logistic regression results for the influence of individual factors on the participation of special groups in the public procurement of works at Dodoma City Council. The significant variables (sex and age) are included in the logistic regression. For each variable, table 7 provides the coefficient (B), standard error (S.E.), Wald statistic, degrees of freedom (df), significance (Sig.), and the corresponding odds ratio (Exp(B)) with its 95% confidence interval (C.I.).

The logistic regression results show that the coefficient (B) for sex is 0.682 with a significant p-value of 0.000. The odds ratio (Exp(B)) of 1.977 indicates that individuals categorized as female are almost two times more likely to perceive low participation among special groups than those classified as male. Similarly, the coefficient (B) for age is 0.624, with a significant p-value of 0.001. The odds ratio (Exp(B)) of 1.866 suggests individuals who are categorized as 21-45 are almost two times to perceive low participation among special groups compared to those classified as 45+. The constant term in the model has a coefficient (B) of -2.307 and a significant p-value of 0.005. This constant term represents the estimated log odds of participation when all other variables are held constant. The model summary statistics indicate that the logistic regression model explains a significant proportion of the variance in

the data. The -2 log-likelihood is 185.933, the Cox & Snell R2 is 0.616, and the Nagelkerke R2 is 0.789. Furthermore, the Hosmer and Lemeshow test assesses the model's goodness-of-fit and yields a non-significant p-value of 0.372, suggesting that the model fits the data well. The classification table shows that the model correctly classifies 70.1% of the cases, indicating a moderate level of accuracy in predicting the participation of special groups in public procurement based on the individual factors considered.

Overall, the logistic regression results suggest that sex and age are significant predictors of the participation of special groups in public procurement at Dodoma City Council, while education level and experience do not significantly influence. These findings can inform efforts to promote inclusivity and targeted interventions to increase the participation of special groups in public procurement processes. Various scholars have their views regarding the situation at hand; for example, according to Mamiro (2017), the sex of special groups can affect their participation in procurement opportunities due to various social, economic, and cultural factors. Societal stereotypes and biases can limit the opportunities available to individuals based on their gender. In many societies, women have historically faced discrimination and unequal treatment, which can manifest in various forms, including limited access to procurement opportunities. Some cultures have traditional gender roles and expectations that assign specific tasks and responsibilities to men and women. These norms can influence the types of businesses women and men participate in and create barriers for individuals who do not conform to these expectations. On the other hand, Makena (2016) indicated that women and other special groups may have limited access to resources necessary for participating in procurement opportunities, such as education, training, financial capital, networks, and mentorship. This lack of access can hinder their ability to compete equally with other groups. Discriminatory practices can disadvantage certain groups in the procurement process. Women and other special groups may face biased evaluations, prejudice, and stereotyping, which can undermine their chances of securing contracts or opportunities. Limited representation of women and other special groups in decision-making roles within procurement organizations can lead to policies and practices that inadvertently exclude these groups. Without diverse perspectives and voices at the table, procurement processes may not adequately address the needs and concerns of these groups.

Mwangi (2017) argues that economic disparities and unequal distribution of resources can disproportionately affect special groups, making it harder for them to participate in procurement opportunities. Factors such as lower income levels, lack of access to credit, and limited business networks can all contribute to these disparities. Addressing challenges requires a multifaceted approach that includes policies promoting gender equality, creating supportive environments, providing equal access to resources and opportunities, and challenging discriminatory practices. Through the process of actively working towards inclusive procurement practices, societies can help overcome these barriers and promote equal participation for all special groups.

The findings are backed up by the ladder participation theory that if people are involved and empowered, they can participate in decision-making. Giving citizens the ability to participate in decision-making is one of the Sustainable Development Goals and Africa Development Agenda 2063. The target groups must have genuine possibilities for participation in decision-making, and those decisions must primarily affect their future growth (Sadiullah, 2006). However, the ladder of citizen participation has significant limitations, such as the uniform distribution of citizen power, as the categories utilized would imply. The racism, paternalism, and resistance of some power brokers, as well as the ignorance and disarray of many low-income communities, are some significant roadblocks that are left out. In the real world of people and programs, there may be a need for as many as necessary to cover the variety of actual citizen involvement levels. Each group contains a variety of opposing viewpoints, deep divisions, conflicting vested interests, and fragmented subgroups.

5. Conclusion and Recommendations

It is concluded that the participation of special groups in the public procurement of works is low. This low participation limits the economic opportunities available to women, youth, and persons with disabilities, making it harder for them to benefit from government projects. If not addressed, this could continue to widen economic inequalities and prevent these groups from gaining the support they need to improve their livelihoods. Therefore, it's important to take steps to increase their involvement in public procurement to promote fairness and economic empowerment. Also, the study concluded that sex and age are significant predictors of the participation of particular groups in public procurement at Dodoma City

Council, while education level and experience do not significantly influence. Despite the conclusion, this study has only focused on one LGA in Tanzania. Thus, this conclusion may not be generalized to other LGAs in the United Republic of Tanzania. Similarly, this study mainly used a quantitative approach to reach this conclusion. Hence, it has left out other qualitative and mixed approaches that might have strengthened the conclusion.

Considering the findings, the study recommends that the government provide targeted support to special groups, particularly females and youth, to help them participate in public procurement. This can include training and capacity-building programs and financial support to help them meet the procurement requirements of works. Concerning the LGAs, the study recommends that LGAs in Tanzania collaborate with relevant stakeholders, such as non-governmental organizations (NGOs) and training institutions, to provide specialized training programs and workshops. These initiatives can focus on business management, financial literacy, procurement regulations, and tendering processes. Equipping special groups with the necessary skills and knowledge allows them to compete on an equal footing with other bidders. Also, the study recommends that policymakers take a leading role in reviewing and strengthening the existing legal framework and policies related to public procurement in Tanzania. This includes ensuring that the laws and regulations explicitly promote the participation of special groups, considering their age and gender. The policy should clearly define special groups and provide specific provisions for their inclusion in public procurement processes. It should also establish targets or quotas for the participation of these groups and set up mechanisms for monitoring and enforcement.

Future research can consider conducting a comparative analysis of the participation of special groups in the public procurement of works across different regions and sectors in Tanzania. This may offer insights for policy reform and help to identify the best practices and difficulties faced by particular populations in various circumstances. Also, research can be conducted to explore the role of institutional factors, such as procurement policies, regulations, and practices, in influencing the participation of special groups in the public procurement of works. This could help assess the effectiveness and impact of existing initiatives and programs that aim to promote the inclusion of these groups in public procurement, especially in work. Similarly, future research can examine the potential benefits and costs of involving special

groups in the public procurement of works for both the procuring entities and the special groups themselves. This could help to evaluate the value for money, efficiency, and quality of the procurement outcomes, as well as the economic and social empowerment of the special groups.

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Sustainability of production and marketing practices in hog raising: Philippine context

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Abstract

This qualitative study employed a descriptive phenomenological research design to explore the production technology and hog marketing strategies among hog raisers in selected municipalities of Quezon Province, Philippines. Twelve participants, comprising backyard, semi-commercial, and commercial hog raisers, were purposively sampled for in-depth interviews. Data analysis utilized horizontalization, a phenomenological method, to identify significant statements and cluster them into meaningful units. Findings underscored the adoption of advanced production technologies such as selective breeding and artificial insemination for enhancing pig health and productivity. Effective marketing strategies, including customer relationship management and efficient distribution channels, were crucial for market access and profitability. Sound financial management practices, including budgeting and cost control, emerged as essential for sustainability. The study contributes insights into improving productivity, profitability, and competitiveness in the hog raising industry, thereby fostering its growth in Quezon Province. Future research could explore longitudinal impacts of such interventions and conduct comparative analyses across regions to understand variations in production practices and market dynamics. Understanding consumer preferences and environmental impacts could inform sustainable strategies and regulatory frameworks, fostering growth and resilience in Quezon Province's hog-raising industry.

Keywords: *hog raising, production technology, marketing strategies, phenomenology, Philippines*

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1. Introduction

Hog raising is a private-led industry that thrived through the years. In fact, the swine industry is a vital component of the agricultural sector in the Philippines, significantly contributing to the country's food security and economy. It is a very popular industry in the Philippines such that there is an increase of backyard producers, which dominates the swine industry and healthy viable commercial sector (Salazar et al., 2022). Despite the complex dynamics of learning (Gonzales & Villacruel, 2024), piggery farmers keep on learning and continuously seek ways to enhance the production and profitability of their operations (Kleen & Guatteo, 2023). Pork is the primary source of meat for Filipinos, with swine production accounting for approximately 60% of the total livestock output and around 70% of this came from small hold farms (Philippine Statistics Authority, 2023; Domingo et al., 2022). The industry's growth has been driven by increasing domestic demand, with pork consumption and imports rising by 7.19% (Arcalas, 2024). However, the industry has also faced fluctuations in production levels due to various challenges.

In recent years, the swine industry has encountered several obstacles that have hindered its growth. One significant issue is the outbreak of African Swine Fever (ASF), which was first detected in the Philippines in 2019. ASF has led to substantial losses in pig populations, having already slaughtered more than 5 million pigs, resulting in losses of over Php 200 billion (Fernandez-Colorado et al., 2020). Despite efforts to control and prevent the spread of ASF, occasional outbreaks had localized impacts on swine populations in certain areas (Limos-Galay et al., 2023). Additionally, high production costs, driven by the increasing prices of feed and other inputs, have put financial pressure on farmers (Wedzerai, 2022). The industry grappled with rising feed prices and supply chain disruptions during this period. The production costs and profitability of swine farmers were affected by fluctuations in the prices of raw materials, such as corn and soybeans, and the continuous decrease of live weight price (Limos-Galay et al., 2023). The COVID-19 pandemic further exacerbated these issues, disrupting supply chains and limiting market access (Dili, 2022)

In Quezon Province in the Philippines, the hog industry forms a vital component of the region's agricultural landscape, reflecting its significance in providing livelihoods and sustaining local economies (Garcia et al., 2020). Like elsewhere in the Philippines, hog raisers

in Quezon Province encounter a mix of challenges and opportunities. African Swine Fever outbreaks have posed a significant threat, triggering economic losses and necessitating stringent biosecurity measures (Mutua & Dione, 2021). Rising feed prices, market volatility, and fluctuating consumer preferences further compound the complexities faced by hog raisers (Van der Poel et al., 2020). Given these challenges, it is crucial to examine specific areas within the swine industry that require improvement. Hence, this study focuses on production technology and hog marketing strategies, particularly in Quezon Province. Production technology plays a critical role in enhancing productivity and ensuring the health of swine populations. Improving production methods can lead to higher yields and better disease management, which are essential for the industry's sustainability. On the other hand, marketing strategies are equally important, as they directly affect the profitability of swine farming. Piggery farmers face numerous marketing challenges, including volatile prices and competition from imported pork (Briones & Espineli, 2022). Additionally, inadequate infrastructure and limited access to markets hinder farmers' ability to sell their products efficiently (Blackall et al., 2020). By addressing these marketing issues, farmers can improve their income and competitiveness in the market.

2. Literature review

2.1. Pig Farming

In a free-range piggery, the pig herd is rotated on pastures or cropland for the majority of their lives. The term "free range" suggests that animals are not confined in enclosures. For instance, they may be fed in a stable but have unrestricted access to paddocks. The land requirements for a free-range piggery are determined by the pig's age at suckling and sale, as well as the climate, soil type, land topography, and pasture vegetation (Miao et al., 2004. On the other hand, in a semi-intensive system, animals are allocated specific areas and are encouraged to forage on natural vegetation by roaming outside. The labor requirements, ailment incidence, and parasite infestations are quite high, despite the fact that the system necessitates less capital investment. Ready-made feeds are also available. Productivity is higher than under free range conditions, hence herd sizes are larger (Xia et al., 2020; Kester et al., 2014; Salmon et al., 2018; He et al., 2022). The housing provided for night shelter during the dry season is identical to that used during the wet season. The semi-intensive approach is suited for small-scale and beginning pig farmers (Zaw Win et al., 2019; Mathobela et al., 2024;

Lemke et al., 2006). The term "intensive production system" denotes the process of raising pigs in high-density confinement. Domestic pigs are bred until they reach slaughter weight in intensive pig farming, a subcategory of pig farming. This strategy of raising pigs from birth to weaning, breastfeeding, and weaned sows may accommodate a huge number of piglets of varying ages. Typically, pigs of comparable ages are kept in groups in a same limited partition and controlled all at once (all-in, all-out).

In terms of production system, Aspile et al. (2016) identify five categories in the Philippines, namely, farrow-to-feeder, farrow-to-finish, farrow-to-breeder-finisher, growing-finishing, and boar-for-hire. The farrow-to-breeder-finisher production system is the most profitable because it can sell more products while charging higher prices for breeder stocks (Mbaso & Kamwana, 2013). In this system, it is recommended that municipal hog raisers and traders form a cooperative, increase production volume, use a community-based approach to herd health improvement, encourage joint production of commercial and backyard swine farms, and increase efforts to raise social awareness about the environmental impact of swine production. Similarly, Farrow to finish production is more profitable because the farmers will earn income from piglets and after four months there is an additional income from selling the market hogs. However, the problem arises when the pig is affected by the disease, causing losses on the farm (Kuberka, 2024).

2.2. The 4Ps in Pig Farming

Product. In pig farming, the product refers to the pigs and pork products offered to the market. Quality and differentiation are key factors that influence consumer preferences and demand. According to Aboah and Lees (2020), high-quality pork, characterized by good meat quality and health status, can command higher prices and customer loyalty. Thus, innovations in breeding, feeding, and biosecurity measures have been essential in enhancing product quality. These emphasize the importance of adopting advanced production technologies and practices to improve the overall quality of pigs, which directly impacts their marketability (Mahfuz et al., 2020). According to Muth et al. (2020), native sows may offer sustainability benefits in terms of reduced environmental burden and public health impact. In fact, the live weight offtake per family per year was lower (274 kg vs. 607 kg) due to the fact that native sows were less prolific than exotic sows. The minimal revenue generated by the marketing of piglets and porkers from native sows impeded a more favorable outcome. Hence, one potential

strategy for development is the transition to organic production and certification, as it is believed that the sole method of improving the cost-effectiveness of native pig farming in Quezon is to increase value added.

Price. Pricing strategies in pig farming need to consider production costs, market demand, and competition. The pricing of pork products is influenced by several factors, including feed costs, labor, and health management. The fluctuating feed prices significantly impact the overall cost of production, necessitating efficient pricing strategies to ensure profitability (Chopra et al., 2021). Market dynamics, such as supply and demand fluctuations, also play a critical role in determining pork prices. This includes the competition from imported pork that affects local pricing strategies, forcing local farmers to adopt competitive pricing to maintain market share (Niu et al., 2022).

Place. It pertains to the distribution channels and market access for pig farmers. Effective distribution strategies ensure that pork products reach consumers efficiently and at the right time. The swine industry in the Philippines faces challenges related to inadequate infrastructure and limited access to markets (Limos-Galay et al., 2023). Farmers often struggle with logistics, leading to increased costs and reduced profitability. Turley and Uzsoki (2019) suggest that improving infrastructure, such as roads and cold storage facilities, can significantly enhance market access and distribution efficiency. Additionally, local markets, supermarkets, and direct-to-consumer sales are essential channels that farmers can utilize to reach their target customers.

Promotion. Promotion involves the strategies used to communicate and market pork products to consumers. Effective promotional strategies can enhance consumer awareness and drive demand. Promotional activities, such as branding, advertising, and public relations, are vital for differentiating pork products in a competitive market (Kung et al., 2021). Social media and digital marketing have become increasingly important tools for reaching a broader audience and engaging with consumers. Farmers who actively promote their products through various channels, including online platforms, tend to achieve better market penetration and customer retention (Pesci et al., 2023).

2.3. Technology in Hog Raising

Technological advancements in hog raising have the potential to significantly enhance productivity and efficiency. Precision farming technologies, such as automated feeding systems, climate control, and health monitoring, have been shown to improve the overall management of swine farms (Tzanidakis et al., 2020). However, the adoption of these technologies remains a challenge for many small-scale farmers due to high costs and lack of technical expertise (Smidt & Jokonya, 2021; Dhillon & Moncur, 2021; Mhlanga & Ndhlovu, 2023; Wakweya, 2023; Puppala et al., 2023). According to Mahfuz et al. (2021), while advanced technologies can lead to better disease management and increased yields, many farmers still rely on traditional methods, which can be less efficient and more prone to issues such as disease outbreaks.

2.4. Profitability Potential and Challenges in Pig Farming

Pig farming is a type of animal husbandry that involves the cultivation and nurturing of domestic pigs for food purposes, which is one of the oldest businesses of the Filipino people. The industry encompasses both commercial and backyard scale operations. One reason this firm has prospered is the Filipinos' love of pork.

According to Magagula and Tsvakirai (2022), a significant number of individuals do not believe that the agricultural industry is profitable. It is a complete misconception that they believe it will not be worth it because they will somehow get their hands soiled. In reality, the piggery industry has the potential to generate hundreds of thousands of pesos on a monthly basis. As per the PSA Swine Situation Report (2021), the average annual swine production was 2,133.45 thousand metric tons. With the exception of 2019 and 2020, in which output decreased by -1% and -6.71%, respectively, the production rate has increased annually. The decrease in production was the result of the African Swine Fever (ASF) that affected the industry during the specified period. The maximum production was recorded in 2018, with a value of Php 277,531.80 million, at 2,319.76 thousand metric tons. The ASF pandemic's high swine prices resulted in a 0.9 percent increase in the gross value of production in 2020 (Php 249,655.00 million) compared to the previous year. However, ASF virus affected the socioeconomic and livelihood of hog raisers in the Philippines (Wedzerai, 2022) that led to

significant losses in pig populations and increased biosecurity costs (Fernandez-Colorado et al., 2020).

According to Shahini et al. (2023), pig rearing has the potential to provide a more substantial economic benefit to small and marginal producers or rural impoverished individuals from the lowest socio-economic strata than other livestock species. Hence, Belal (2023) suggests that backyard pig raising has the potential to be a profitable endeavor and a source of additional income for farmers in any pig production systems, such as intensive production, semi-intensive production, and extensive or free-range (scavengers). However, high production costs, particularly for feed and health management, are major concerns for farmers. According to Vonderohe et al. (2022), the economic sustainability of swine farming is heavily impacted by these costs, which have been exacerbated by global supply chain disruptions and increasing prices of raw materials. Thus, efficient management practices and cost-saving technologies are essential to enhance profitability.

3. Methodology

The study adopted a qualitative research and a descriptive phenomenological research design to gain deeper insights into the production technology and marketing strategies employed by piggery farm owners or hog raisers in specific municipalities within Quezon Province in the Philippines. It provides a more detailed examination of the phenomena under inquiry, allowing researchers to identify underlying meanings, motives, and patterns in participants' reactions (Creswell & Poth, 2018).

The participants of the study were composed of twelve (12) hog raisers in selected municipalities of Quezon Province, seven of whom were backyard hog raisers, two were semi-commercial farm owners, and three were commercial farm owners who have experienced working in their farm and selling their pigs. Participants were chosen through the purposive sampling method, which involves the researchers deliberately selecting the site and individuals for the study.

Prior to data collection, permission was secured from relevant authorities and participating farmers, ensuring informed consent. Participants were fully informed about the study's purpose, procedures, and their rights, including the right to withdraw at any time. Confidentiality of the gathered data was strictly maintained; personal identifiers were

anonymized to protect participants' privacy. Data were securely stored and only accessible to authorized research personnel, ensuring that sensitive information remained protected. These measures ensured the ethical integrity of the research process and the trust of participants. Then, an interview was conducted to each participant to get the necessary data for analysis and interpretation. A well-structured interview questionnaire was prepared ahead of time, which was validated by the experts of the field. The aim is to get factual information about the current production and marketing strategies of hog raisers.

This research used horizontalization as the analysis method, a technique rooted in phenomenological analysis. At the initial stage, it was ensured that no statement or experience is prematurely discounted. By meticulously examining each data point with the same level of attention, this can identify significant statements and cluster them into meaning units. The significant statements were used to develop clusters of meaning, which were then used to compose a textural description (what the participants experienced) and a structural description (how the participants experienced the phenomenon). This was done in order to form conclusions and recommendations (Husserl, 1931; Gasparyan, 2021).

4. Findings and Discussion

4.1. Production Technology

4.1.1. Breeding Management

Selection, breeding and high genetics. Hog farmers use selective breeding techniques to improve desired features in their herds, such as growth rate, feed efficiency, and disease resistance. They may utilize artificial insemination or genetic selection to improve the genetic makeup of their pigs, aiming for superior offspring with higher market value.

Annotated Exemplars:

> *"I use high genetics. High genetics is better than 'chopsuey' or unknown breed pigs in terms of quality but it still varies on proper management of the farm. High genetic pigs are fast grower and nice body built." (Participant 2 - Translated)*
>
> *"Before the genetics of my pigs were not important. It is just chapseuy (unknown breed) but when I compare it with other farms, they are more profitable. Then I decided to improve the genetics of my pigs because high genetics is a fast grower and good quality meat." (Participant 7 – Translated)*

Table 1

Thematic analysis of production technology

Coded Responses	Codes	Categories	Themes
Fewer number of birth piglets during farrowing date Old boar can result to weaker egg cell while gilts have long period of time before in heat that can add to expenses High genetics is better than "chapseuy" or no/unknown breed, but it depends on management of the farm Piglets are fast grower but the only problem we see is high genetics are prone to stress and diseases Established high genetics is very important in a farm to achieve high profit because it can produce fast grower pigs	Selection, Breeding, and High Genetics		
Proper monitoring & management of sows (performance, expenses, number of piglets produce, checking of reheat) Giving an extra effort on taking care of the pigs Determine and address immediately the problem encountered inside the farm	Husbandry and Farm Management		
Minimize the feeds expense because instead of raising boar I choose to buy quality semen for AI. Additionally, in AI you can also choose breed that you want to inseminate in your sow This AI lessen the expenses of the farm because we don't have to buy expensive high genetics boar worth 250k just to use for natural mating Thru AI, many sows can inseminate using semen from 1 boar	Artificial Insemination	Breeding Management	
			Production Technology
Cough and colds of pigs the basic problem of the farm	Treatments		
Sows are not easily getting pregnant because of the infections or long dry period	Housing		
Piglets scouring due to climate change Limited facilities can result to not good production	Facilities and Equipment		
Using Luntian Cooperative feeds results to low fat fatteners Before we used low quality of feeds such as "Palyat" but the problem is our sows are too thin and their piglets are malnourished, now we used Luntian feeds which is very high in nutrition so we get the heavy weight of our fatteners and the piglets of our sows are big	Swine Nutrition	Swine and Housing Management	
I think it is better to have a system that can be used in day-to-day operation. This system will update the owner when the pig gives vaccine or vitamins. Monitoring of overall operations	Advanced System		

Longevity genetic-economic indicators for net merit, fluid merit, cheese merit, and grazing merit are provided to the dairy industry (Vanraden et al., 2021). These indices place animals in order of combined genetic merit for traits that are important economically. Several indexes are provided to help choose among several management and milk payment plans. Regular updates to the indexes provide new functionality and reflect anticipated expenses for the upcoming years. The most current update was made in August 2021 and contains details on the recently assessed characteristics of early first calving, heifer livability, and feed saved.

Prospective dams and bulls that are marketed commercially are the subject of genetic relationships data from the Council on Dairy Cattle Breeding (CDCB). In contrast to pedigree analysis, which can only provide an average based on relationships, these data represent the actual percentage of genetic variants (alleles) that are shared. This more precisely prevents inbreeding. Furthermore, the CDCB forecasts certain recessive disorders, which makes it possible to prevent possible carrier-to-carrier mating without the use of animal testing. Through genomics, the haplotypes influencing fertility were identified and are currently used in mating. As of 2022, 27 conditions have been documented (Cole et al., 2022). Recessives recently introduced are AHC (curly calves in Ayrshires), HH6 (early embryonic death in Holsteins), and JNS (neuropathy with splayed forelimbs in Jerseys).

Husbandry and farm management. Good farm husbandry practices are essential for the production of secure, high-quality food. From the acquisition and rearing of healthy animals, as well as their welfare, to the ultimate slaughter or milking process, all farm measures are included. The purpose of farm management is to ensure the health of livestock by providing them with optimal living conditions and appropriate, contamination-free forage and water. Animals are bred in accordance with risk analysis, and these risks are mitigated to guarantee the safety of food production. Proper records are kept to facilitate tracing.

Annotated Exemplars:

> *"Proper monitoring and management of sows (performance, expenses, number of piglets produce, checking of reheat." (Participant 8)*

Artificial insemination. Reproductive assistance technology, such as artificial insemination (AI), have greatly increased pig farm output rates in recent years. Conversely, the FAO (2016) reports that pork is the most consumed form of red meat globally as a result

of its exceptional rate of food conversion, which has led to a significant demand for global food security. As a result, integrating AI reproductive procedures allows for better production conditions, lower costs, and increased efficiency.

Annotated Exemplar:

> *"Minimize the feeds expense because instead of raising boar I choose to buy quality semen for AI. Additionally, in AI you can also choose breed that you want to inseminate in your sow." (Participant 5 - Translated)*
>
> *"This AI lessen the expenses of the farm because we don't have to buy expensive high genetics boar worth 250k just to use for Natural mating." (Participant 8 – Translated)*

Insemination efficacy has been enhanced by the development of techniques that allow for the insemination of a reduced number of spermatozoa in a smaller volume. This is particularly critical when employing high-value spermatozoa that have been degraded, such as through sex sorting or chilling and thawing. Numerous devices have been created for intrauterine or post-cervical insemination, which enables the implantation of sperm in the posterior horn or uterine body of multiparous sows. Post-cervical AI permits a threefold decrease in the quantity of spermatozoa inseminated in comparison to conventional transcervical AI, whereas deep intrauterine AI permits a five-to-20-fold reduction. The practice of post-cervical insemination varies between and within countries. The risk of cervical or uterine tissue injury, the expertise necessary for catheter handling, and the use in sows alone may all contribute to the development of limitations. Barium alginate membranes have been demonstrated to facilitate single insemination through the encapsulation of semen (Kantale et al., 2021). Laparoscopy enables the insemination of a negligible quantity of spermatozoa (0.3 x 106) into the oviducts of anesthetized swine. Nevertheless, the likelihood of polyspermic fertilization is substantial. It is not advisable to employ it in practice due to the surgical intervention.

Numerous investigations have implemented ultrasound to investigate the timing of fertilization, insemination, ovulation, and oestrus. The fundamental observation is that ovulation occurs at the commencement of the latter third of oestrus, irrespective of the duration of oestrus. Individual pigs' spontaneous ovulation times cannot yet be precisely predicted. However, predicting oestrus duration by observing its beginning after weaning has gained

widespread support in AI practice for calculating the expected timing of ovulation (Singh et al., 2022). AI should be timed as near to ovulation as feasible, ideally 12 to 24 hours before it. In practice, ultrasonography examination of ovarian morphology has proven beneficial for pig fertility management (Małopolska., 2021). The potential to provide shortcuts in AI timing and develop farm-specific techniques for improving AI management is evident in the determination of the time of ovulation in relation to oestrus behaviour and AI management in representative numbers of sows on successive days.

4.1.2. Swine and housing management

Housing. Housing systems play a crucial role in pig production, providing shelter, protection from harsh weather conditions, and space for pigs to move and express natural behaviors. Modern hog production facilities often incorporate climate-controlled environments to optimize temperature and humidity levels, promoting optimal growth and health. Some hog raisers utilize innovative housing designs like deep-litter systems or hoop barns, which offer benefits such as improved waste management and reduced environmental impact.

Annotated Exemplar:

> *"Cleanliness, disinfection and limit access to the farm from other people to avoid spread of viruses. We only give feeds 2 times a day from starter stage until we sell our fatteners to minimize the expenses (with conviction shown on her face)" (Participant 3 – Translated)*

Pigs raised in bleak conditions frequently show signs of restlessness and frustration (Albernaz-Gonçalves et al., 2021). Environmental enrichments obviously boost pig welfare by allowing them to express natural, species-specific behaviors, contributing significantly to the creation of a welfare-friendly farm environment. On the other hand, the true effect of enrichments on pigs is determined by a variety of criteria, including the type of enrichment, the appropriate quantity, location, maintenance, and safety. Not all inputs to barren farm environments are appropriate enrichment for pigs (Van de Weerd & Ison, 2019). Pig enrichments should be tasty, chewable, safe, and replaced or renewed on a regular basis to keep the animals interested (EU, 2016). According to the Commission Recommendation (EU) 2016/336 (EU, 2016), straw, green fodder, miscanthus, and root vegetables may constitute 'ideal' pig feed components. When used as bedding, these materials encourage roots, provide a comfy resting space, and absorb excrement. ASF outbreaks in Europe have linked virus-

infected straw, green fodder, or hay to the disease (Woźniakowski et al., 2021). Furthermore, the use of natural enrichments, such as straw, is restricted in some parts of the world due to increased production costs (including straw and labor) when compared to dwellings with slatted floors. When substrates are employed as environmental enrichments, slatted floor housing systems may cause slurry system management issues (Tuyttens, 2005). Pigs should be served hay or silage in racks that are positioned above the floor in no-bedding systems, as per Nannoni et al. (2019). Pig enrichments, including straw in racks, peanut shells, fresh wood, maize cobs, natural cords, shredded paper, and pellets, are considered "suboptimal" by Commission Recommendation (EU) 2016/336 (EU, 2016). Although deep-bedded straw systems may appear to be welfare-friendly, they are not without health and welfare concerns. Studies looking into the relationship between straw bedding use and sanitary issues and pathogen development have shown inconsistent results (Tuyttens, 2005). Furthermore, pigs' floor type preference (deep-bedding vs. slatted floor) is determined by thermal circumstances, as when temperatures are high, the animals prefer to sleep on concrete floors to cool down. Pigs prefer straw to concrete flooring particularly in warmer weather; however, they prefer substrates such as peat and compost over straw (Tuyttens, 2005).

Facilities and equipment. Efficient waste management is essential for mitigating environmental pollution and complying with regulatory requirements. Hog raisers may implement strategies such as composting, anaerobic digestion, or utilization of waste as fertilizer to manage manure effectively while minimizing odor and nutrient runoff. Adoption of environmentally sustainable practices, such as utilizing renewable energy sources or implementing water recycling systems, may further enhance the sustainability of hog production operations.

Annotated Exemplars:

> *"Monitoring of Sow when to farrow is important. Must meet the cycle per month. I have to be monitored all the operation of the business. Proper Monitoring and Management. Cleanliness is also important." (Participant 5 – Translated)*

> *"I have trained my caretaker on how to handle our farrowing section, I just monitored and instruct them what will they do. Our sow also has proper breeding management as they give to farrow at the same day just to minimize the work of our caretaker." (Participant 8 – Translated)*

Hog raising facilities and equipment are crucial for successful pig farming operations. These facilities are designed to provide a comfortable and hygienic environment for pigs while ensuring efficient management practices. Strong and secure fencing is necessary to prevent pigs from escaping and to keep predators out. Fencing materials may include wood, wire mesh, or electric fencing. Automatic or manual feeding systems are used to provide pigs with a balanced diet. This equipment includes feeders, troughs, and hoppers designed to minimize wastage and allow easy access to feed, fire extinguishers, emergency lighting, and secure storage for chemicals are essential for ensuring the safety of both pigs and workers. Overall, investing in high-quality facilities and equipment is essential for the success and sustainability of hog raising operations, ensuring the well-being of the animals and maximizing productivity.

***Swine nutrition*.** Proper nutrition is essential for maximizing growth rates and overall health in pigs. Hog raisers carefully formulate diets tailored to the specific nutritional needs of different stages of pig development. They may incorporate locally available feed ingredients and supplements to ensure balanced nutrition while minimizing costs. Utilization of feed additives such as probiotics, enzymes, and growth promoters may also be employed to enhance feed efficiency and overall performance.

Annotated Exemplars:

> *"Using Luntian Coop feeds results to low fat fatteners. Giving malunggay leaves before giving feeds." (Participant 3 – Translated)*

> *"Before we used low quality of feeds such as 'Palyat' but the problem is our sows are too thin and their piglets are malnourished, now we used Luntian feeds which is very high in nutrition so we get the heavy weight of our fatteners and the piglets of our sows are big." (Participant 4 – Translated)*

Sound feeding practices that meet necessary nutrient requirements are critical to the health and well-being of pigs at all phases of production. Pigs should be fed a diet that is nutritionally balanced and suitable for their age. Pigs necessitate a diet that is more concentrated and less fibrous than that of cattle, sheep, or horses. Their nutritional needs change as they grow, and the diet should meet them at different periods of development and production.

Swine nutrition begins with six fundamental nutrients: water, carbs, fats, protein (amino acids), minerals, and vitamins. Each of these nutrients is essential for proper maintenance, development, reproduction, breastfeeding, and other metabolic processes. Nutrient requirements are influenced by a variety of factors, including lean growth rate, gender, dietary energy density, environmental temperature, congestion, parity, gestation stage, and numerous sow productivity parameters.

Profitability of commercial swine operations is influenced by a number of variables, such as pig genetic potential, environment, feed consumption, component supply, and market prices. While creating the most profitable and efficient feeding and management system, each of these factors needs to be taken into consideration. Every distinct manufacturing unit may require a different final feeding and management strategy, and these strategies may also change in response to shifting economic and environmental conditions. The producer's job is to control every aspect so that output and profit are optimized. 65 to 75 percent of the total expenditures of producing hogs are attributed to feeding, of which 75 percent are supplied during the grow-finish stage. A nutrition and feeding management program need to be carefully planned in order to enhance profitability.

Advanced system. Advancements in production technologies, such as automated feeding systems, precision farming tools, and data analytics, are increasingly being embraced by hog raisers to improve efficiency and productivity. Integration of digital platforms and sensor-based technologies enables real-time monitoring of key parameters such as feed consumption, growth performance, and environmental conditions, facilitating informed decision-making and proactive management.

Annotated Exemplars:

> *"I use AI once, and my pigs are not high breed or high genetics." (Participant 3)*
>
> *"Strict biosecurity inside the farm to prevent disease. We have a trusted employee inside the farm, we are calm that everything goes well when he is there." (Participant 12 – translated)*
>
> *"I think it is better to have a system that can be used in day-to-day operation. This system will update the owner when the pig will give vaccine or vitamins. Monitoring of overall operations." (Participant 1)*

Pig farms throughout the nation and the globe have been transformed by modern pig farming technology. A successful pig farm today is one in which producers employ technology to their advantage. In doing so, farm operations benefit both workers and animals. Automated livestock operations and jobs can improve animal care. The farm benefits from increased productivity, efficiency, and profitability. The optimal conditions for the rearing, feeding, housing, and care of pigs at all phases of their lives are established by those who employ current pig farming methods. Another area in which pig husbandry technology has advanced is the pursuit of optimal environmental conditions for the development of pigs, with a particular emphasis on maintaining the temperature of adolescent pigs. It is imperative to ensure that the temperature of the pigs is maintained at the optimal level for their overall health, and this is particularly important during the processes of farrowing and nursery management. Farrowed piglets require extra heat to perform and grow properly. A technologically advanced pig farm is both productive and profitable. The financial benefits of implementing pig farming technology not only boost pig production efficiency, but also assist farmers better manage their operations. Automated solutions provide savings by lowering expenses in areas such as energy, feed, and disease control. Technology can efficiently combine production and animal care, resulting in a successful pig farm.

4.2. Marketing

4.2.1. Customer Relationship Management

***Customer satisfaction and loyalty*.** Customer satisfaction and loyalty are essential components of success in hog raising, as they contribute to a stable market, repeat business, and positive word-of-mouth referrals. Consistency in meeting buyer requirements is another key factor. Whether it's specific breed preferences, weight specifications, or delivery schedules, hog raisers must strive to consistently fulfill these demands to satisfy customers. This reliability builds trust and confidence in the product and the producer. Handling customer complaints or issues promptly and professionally is vital for maintaining satisfaction and loyalty. Resolving problems quickly and effectively indicates a dedication to customer service and can transform a potentially unpleasant experience into a positive one, so boosting loyalty. Building customer loyalty in hog raising often involves offering incentives or rewards for repeat purchases. This could include discounts on bulk orders, special promotions for loyal

customers, or membership programs with exclusive benefits. These initiatives encourage buyers to stick with a particular hog raiser, rather than seeking alternatives.

Annotated Exemplars:

"Loyal to customer or buyer…" (Participant 6 – Translated)

"We provide what buyer's preferences. If they need 90 kilos up, we give them." (Participant 9 – Translated)

Table 2

Thematic analysis of hog marketing

Coded Responses	Codes	Categories	Themes
Loyal to customer or buyer We provide what buyer`s preferences. If they need 90 kilos up, we give them	Customer Satisfaction and Loyalty	Customer Relationship Management	Hog Marketing
I sell my meat in **low price** and provide quality of meat because it is too young and fresh	Good Relationship		
I let my trusted agent sell my pigs to our buyer. I can easily harvest my pigs because the agent has more buyers	Sales Agent		
Luntian Cooperative schedule the harvest date of our pig	Contract-to-Buy	Promotional Activities and Distribution Channels	
We wait for a maximum of 15 days before we decide to sell the fatteners	Expansion of Selling Schedule		
We use facebook to find buyer and we promote by posting our pigs to show them that our pigs are quality and high genetics I also post my pigs thru social media to share my knowledge. It can also attract customer because marketing now a days is in thru online	Social Media		
Accessible to the buyer Not prone to any disease	Strategic Location		
Maintaining a close range around the optimal market weight leads to higher profit margins. Good liveweight for selling Market Trends and Prospects… You are going to hold your pig until it reaches the higher price in order to increase profit	Market Timing		
We have piglets' production so we sell it when they are totally condition and age of 45 to 60 days old Based on harvest date and feeds consumed. I extend the date and add extra sack to meet heavy weight Based on consumed feeds allotted to that batch of fatteners	Harvest Parameters		

***Good relationship*.** Maintaining a good relationship with customers is paramount in hog raising to ensure a steady market, repeat business, and positive reputation. Transparency and honesty play key roles in building trust with customers. Similarly, special promotions or discounts, providing after-sales support, or even arranging personalized delivery options are employed. By prioritizing these aspects, hog raisers foster strong relationships with customers, ensuring their continued success in the industry.

Annotated Exemplar:

> *"We ensure that our piglets are high quality and fast growers even if the price of our piglets is high other than the farm, we make sure that it can provide profit to the customers" (Participant 10 – Translated)*

***Sales agents*.** Collaborating with retailers such as grocery stores, butcher shops, and specialty food stores expands hog raisers' reach and accessibility to customers. This includes the challenges of negotiating partnerships with retailers, the importance of product placement and visibility in-store, and the impact of branding and packaging on consumer purchasing decisions.

Annotated Exemplars:

> *"When my feeds is from Luntian, Luntian will buy my pigs, when I used other feeds then I find my other hauler. The problem in Luntian coop. they less 10 pesos on liveweight price base on the back fat of fatteners that' s because I prefer to find other buyer." (Participant 9 – Translated)*

> *"The target market of our piglets is the INSPIRE program of the Government. Government created a farm which operated by small hog raisers in selected municipalities to raise market pigs." (Participant 4 – Translated)*

***Contract-to-buy*.** Hog raisers may sell their products directly from their farms, offering customers the opportunity to purchase pork products onsite. Themes might include the customer experience of visiting the farm, the emphasis on freshness and traceability, and the role of farm tours or educational experiences in attracting customers.

Annotated Exemplar:

> *"We just message or call the buyer and talk about the transaction."*

Hog contracting is becoming more popular, partly because many producers find it difficult to secure sufficient funding. Coordinating the production of pigs, from genetics and nutrition to the retail meat counter, is another application of contracting. Nowadays, a little but increasing portion of hogs are raised, fed, or sold under contract. The buyer assures the seller of a minimum price (the floor price) for the hogs, and the seller consents to provide a predetermined quantity of hogs to the buyer at a later time. The seller often gets paid the difference between the floor price and the delivery market price, less any discounts. The discount covers the buyer's expenditures for supplying the guaranteed minimum price, including options premiums and other contract-related variable costs. Only the risk of changes in hog prices is mitigated by both floor price contracts and forward fixed price contracts. The additional risks related to hog farming still rest with the producer. Many larger manufacturers employ contract production to reduce risk and required capital so they can increase their own production more quickly. Although farmers, feed dealers, investors, and other people are frequently interested in raising hogs, they are frequently unable or unwilling to supply the labor, facilities, and equipment required. As a result, they look for producers who would provide the labor and tools in return for a set salary or a cut of the earnings. The ensuing interactions between the producer and owner differ greatly in terms of the nature of each party's obligation. Young or strapped for cash producers, aspiring farmers without the means to buy a herd, and producers with underutilized facilities find these contractual agreements appealing.

4.2.2 Promotional Activities and Distribution Channels

***Expansion of selling schedule*.** Exploring opportunities for market expansion beyond local or regional markets, including export markets, can help in the diversification of revenue streams and lessen the risks associated with domestic market volatility. Adapting products and marketing strategies to meet the preferences and regulatory requirements of international markets is essential for success in global trade.

Social Media. By leveraging digital marketing and social media engagement effectively, hog raisers can build brand awareness, engage with customers, drive sales, and cultivate a loyal following that supports their business growth.

Annotated Exemplar:

> *"Yes we use FB to find buyer and we post our pigs." (Participant 6 – Translated)*
>
> *"I have always posted my pigs on social media to attract customers just to show that the pigs inside my farm have high genetics." (Participant 9 – Translated)*

A website is also beneficial; however, Facebook's posts, shares, and likes provide a substantially broader audience. It is also beneficial to engage in LinkedIn, Instagram, and Twitter. This can assist in establishing a connection with consumers.

***Strategic location*.** Developing effective promotional strategies, such as advertising campaigns, promotions, and discounts, help increase brand visibility, stimulate demand, and drive sales.

Annotated Exemplar:

> *"My marketing strategies is I post it through social media to expand my target market so they know that I have available pigs for sale." (Participant 6)*

***Market timing*.** One key factor in market timing is monitoring market trends and demand. Hog raisers need to stay informed about fluctuations in market prices, as well as seasonal variations in demand. For example, there may be increased demand for hogs during certain holidays or special events, which can affect pricing. Additionally, understanding the lifecycle of hogs is crucial. Hogs are typically sold at specific weights, and the optimal time to sell depends on the growth rate of the animals and the desired market weight. Selling too early may result in lower prices due to smaller sizes, while waiting too long can lead to increased feed costs and potential oversupply in the market. Weather conditions can also influence market timing. Extreme temperatures or adverse weather events can impact feed consumption and growth rates, affecting the timing of sales. Monitoring weather forecasts and adjusting production schedules accordingly can help mitigate risks associated with weather-related market fluctuations. Ultimately, successful market timing in hog raising requires a combination of careful planning, monitoring market dynamics, and adapting to changing conditions. By understanding market trends, the lifecycle of hogs, weather patterns, and economic factors, hog raisers can optimize their sales timing to maximize profits and maintain a competitive edge in the industry.

Harvest parameter. Harvest parameters in hog raising refer to the specific criteria used to determine when a hog is ready for slaughter and processing. These encompass a combination of factors including weight, age, body condition, backfat thickness, health status, feed efficiency, and market demand. By carefully monitoring and managing these parameters, hog raisers can ensure that hogs are harvested at the optimal time for maximizing meat quality and profitability.

5. Conclusion and Recommendations

The study reveals crucial insights into hog production and marketing, highlighting the importance of advanced production technologies, such as selective breeding and artificial insemination, along with proper swine and housing management to ensure pig health and productivity. Similarly, effective marketing strategies, including customer relationship management, promotional activities, and efficient distribution channels, are essential for enhancing market access and profitability.

For future research, it is advisable to delve into comparative analyses across different regions to provide valuable insights into regional variations in production practices and market dynamics. Additionally, studying consumer behavior and preferences regarding locally produced pork, along with environmental impact assessments of hog raising practices, would contribute to developing sustainable strategies and informed regulatory frameworks for the industry's growth and resilience.

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Enhancing financial literacy among Pantawid Pamilyang Pilipino Program beneficiaries

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Abstract

This study aimed to evaluate the effectiveness of financial literacy education among the Pantawid Pamilyang Pilipino Program (4Ps) household grantees in Baguio City in the Philippines. The focus was on enhancing financial knowledge and skills, particularly in financial planning, budgeting, and savings. Using a descriptive quantitative methodology, a questionnaire was administered to 297 respondents selected through stratified random sampling. The study assessed the financial literacy improvement relative to demographic factors such as gender and educational attainment. Results indicated that financial literacy sessions had a significant positive impact, with respondents demonstrating a "great extent" of improvement in financial planning, budgeting, and savings. Statistical analysis revealed no significant differences based on gender, while educational attainment showed significant differences, with higher education levels correlating with better financial literacy. The findings suggest that while financial literacy programs are broadly effective, tailoring these sessions to accommodate varying educational backgrounds could enhance outcomes further. Future recommendations include developing targeted financial education strategies to address the needs of those with lower educational attainment and expanding the program to reach a larger demographic. This approach could foster greater financial stability and empowerment among low-income families, ultimately contributing to poverty reduction efforts.

Keywords: *financial literacy, 4Ps household grantees, financial planning, budgeting, savings*

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1. Introduction

Poverty is a multifaceted global issue, significantly influenced by inadequate income, education, and resources. Research indicates that education is a critical pathway out of poverty, as it enhances labor force efficiency and economic growth, which in turn can lower poverty levels (Julius et al., 2011). The relationship between education and poverty is further emphasized by studies showing that regions with higher literacy rates and educational attainment experience lower poverty headcounts (Julius et al., 2011). Additionally, the role of financial inclusion is highlighted, where access to formal financial systems, combined with educational advancements, accelerates poverty reduction in lower-income countries (Shi et al., 2022). However, traditional definitions of poverty often focus narrowly on income, neglecting broader dimensions such as education and social justice, which are essential for understanding and addressing the root causes of poverty (Aleksiak, 2020). Thus, a comprehensive approach that integrates education, financial inclusion, and social equity is vital for effective poverty alleviation strategies.

The United Nations (2015) defines poverty as a lack of income, often manifesting in hunger, malnutrition, and limited access to essential services such as health and education. Poverty also includes social exclusion and lack of participation in decision-making processes. In 2015, extreme poverty affected an estimated 734 million people, or 10% of the global population. The UN describes extreme poverty as living on less than US$1.90 per day, according to the international poverty line used in the world's poorest countries. This characterization applies globally, meaning anyone living on less than $1.90 per day is considered extremely poor, regardless of location.

Seth and Tutor (2019) note that poverty is the top agenda in the Sustainable Development Goals (SDGs), with the aim of eradicating extreme poverty by 2030. Poverty alleviation strategies and anti-poverty programs are essential components of welfare policies in both developed and developing countries. These efforts range from various welfare programs in the United States (CEA, 2018) to strategies addressing poverty, social exclusion, and social immobility in European countries (OECD, 2018). In developing nations, these programs include social security measures that enhance food and livelihood security, as well as a variety of social safety nets like cash transfers, in-kind transfers, social pensions, and school-feeding programs targeting the poorest segments of the population.

The SDGs aim to establish sound policy frameworks at national and regional levels, focusing on pro-poor and gender-sensitive development strategies. By 2030, these strategies aim to ensure that all men and women have equal rights to economic resources, access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology, and financial services, including microfinance. Breaking the cycle of poverty requires the creation of decent, productive jobs, sustainable enterprises, and economic transformation, as regular employment is a key factor in escaping poverty (United Nations Global Issues, 2022).

The Philippines launched AmBisyon 2040, a long-term vision aimed at reducing poverty and improving the lives of the poorest segments of the population. The Department of Social Welfare and Development (DSWD) leads the implementation of the Pantawid Pamilyang Pilipino Program (4Ps), a Conditional Cash Transfer (CCT) initiative that serves as the cornerstone of the government's social protection framework. The CCT program is recognized as a social safety net, encompassing social insurance, labor market interventions, social welfare programs, and other support measures (The World Bank, 2018).

The 4Ps is a human development initiative that provides cash assistance to meet families' short-term needs while investing in human capital, particularly in education, health, and nutrition. It includes Family Development Sessions (FDS) to help break the intergenerational cycle of poverty. According to DSWD Memorandum Circular 22, series of 2018, the FDS is a key intervention aimed at strengthening families' and children' human capital. These sessions play a crucial role in fostering family transformation and development. Specifically, they aim to enhance basic knowledge, attitudes, and skills of parents or household grantees regarding familial and parental responsibilities, such as managing family and community resources, engaging in livelihood activities, and promoting peer support and monitoring to improve overall well-being.

Research on 4Ps beneficiaries in the Philippines reveals a mixed picture of financial literacy. While the program has successfully met its objectives in poverty alleviation and improving access to education and healthcare (Once et al., 2019; De Los Reyes et al., 2022), beneficiaries struggle with financial literacy, particularly in budget allocation for essential needs and savings (Once et al., 2019). A study in Surigao City found no significant differences in financial literacy based on age, sex, civil status, or educational attainment, but noted variations in financial behavior and awareness related to employment status (Plaza, 2023). The

program's potential to enhance financial capability through conditional cash transfers is being explored (Eleoran et al., 2023). Despite these challenges, 4Ps has positively impacted beneficiaries' lives, providing for basic needs, promoting well-being, and offering capital for livelihood opportunities (De Los Reyes et al., 2022). However, the need for additional support in financial management and literacy remains evident.

Financial literacy plays a vital role in poverty alleviation by equipping individuals with the knowledge and skills needed to manage their resources effectively, influencing their financial behavior and decision-making. This study explores the impact of financial literacy education among 4Ps household grantees in Baguio City, Philippines, with a particular focus on financial planning, budgeting, and savings. Given the importance of demographics in shaping financial behavior, it is essential to recognize that the beneficiaries of financial literacy programs may differ significantly based on demographic factors such as gender and educational attainment.

2. Literature Review

2.1. Financial Literacy and Gender

Research consistently shows gender differences in financial literacy, with males generally demonstrating higher levels than females (Sahabuddin et al., 2023; Tinghög et al., 2021). The gender disparity extends to financial behavior, with males exhibiting better money management practices when financially knowledgeable (Sahabuddin et al., 2023). Interestingly, the gender gap persists in non-numerical financial contexts and cannot be attributed solely to differences in displayed confidence (Tinghög et al., 2021). Stereotype threat may contribute to this gap, as financial anxiety mediates the relationship between gender and financial literacy (Tinghög et al., 2021). These findings highlight the need for targeted financial education, particularly for female students and those with lower academic performance (Sahabuddin et al., 2023).

Studies by Kadoya et al. (2018), Kadova et al. (2020), and Watanapongvanich et al. (2021) suggest gender inequality in economic status significantly contributes to differences in financial literacy. Socio-economic factors, education, and occupation also play a role (Okamoto, 2021). Lusardi et al. (2017) found that the root of these differences is related to the benefits of financial literacy, with data from the S&P Global FinLit Survey showing that financial literacy levels are generally low worldwide, and women consistently score lower than

men. On the other hand, Gudjonsson et al. (2022) explored whether gender differences in financial literacy could be attributed to differing interests between men and women. The findings indicated that women have lower financial literacy than men, but this gap is not due to varying interests in people and things. Ndou (2023) found that in rural South Africa, men used budgets slightly more than women, though the overall relationship between demographic factors and financial literacy was negative. Radianto et al. (2020) concluded that while financial literacy significantly influences investment decisions, gender does not play a significant role in these decisions.

2.2. Financial Literacy and Educational Attainment

Research consistently highlights a positive relationship between educational attainment and financial literacy. Studies conducted in China by Zhou et al. (2022) and Gan et al. (2019) reveal that increased education, particularly through compulsory schooling, significantly enhances financial literacy, with the effect being more pronounced among males, urban residents, and those lacking economics training. This relationship is partly explained by improved math skills and increased sociability.

Further research underscores the link between education and financial literacy across different contexts. Kadoya and Khan (2020) found that higher education levels correlate with increased financial literacy, while Wagner (2019) noted that individuals with lower education and income levels tend to have lower financial literacy. This is consistent with findings by Ahmad et al. (2016), who emphasized that insufficient financial knowledge complicates personal financial management. Grohman et al. (2015) also associated better financial decisions with higher financial proficiency. In South Africa, Ndou (2023) observed that individuals with higher education, particularly those with a matric qualification, were better at saving for retirement, though a paradoxical negative correlation between education level and retirement savings was also noted. Dewi (2022) confirmed that demographic factors, including education, significantly impact financial skills and awareness, a finding echoed by Bangco et al. (2022) in the MIMAROPA region of the Philippines. Interestingly, Radianto et al. (2020) reported that while financial literacy significantly influences investment decisions, education alone does not.

2.3. The Role of Financial Literacy Programs in Economic Empowerment and Poverty Alleviation

Financial literacy programs, such as those implemented by World Vision and USAID, are increasingly recognized for their holistic approaches to economic empowerment. These initiatives not only enhance financial management skills but also promote gender equality by empowering women to participate fully in economic activities. For instance, World Vision's Gender Inclusive Financial Literacy Training (GIFT) supports couples in managing finances effectively, contributing to household stability and children's well-being (Manuere et al., 2018; Lopus et al., 2019). In countries like Papua New Guinea and Ghana, financial literacy initiatives are crucial for poverty alleviation. The Microfinance Expansion Project (MEP) in Papua New Guinea and governmental efforts in rural Ghana have shown that improving financial literacy enables individuals to manage resources better, make informed financial decisions, and generate income. These programs emphasize savings, responsible budgeting, and entrepreneurial skills, leading to improved economic stability and reduced poverty rates (Askar et al., 2020; Twumasi et al., 2020; Sehrawat et al., 2021).

National governments, such as the Philippines, are also integrating financial literacy into social welfare programs like the 4Ps. The Department of Social Welfare and Development (DSWD), in collaboration with USAID, launched the Financial Literacy Manual for the Family Development Sessions (FDS) to enhance financial knowledge and skills among 4Ps beneficiaries. This initiative prepares households for their eventual exit from the program and aims to help them achieve sustainable financial independence (DSWD, 2021). The targeted education provided through FDS on financial planning, budgeting, and savings has significantly benefited low-income families, while institutional support ensures the sustainability and long-term impact on the financial well-being of program beneficiaries (officialgazette.gov.ph; Dizon et al., 2017).

Empirical evidence highlights the critical role of financial literacy in addressing poverty, particularly among vulnerable populations such as those participating in social welfare programs like the Philippines' 4Ps. While existing studies provide insights into the impact of financial education on various demographic factors like gender and educational attainment, gaps remain in understanding the specific effectiveness of financial literacy interventions within the context of 4Ps households in Baguio City. Hence, this study aims to

fill this gap by examining how financial literacy education delivered through the FDS influences the financial planning, budgeting, and savings behaviors of 4Ps beneficiaries.

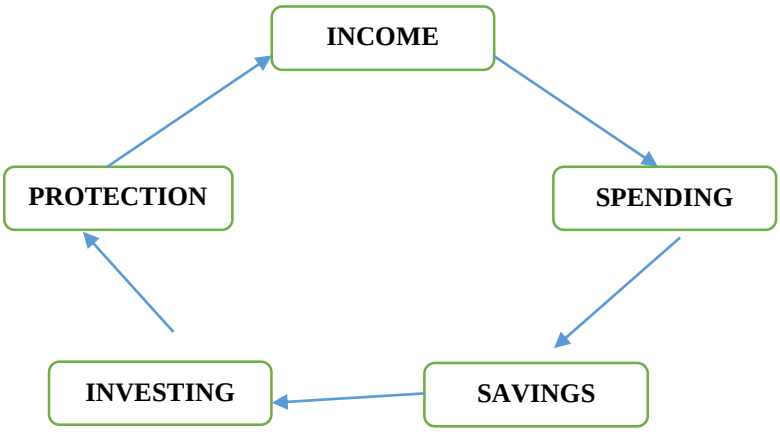
2.4. Theoretical Framework

Cognizant of the goal of this research, this study is anchored in the 4Ps Financial Literacy program. Financial Literacy has a significant role in reducing poverty in low-income families to improve their financial well-being. In some developing countries, they implement financial literacy through education. It can help create pathways to improve poverty; improving low-income individuals' financial standing and economic stability (Simpson, 2021). Firli (2017) asserts that financial literacy combines awareness, knowledge, skill, attitude, and behavior in making sound financial decisions and to achieve financing well-being. According to Pailella (2016), financial literacy is the ability to use the knowledge and skills in managing financial resources effectively for a lifetime. At the same time, Jumpstart Coalition (2018) describes financial literacy as the ability to use the knowledge and skills in managing financial resources effectively for lifetime financial security. Financial literacy is evident from financial knowledge and understanding of financial issues. The United States Treasury's Financial Literacy and Education Commission (2018) defined financial literacy as the ability to use knowledge and skills to improve their financial resources effectively for a lifetime of financial well-being.

Financial literacy has five key components: income, spending, savings, investing, and protection. The first component is income, which is the foundation of personal finances because this includes all parts of cash flow, like salaries, pensions, property income, and investments. Second is the spending, which includes the money for any expenses incurred. Personal budgeting is a plan for spending money, but it is the most useful tool for achieving financial goals. The third component is Savings, which includes any money from income that is not spent but was set aside for the future. Saving for the future or saving for an emergency fund will give you peace of mind and also prevent a financial setback in your life. The fourth component is Investing; this includes purchases intended for the business to earn future income or savings. The fifth component is protection from financial risks, handled through various financial products, including annuities, property/casualty insurance, and life and health insurance (CFI Education Inc., 2023).

Figure 1

The five key components of financial literacy



The financial literacy lectures are conducted in all the barangays in Baguio City that are covered by the 4Ps program during the monthly FDS. Financial literacy is one of the topics discussed during these sessions. It helped the 4Ps grantees improve their financial knowledge by understanding the basic financial concepts, including the five key components of financial literacy, to make them aware and responsible in financial decision-making. Having skills in financial literacy empowers them to set financial goals, create effective budget plans, manage debt, and save money for emergency funds to address medical emergencies, job loss, and natural disasters. At the same time, the remaining savings can be used for investment.

According to Askar et al. (2020), financial literacy is important in the three core concepts: how to spend, save, and borrow, and how to invest and accumulate wealth. Financial literacy can impact poverty by affecting an individual's ability to manage financial resources and by influencing financial behaviour and decision-making in areas particularly crucial for the poor to improve their economic well-being.

3. Methodology

3.1. Research Design

This study employed a descriptive research method to examine the financial literacy levels among beneficiaries of the 4Ps. A quantitative approach using questionnaires was utilized to assess demographic characteristics such as gender and educational attainment, as well as to evaluate the knowledge and skills acquired from financial literacy lectures.

3.2. Population and locale of the Study

The study was conducted in ten (10) barangays in Baguio City, Philippines with the highest number of 4Ps household beneficiaries based on the Pantawid Pamilya Information System (PPIS) as of February 28, 2022, of which total active grantees is 2,737. These grantees were selected through the National Household Targeting System, also known as Listahanan.

The RAOSOFT calculator was used to calculate the sample size or margin of error, complete statistical interpretations and algorithm. The sample size is computed using the RAOSOFT sample size calculator with 95 percent confidence level and a 5 percent margin of error. As a result, the minimum recommended sample size is 297 active grantees to be allocated in the top 10 barangays in Baguio City.

The identification of the 297 households (HHs) respondents was through stratified random sampling using the generated list of active household beneficiaries from the DSWD PPIS. The respondents were the grantees who actively participate in the monthly Family Development sessions. The top ten barangays with total active household beneficiaries are as follows:

Table 1

Active household beneficiaries of the top ten barangays

Barangays	Frequency	Percent	Valid Percent	Cumulative Percent
Irisan	102	34.3	34.3	34.3
Asin Road	31	10.4	10.4	44.8
Bakakeng	28	9.4	9.4	54.2
Pinget	26	8.8	8.8	63.0
San Luis Village	21	7.1	7.1	70.0
Santo Tomas	19	6.4	6.4	76.4
Kias	19	6.4	6.4	82.8
Loakan Proper	18	6.1	6.1	88.9
Fairview	18	6.1	6.1	94.9
Camp 7	15	5.1	5.1	100.0
Total	**297**	**100.0**	**100.0**	

Table 1 shows the total sample size of respondents based on the identified barangays. Irisan has the highest number and percentage of respondents with 102 (34.3%), followed by Asin Road 31 (10.4%), Bakakeng 28 (9.4%), Pinget 26 (8.8%), San Luis Village 21 (7.1%),

Santo Tomas and Kias 19 (6.4%) respectively, Loakan Proper and Fairview 18 (6.1%) respectively, and Camp7 15 (5.1%). The allocated number of respondents per barangay were given questionnaires and submitted them personally to the researcher after completion.

The following shows the demographic characteristics of the 297 4Ps grantees/respondents according to Gender and Educational Attainment.

Table 2

Gender of the respondents

Gender	**Frequency**	**Percent**
Male	28	9.4
Female	269	90.6
Total	**297**	**100.0**

Table 2 indicates that almost all of the respondents are females (91%), and only a few are males (9%). In comparison with the list of active grantees in the PPIS System for Baguio City, 88.91% are females, and the majority of them are housekeepers. They are the ones who are actively participating in the monthly family development sessions and training for skills development like financial literacy. On the other hand, 11.09% are male grantees whose wives are working both locally and abroad. They represent their family during the monthly FDS.

In addition, the Expanded Social Assistance Project (2019) of the Asian Development Bank stated that, in 2008, the total number of active grantees for the 4Ps in the seventeen (17) regions was 4,124,088. The majority are female grantees, 3,561,882 (86.4%), and 562,206 (13.6%) are male grantees. Most of these active grantees come from Luzon 1,682,133 (40.8%), followed by those in Mindanao 1,605,016 (38.9%) and Visayas 836,939 (20.3%). Women grantees have been targeted as the main beneficiaries. It was also mentioned in the study that many of the women grantees engage in informal work such as household help, laundry work, and vendors, among others, as cited in a key informant interview.

The Department of Human and Family Development Studies, University of the Philippines Los Banos (2018), conducted research on the assessment of the FDS of the 4Ps. The result of the study showed that there are 1,112 respondents, majority of them are females 802 (70.22%), high school level/graduate 597 (56.71%). The same trend with the result of the study of Gealon (2016) is that the majority of the respondents in the FDS in the coastal areas in Negros Occidental are high school level/graduates.

Table 3

Educational attainment of the respondent

Educational Attainment	Frequency	Percent
Elementary	100	33.7
High School	159	53.5
Vocational	17	5.7
College	21	7.1
Total	**297**	**100.0**

3.3. Research Instrumentation

The questionnaire was divided into two parts. Part I dealt with the demographic characteristics of the 4Ps grantees/respondents, such as gender and educational attainment. The validated questionnaires were given to the 297 respondents of the ten (10) identified barangays in Baguio City during the schedule of FDS. Part II looked into the extent of improvement in the knowledge and skills of the 4Ps grantees through the financial literacy lectures. Prior to the actual data gathering, the questionnaire was submitted to three experts for validity testing. The questionnaire was tried out in one barangay in Baguio City for the reliability test.

3.4. Data Gathering Procedures

Before distributing the questionnaire, the researcher sought approval from the DSWD-CAR's Plans and Policy Division (PPD). The Chief of PPD endorsed the request to the Regional Director (RD) for approval. Once approved by the RD, the researcher prepared letters to the barangay captains, requesting permission to distribute the questionnaire to the 4Ps household beneficiaries in their respective barangays. These letters, along with the approved request from the DSWD-CAR Regional Director, were presented during a courtesy call to the barangay captains.

In coordination with the Parent Leaders (PLs), the researcher gathered the necessary data during the scheduled Family Development Sessions (FDS) held in each cluster or barangay. The researcher explained the questionnaire instructions in both English and the Ilocano dialect to ensure clarity for the respondents. Ample time was provided for them to complete the questionnaire, and the researcher verified that all items were properly filled out before collecting the completed questionnaires.

3.5. Treatment of Data

The responses were tallied and tabulated using the Statistical Package for Social Sciences (SPSS). Data were subjected to computations using frequency counts, percentages, and computation of mean scores. Mean values were computed to describe the impact of financial literacy education among 4Ps household grantees in Baguio City. The values were interpreted based on 4 Likert scale ranging from no effect (1) to very great extent (4).

Analysis of Variance and T-test were also used to determine if there were significant differences according to educational attainment and gender, respectively. Post Hoc Test and Levene's test were used to look into the differences within the groups.

3.6. Ethical Consideration

The researcher administered the data gathering using the validated questionnaire during the schedule of FDS. The researcher also informed the respondents that they have the right to participate or withdraw in answering the questionnaire by signing the consent form. It was stated in the consent form that any information that the researcher obtained would be protected against misuse, loss, and other unauthorized changes. The data gathered were utilized for research purposes only, and the responses were treated with utmost confidentiality. The researcher maintained the anonymity of the respondents. The identity of the participants is not required in the research; they must not reveal the participant's data in public.

4. Findings and Discussion

The extent of improvement of the knowledge and skills of the 4Ps grantees in the financial literacy lectures was rated in the following topics: (a) financial planning, (b) budgeting, and (c) savings.

Table 4

Extent of improvement on the knowledge and skills of the 4Ps grantees through the financial literacy lecture (n=297)

	Mean	**Std. Dev.**	**DI**
Financial Planning	3.11	0.67	Great Extent
Budgeting	3.11	0.67	Great Extent
Savings	3.09	0.67	Great Extent
Over-all Mean	**3.10**	**0.62**	**Great Extent**

Legend: 1.00 – 1.74 No Effect at all (NE); 1.75 – 2.50 Little Extent (LE); 2.51 – 3.25 Great Extent (GE); 3.26 – 4.00 Very Great Extent (VGE)

Table 4 presents the findings regarding the effectiveness of financial literacy lectures on the knowledge and skills of 4Ps grantees, focusing on topics such as financial planning, budgeting, and savings. The overall mean score of 3.10 with a standard deviation of 0.62 suggests a substantial improvement in the participants' financial literacy levels. Specifically, participants demonstrated a commendable improvement in financial planning skills. This proficiency indicates that financial literacy interventions, such as those integrated into the FDS, are making a meaningful impact. Beneficiaries are not only receiving financial assistance but are also acquiring essential skills to manage these resources wisely, which could lead to long-term financial stability and independence. The ability to effectively manage family income and utilize cash grants underscores the importance of continuing and expanding financial education within social welfare programs. This is crucial, as financial planning not only involves setting financial goals but also strategizing to achieve them through informed decision-making (Xu et al., 2021). Research supports the effectiveness of cash grants in helping low-income families manage their finances and improve their quality of life. Studies show that beneficiaries of programs like the 4Ps and South Africa's disability grants use the funds responsibly, investing in education, health, and basic needs rather than vices (Orbeta et al.,2016; Kelly, 2019). These grants enable recipients to contribute to household income, enhancing their agency and securing support from family members (Kelly, 2019).

Regarding budgeting, which is essential for managing day-to-day expenses, participants achieved an average score of 3.11. This score suggests that while participants have a foundational understanding of budgeting, there is still room for improvement. The ability to budget effectively is crucial for making informed financial decisions and avoiding debt, particularly in low-income households where resources are limited. The average score indicates that the financial literacy efforts have had a positive impact, but further emphasis on budgeting skills could enhance the participants' ability to manage their finances more effectively. Strengthening these skills could lead to better financial planning, reduced financial stress, and ultimately, a more stable economic future for these households. Budgeting is considered a foundational financial behavior in the behavioral hierarchy, suggesting its importance for developing financial capability (Xiao et al., 2018). While adept at listing and planning expenses, challenges in adhering strictly to budgets were evident, which underscores the ongoing need for reinforcing budgeting practices to foster greater financial discipline (Kadoya et al., 2020).

In terms of savings practices, participants scored an average of 3.09, indicating significant improvement. The prioritization of saving for children's education and emergency funds underscores their commitment to long-term financial security. This focus on future-oriented financial goals reflects an encouraging shift in behavior, as participants recognize the importance of preparing for unforeseen circumstances and investing in their children's future. These savings practices suggest that the financial literacy programs have been successful in fostering a savings culture among beneficiaries, which is crucial for building financial resilience. However, the overall score also highlights the need for continued support and education to further strengthen these practices. By enhancing their ability to save consistently, participants can better navigate financial challenges and contribute to a more secure and stable financial future for their families. The importance of emergency savings is highlighted in a review of evidence-based strategies to build such funds (Ratcliffe et al., 2020). Furthermore, family savings for children's education is positively correlated with children's self-control scores, suggesting that asset building for children could be a potential policy tool to promote child development (Zhi et al., 2020). These findings underscore the importance of prioritizing savings for education and emergency funds in improving overall financial well-being and long-term security.

The findings reveal that participants demonstrate significant proficiency in key areas of financial management, reflecting the effectiveness of financial literacy initiatives integrated into the 4Ps program. Notably, participants excel in prioritizing their children's education. This competence underscores the participants' recognition of the critical role that education plays in securing future stability and career prospects for their children. This focus aligns with the overarching objective of the 4Ps program, as outlined in RA 11310, which aims to break the cycle of poverty by improving educational outcomes among beneficiaries. The high emphasis on education indicates that the program is successfully instilling the importance of investing in children's futures as a pathway out of poverty. Moreover, participants exhibit strong adeptness in spending wisely on essential family needs, which highlights their ability to allocate resources effectively toward necessities such as food, clothing, and healthcare, which are fundamental to maintaining family well-being. This financial discipline is crucial for ensuring that limited resources are utilized efficiently, thereby enhancing the overall quality of life for their families. Families facing financial constraints often adapt their spending habits,

focusing on essential needs and in-home recreation when external activities are unaffordable (Hill et al., 2016).

Additionally, the ability to save for emergency purposes further underscores participants' proactive approach to financial resilience. This preparedness for unforeseen financial shocks indicates that participants are internalizing the importance of building a financial safety net. By prioritizing savings, they are better equipped to handle emergencies without resorting to debt or compromising essential needs. This behavior not only strengthens their financial stability but also reduces their vulnerability to economic disruptions, contributing to long-term financial security. However, challenges arise in managing daily expenditures and adhering to financial plans. While beneficiaries exhibit knowledge in financial planning and budgeting, they struggle with consistent implementation, occasionally overspending relative to their income or budget targets. This gap highlights the need for ongoing support in reinforcing financial discipline among program participants (Simpson, 2021).

Financial literacy proves instrumental in equipping 4Ps beneficiaries with essential skills to achieve economic stability and self-sufficiency. By prioritizing education and savings, participants align with the program's broader objective of poverty alleviation through improved financial management. Literature supports these findings, indicating that enhanced financial literacy positively correlates with reduced poverty levels, particularly in rural settings where financial knowledge empowers households to manage income and assets more effectively (Xu et al., 2021). Defined as the ability to effectively manage financial resources for long-term well-being, financial literacy enhances decision-making capabilities crucial for achieving economic security and life goals (US Financial Literacy and Education Commission, 2016; Jumpstart Coalition, 2019).

Table 5 provides insights into the effectiveness of financial literacy lectures on 4Ps grantees' knowledge and skills, categorized by gender. The findings reveal notable differences and similarities in financial management proficiency between males and females. Overall, females achieved a higher mean score of 3.12 compared to males' 2.91, indicating that both genders significantly improved their financial literacy to a great extent (GE).

Table 5

According to gender

	Gender	N	Mean	DI
Financial Planning	Male	28	2.85	GE
	Female	269	3.14	GE
Budgeting	Male	28	2.96	GE
	Female	269	3.13	GE
Average (Savings)	Male	28	2.91	GE
	Female	269	3.10	GE
Over-all Mean	**Male**	**28**	**2.91**	**GE**
	Female	**269**	**3.12**	**GE**

Legend: 1.00 – 1.74 No Effect at all (NE); 1.75 – 2.50 Little Extent (LE); 2.51 – 3.25 Great Extent (GE); 3.26 – 4.00 Very Great Extent (VGE)

The study demonstrated that females are more confident in managing their family resources through financial planning and savings, manifested by their higher prioritization of children's education and health, emergency funds, and basic family needs. Females' higher scores in financial planning and savings suggest a stronger commitment to long-term financial security. They prioritize essential needs like children's education and emergency funds more effectively than males. This is consistent with Dewi (2022), who found that females are more skilled in evaluating debts, saving money, and managing bills and receipts than males. Dewi's study also indicated that while males may be more knowledgeable, females are more skillful in financial management. This skillfulness in practical financial management makes females more reliable in managing family finances, aligning with the findings of this study. These findings imply that financial education programs should continue to emphasize practical financial management skills, particularly targeting males to improve their proficiency in areas where females excel. Policymakers should design interventions that promote practical financial skills and confidence among both genders, addressing specific areas, where males lag behind.

Both genders exhibited strong budgeting skills, with females scoring slightly higher (3.13) than males (2.96). This indicates a general competence in listing monthly expenses and preparing budget plans, though females again demonstrated a slight edge. Literature supports these findings, indicating that females often manage family finances effectively, with broader perspectives on family well-being (Savard & Cavalcante, 2021). Financial literacy programs

should reinforce budgeting skills for all participants, while also highlighting the differences in how males and females approach budgeting.

Gender differences in savings practices were evident, with females showing a higher inclination towards saving for educational purposes and emergency needs. These findings resonate with Ndou (2023), who noted that while men used budgets slightly more than women, females tend to save more effectively for future needs. Financial education should emphasize the importance of savings for long-term security, particularly targeting males to enhance their savings practices. Programs could include modules on setting up emergency funds, saving for education, and other future needs to ensure a balanced approach to financial planning for both genders.

Although the study found no significant overall difference in financial literacy between males and females ($p = 0.08$), significant differences emerged in specific areas like financial planning ($p = 0.03$), as shown in table 6. Females showed greater competency in managing family resources by prioritizing education, monthly dues, and essential needs, corroborating Okamoto (2021) and Savard et al. (2021) who highlighted that females often have more positive financial behaviors and attitudes despite lower overall financial literacy. Furthermore, Kadoya et al. (2020) observed that males are more knowledgeable but females are more skillful in financial management, particularly in household contexts. To address these disparities, educational programs should focus on boosting financial literacy among females from a young age. Tailored financial education that counters stereotypes and encourages active financial management from an early age can help bridge the gender gap. Additionally, promoting inclusive financial education that highlights practical management skills could empower both genders to achieve better financial outcomes. Okamoto's findings also suggest that gender differences in financial literacy could be mitigated through enhanced educational opportunities for females, challenging stereotypes about their financial capabilities. Recent literature has also explored gender differences in financial socialization within the home environment, suggesting that differences in parental financial behaviors and attitudes towards money can significantly influence children's financial attitudes later in life (Agnew et al., 2018). Such findings underscore the importance of designing school-based financial literacy programs that challenge gender-based financial stereotypes and encourage open discussions about financial roles and responsibilities within families.

Overall, the study highlights the importance of tailored educational programs that address gender-specific challenges in financial literacy. Policymakers should focus on enhancing financial education initiatives that cater to the unique needs of males and females, particularly in marginalized communities and rural areas (Ansari et al., 2023; Radianto et al., 2020).

Table 6

Independent samples test according to gender

Topics		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Ave_ Financial Planning	Equal variances assumed	1.49	0.22	-2.20	0.03	-0.29	0.13	-0.55	-0.03
	Equal variances not assumed			-1.87	0.07	-0.29	0.16	-0.61	0.03
Ave_ Budgeting	Equal variances assumed	4.89	0.03	-1.29	0.20	-0.17	0.13	-0.43	0.09
	Equal variances not assumed			-1.01	0.32	-0.17	0.17	-0.52	0.18
Ave-Savings	Equal variances assumed	1.75	0.19	-1.44	0.15	-0.19	0.13	-0.45	0.07
	Equal variances not assumed			-1.20	0.24	-0.19	0.16	-0.52	0.13
GV	Equal variances assumed	3.60	0.06	-1.78	0.08	-0.22	0.12	-0.46	0.02
	Equal variances not assumed			-1.41	0.17	-0.22	0.15	-0.53	0.10

Table 7 presents the differences in financial literacy improvements among 4Ps grantees based on their educational attainment, specifically looking at financial planning, budgeting, and savings. The findings revealed that elementary graduates scored an average of 2.99 in financial planning, high school graduates 3.14, vocational graduates 3.08, and college graduates 3.49. This indicates a substantial improvement across all educational levels, with college graduates exhibiting a significantly higher capability in financial planning compared to those with lower educational attainment. Financial planning, essential for resource management and future preparedness, is evidently better understood and applied by those with higher education, aligning with Lusardi's (2019) assertion that more educated individuals possess greater financial literacy.

Table 7

According to educational attainment

	Educational Attainment	**N**	**Mean**	**DI**	**p-value**	**Decision**
Average (Financial Planning)	Elementary	100	2.99	GE	0.013	Sig. diff
	High School	159	3.14	GE		
	Vocational	17	3.08	GE		
	College	21	3.49	VGE		
Average (Budgeting)	Elementary	100	3.09	GE	0.366	No sig. diff
	High School	159	3.12	GE		
	Vocational	17	3.05	GE		
	College	21	3.26	VGE		
Average (Savings)	Elementary	100	3	GE	0.364	No sig. diff
	High School	159	3.13	GE		
	Vocational	17	3.01	GE		
	College	21	3.2	GE		
Over-all Mean	Elementary	100	3.02	GE	0.205	No sig. diff
	High School	159	3.13	GE		
	Vocational	17	3.04	GE		
	College	21	3.32	VGE		

Legend: 1.00 – 1.74 No Effect at all (NE); 1.75 – 2.50 Little Extent (LE); 2.51 – 3.25 Great Extent (GE); 3.26 – 4.00 Very Great Extent (VGE)

In budgeting, elementary graduates scored an average of 3.09, high school graduates 3.12, and vocational graduates 3.05, all reflecting a considerable extent of improvement.

College graduates, with a mean score of 3.26, demonstrated an even greater extent of improvement. Effective budgeting is crucial for financial stability, and the data suggests that higher educational attainment enhances budgeting skills. This supports Wagner's (2019) observation that individuals with higher education levels tend to have better financial literacy and budgeting abilities, leading to more effective financial management.

Regarding savings, the average scores were 3.00 for elementary graduates, 3.13 for high school graduates, 3.01 for vocational graduates, and 3.20 for college graduates, all indicating significant improvement. College graduates, in particular, showed notable improvement in saving for children's education, future investments, and transforming small amounts into savings. This aligns with Dulin's (2016) findings that higher educational attainment leads to greater awareness and knowledge about savings and investment strategies, highlighting the impact of education on financial literacy.

Overall, the mean scores for financial literacy topics were 3.02 for elementary graduates, 3.13 for high school graduates, and 3.04 for vocational graduates, indicating substantial improvement. College graduates, with an overall mean of 3.32, exhibited a very great extent of improvement. This demonstrates a clear correlation between higher educational attainment and better financial literacy. Elementary graduates showed considerable improvement in all financial literacy areas, while high school graduates demonstrated notable improvement in specific areas like sending children to school, spending wisely, and saving for education and emergencies. Vocational graduates also showed significant improvement in paying bills on time and spending wisely on necessities.

College graduates exhibited notable improvement in all areas except for certain aspects such as understanding different modes of savings, decreasing expenses based on a budget plan, and comparing actual expenses to budgeted costs. These findings suggest that 4Ps grantees possess the necessary knowledge and skills to manage their financial resources effectively, with higher educational attainment correlating with better financial literacy outcomes. This supports Wagner's (2019) and Lusardi's (2019) conclusions that education plays a critical role in enhancing financial literacy. Wagner (2019) emphasized the generally low levels of financial literacy in the United States, particularly among those with lower education and income, further highlighting the importance of education in financial literacy. People with higher education are generally more financially literate, as also supported by Lusardi (2019) and Dulin (2016), who found that higher education levels correlate with greater financial

knowledge. This underscores the need for educational interventions to improve financial literacy. Education enhances cognitive ability, increasing financial literacy, as argued by Kadoya et al. (2020). Ahmad et al. (2016) noted that individuals with lower education and income have lower financial literacy levels, leading to financial management difficulties. Grohman et al. (2015) emphasized the link between financial proficiency and better financial decisions.

Table 8

Post Hoc Tests

Dependent Variable	(I) Educ. Att.	(J) Educ Att	Sig.	Decision
Setting aside family funds for emergency purposes, by knowing the formula of savings; "net income - savings equals expenses"	Elementary	College	0.012	Sig. diff
Managing daily expenditure, economic transactions, and financial resources	Elementary	College	0.004	Sig. diff
	High School	College	0.028	Sig. diff
Ave_Financial Planning	Elementary	College	0.008	Sig. diff

The Post Hoc Tests in table 8 revealed significant differences in financial planning, particularly in setting aside family funds for emergency purposes. Significant differences were noted between elementary and college graduates, and between high school and college graduates in managing daily expenditures, economic transactions, and financial resources. These findings assert the significant difference in financial planning improvement based on educational attainment. The ability of college graduates to manage family resources efficiently aligns with Lusardi et al. (2018), who noted that higher educational attainment correlates with better personal financial planning, investing, and spending behavior. Sinaga (2020) further supports this, indicating that individuals with higher education levels tend to have higher financial literacy. This suggests that educational interventions could be crucial in enhancing financial literacy among lower-educated populations, potentially leading to better financial decision-making and resource management.

5. Conclusion

Based on the analysis of the effectiveness of financial literacy lectures for 4Ps grantees, it is evident that these programs have significantly enhanced participants' knowledge and skills in financial planning, budgeting, and savings. Participants demonstrated commendable progress in understanding financial planning strategies, effectively managing budgets and prioritizing savings. Despite these strengths, challenges persist in consistently adhering to financial plans and budgets, particularly in managing daily expenditures. This highlights the ongoing need for reinforcement and support in fostering sustained financial discipline among program beneficiaries. Furthermore, the study reveals notable gender differences in financial management proficiency, with females generally scoring higher across various aspects of financial literacy compared to males. Females exhibited stronger capabilities in financial planning and savings practices, emphasizing education and emergency preparedness to a greater extent than their male counterparts. Educational attainment also emerged as a significant factor influencing financial literacy outcomes, with higher levels of education correlating positively with improved financial planning, budgeting, and savings skills. College graduates, in particular, demonstrated the highest proficiency in these areas, indicating the critical role of education in enhancing financial literacy.

This study suggests that the financial literacy modules be tailored to the educational levels of 4Ps household beneficiaries, most of whom are high school graduates, followed by elementary graduates. These modules should be simple, concise, and accessible to both the participants and their family members. Additionally, the modules should be translated into the Ilocano dialect or the local vernacular to ensure better understanding and engagement.

While the research provides valuable insights, several limitations should be noted. The sample size, though substantial with the 297 respondents, is geographically restricted to only 10 barangays in a single city. This limited geographic scope and sample size may not fully represent the broader population of 4Ps grantees across different regions. Consequently, the findings may not be generalizable to other areas or to the entire population covered by the 4Ps program. Hence, further studies with wider scope and sample size as well as comparative studies of different cities in the Philippines are highly encouraged.

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Impact of agricultural intervention on socio-economic development of farmers: Evidence from regression discontinuity design

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Abstract

The contribution of agriculture in the socio-economic development is undeniable and is truly an important part of the Philippine economy. It is also a major source of livelihood and employment of most Filipinos, especially in the rural areas. The general intent of this study is to evaluate the impact of the government agricultural intervention on selected upland communities in Goa, Camarines Sur, especially in the far-flung barangays of the municipality, using Regression Discontinuity Design. This study assessed the socio-economic and poverty status of the local farmers through the agricultural interventions received. The results showed that the distribution of seeds, fertilizers and cash assistance to the upland farmers could improve the overall outputs of the farmers, which can help alleviate their lives. Similarly, the government's agricultural interventions have a significant and positive impact on alleviating poverty and improving the quality of life of the local farmers. However, irrigation and farm-to-market roads need to be prioritized to ensure an increase in agricultural production output.

Keywords: *impact evaluation, socio-economic development, agricultural interventions, upland farmers, regression discontinuity design*

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1. Introduction

The growth observed in the agricultural sector can be attributed to various government-implemented agricultural intervention programs designed to support the sector's requirements. As reported by the Department of Agriculture (DA, 2019), their programs prioritize production support services, market development, extension support, education and training, research and development, irrigation network expansion, and the provision of agricultural equipment and facilities. These initiatives aim to enhance productivity in rice, corn, high-value crops, livestock, and organic agriculture. These programs play a direct role in advancing Sustainable Development Goals (SDG) 2, 8, and 11, which target issues related to food security, poverty alleviation, and sustainable growth by increasing farm income and productivity. By focusing on these key areas, the agricultural sector in the Philippines not only contributes significantly to the national economy but also plays a crucial role in achieving broader developmental objectives outlined in the SDGs.

In Goa, Camarines Sur, agriculture stands out as a primary livelihood source for residents in upland communities, involving the cultivation of rice, corn, coconut, abaca, root crops, and the raising of livestock such as native chickens, pigs, carabaos, and cows. To bolster this crucial sector, the Local Government Unit (LGU), in collaboration with various agencies and private organizations, implements diverse programs and agricultural interventions as a fundamental strategy to enhance the well-being of upland farmers (Onsay & Rabajante, 2024; Onsay, 2022). This study is designed to assess the impact of these agricultural interventions, with a specific focus on selected far-flung barangays that are identified as vulnerable entities facing significant challenges in meeting the Sustainable Development Goals (SDGs) related to food security and poverty alleviation.

Despite the presence of these interventions, there is a notable absence of studies and reports evaluating the effectiveness of these programs in generating positive impacts on the economic and social welfare of farmers. The research aims to shed light on the government interventions received by farmers, the types of irrigation systems and housing structures utilized by upland farmers, the poverty status of both registered and unregistered farmers, the effects of government agricultural interventions on local upland farmers, and the local average treatment effects of these interventions. By delving into these aspects, the study seeks to

provide valuable insights into the efficacy of existing agricultural programs and their influence on the livelihoods and prosperity of upland farmers in the region. Through a comprehensive analysis of these factors, the research aims to contribute to the ongoing efforts to enhance agricultural sustainability, address poverty, and promote economic development in upland communities in Goa, Camarines Sur.

2. Literature Review

2.1 Challenges and strategies in the farming sector

In the context of the Sustainable Development Goals (SDGs), traditional rural livelihood practices include hunting, fishing, gathering, shifting cultivation, pastoralism, and high mountain agriculture. These practices not only promote cultural heritage but also play a crucial role in defining the identity and well-being of communities while ensuring food security (United Nations, 2022). Mphande (2016) states that 90% of the world's population depends on farming, with a significant portion of income derived from agricultural activities. Additionally, the agricultural, fisheries, and forestry industries serve as vital sources of employment for rural communities (Kainyande et al., 2022; Sheludkov et al., 2020). In the Philippines, farming is a major livelihood source for many Filipinos, particularly those residing in upland areas where agriculture is essential (Mercado & Osbahr, 2023). Notably, approximately 8.6% of the country’s Gross Domestic Product (GDP) comes from the agriculture sector (Mopera, 2016; Diaz, 2022). However, agriculture is considered a vulnerable sector in light of climate change (Jamshidi et al., 2019; Chimi et al., 2023; Mohapatra et al., 2022). For instance, upland farmers in La Trinidad, Benguet, Philippines, have experienced adverse effects from climate change, negatively impacting crop production, water resources, and household economies (Alfonso & Laruan, 2020). Furthermore, Cerio (2018) identifies several additional challenges faced by farmers, including their limited capacity to produce food and generate agricultural income—factors influenced by their farm holdings, land tenure, and access to farm inputs. Farmers also struggle to generate non-agricultural income, possess low household wealth, and have inadequate access to formal credit facilities.

To address the issue of climate change in the Philippines, farmers adopt various strategies. For instance, Peñaflor et al. (2020) highlight the practices of smallholder upland

farmers in the Barobbob Watershed, located in Bayombong, Nueva Vizcaya. These practices include establishing diversion canals and rain-based sprinklers, conducting farm experiments with fertilizers and watering devices, and implementing contour farming. While many farmers in the country heavily rely on changing cropping patterns (Landicho et al., 2016; Pulhin et al., 2016), Elauria et al. (2017) emphasize the importance of Conservation Farming (CF) Technologies, which aim to transform the traditional mono-cropping system into a diversified cropping system in La Libertad, Negros Oriental. However, these farmers often lack adequate support from local government authorities. Furthermore, Philippine farming practices lag behind those of other countries (Briones, 2021), with some farmers still inclined to adhere to indigenous beliefs and traditional practices (Israel & Sierra, 2023). Despite this, there is a growing openness among farmers to integrate and adapt new technologies (Jalotjot & Tokuda, 2024; Briones et al., 2023). In Ethiopia, rural livelihood diversification is practiced to cope with increasing challenges in agricultural production (Abebe et al., 2021). Similarly, partnerships with private sectors, shared farming, and contract farming have been shown to enhance rural livelihoods and agricultural output (Ingram & Kirwan, 2011).

2.2 Agricultural Interventions

Governments around the world subsidize agriculture in three primary forms: land settlement programs, price and income supports, and energy and emissions initiatives. However, the implementation of these state subsidies has been linked to negative effects on soil fertility, freshwater supplies, biodiversity, and atmospheric carbon levels (Williams, 2017). For instance, agricultural interventions by the Chinese government—specifically, the subsidies granted to farmers—have facilitated the growth of agricultural enterprises in China (Wu et al., 2022). In Bangladesh, the Integrated Rice–Fish Farming System (IRFFS) has been implemented to alleviate poverty and improve the living conditions of marginalized small-scale rural households (Islam et al., 2015). In Rwanda, the government established the Crop Intensification Program targeting farmers with larger and more dispersed land areas. However, this initiative did not yield beneficial results for impoverished farmers in rural regions, who often possess extremely small plots of land (Muyombano, 2020). In South Korea, the Rural Development Administration initiated the Korean Programs on International Agriculture (KOPIA) to introduce new agricultural technologies (Park et al., 2019). Meanwhile, the Indian government has placed a strong emphasis on organic farming to promote sustainable

agricultural practices (Roychowdhury et al., 2013; Meena et al., 2020). Among the various government interventions, Bisht et al. (2020) argue that four crucial strategies include the integration of traditional and organic farming, support for smallholder farming, improved market access, and reducing rural populations' over-dependence on agriculture as their primary source of income. According to Gautam (2015), production price supports and trade policies are significant factors contributing to the establishment of these subsidies.

According to Setboonsarng (2008), the creation of farm-to-market roads has had a significant impact on communities by facilitating the easy transport of goods from farms. Overall, public infrastructure plays a crucial role in enhancing productivity growth in agriculture in the Philippines (Teruel & Kuroda, 2005). Karlberg et al. (2015) emphasize the importance of agricultural water interventions; a proper irrigation system is essential for farming, as it contributes to good harvests and abundant yields. To achieve maximum and sustainable farming benefits, specific policies and programs are needed. This includes an expansive farm-to-market infrastructure program, institutional and business support interventions to connect farmers with markets, conditional cash farming subsidies in lieu of direct provision of farm inputs, and promotion of crop diversification through dedicated support programs. For example, the Government of Nueva Ecija adopted the Palay Check System, which addresses key aspects of crop management, including seed quality, land preparation, crop establishment, nutrient management, water management, pest management, and harvest management (Cuevas et al., 2021). This comprehensive approach has led to increased yields. Barnedo et al. (2021) argue that government subsidies significantly impact both the agriculture and manufacturing sectors, as they can enhance market power within the agricultural market. However, agricultural policies have not been adequately reviewed, leading to financial difficulties for farmers (Balkrishna et al., 2020). In the Philippines, Briones (2013) emphasizes the importance of properly reviewing projects due to various issues and anomalies encountered during implementation. Additionally, farmers in Southeast Asia face numerous challenges, including limited land for agriculture, soil degradation, and economic obstacles (Blackmore et al., 2021).

Farmers' yield and productivity serve as crucial indicators of agricultural success and sustainability. The productivity of agricultural systems is influenced by various factors, including household conditions and financial expenditures. Understanding these impacts can

guide interventions aimed at improving agricultural outcomes. Research indicates that housing quality significantly influences farmers' productivity. Proper housing provides farming families with a stable living environment, directly contributing to their physical and mental well-being. Studies have shown that higher housing quality correlates with increased labor efficiency and reduced stress levels among farm workers, ultimately enhancing productivity (Geffersa, 2023). Adequate housing for farmers and their laborers significantly affects overall productivity. Evidence suggests that living in substandard conditions can lead to health issues, thereby diminishing a worker's efficiency and output. Conversely, improved housing conditions can increase worker satisfaction and productivity, ultimately benefiting agricultural output (Umanailo et al., 2021). Seed quality is also paramount in determining agricultural productivity. Research demonstrates that high-quality seeds yield superior results compared to lower-quality varieties, largely due to their enhanced physiological purity and disease resistance. When farmers utilize premium seeds, they can expect improved crop yields, which help mitigate the risk of food insecurity and enhance profitability (Wimalasekera, 2015). The relationship between housing conditions, seed quality, and economic factors is multifaceted. For instance, enhanced housing can lead to a more motivated labor force, which, when coupled with high-quality seeds, can significantly boost productivity (Das et al., 2021). Furthermore, effective economic management, including optimal resource allocation, is crucial for maximizing agricultural yields (Emran et al., 2021).

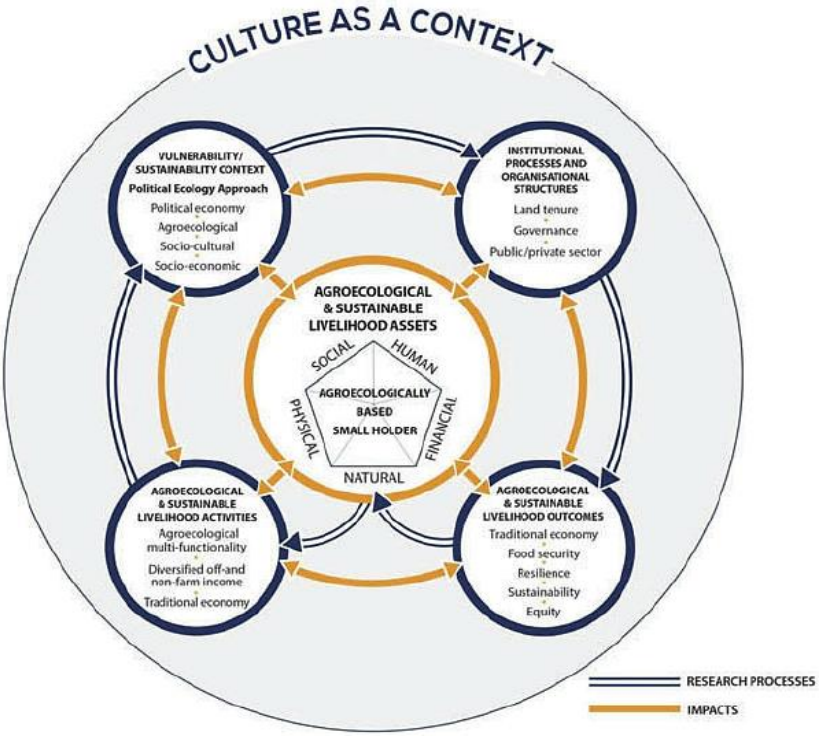
2.3. Theoretical Framework

Figure 1 illustrates the agro-ecology model, emphasizing investments in smallholder family farming and the pursuit of food sovereignty. Family farming, as described by Addinsall et al. (2015), encompasses all family-based agricultural activities associated with various facets of rural development. The 2009 annual report of the International Assessment of Agricultural Knowledge, Science, and Technology for Development highlighted the adverse effects of conventional agricultural practices, their indirect socio-environmental repercussions, and positioned smallholder farmers at the core of sustainable agriculture and food security. Small-scale farming plays a crucial role in ensuring security by underscoring the significance of the future food system and fostering a vibrant, diverse rural economy that benefits all communities. Within the agricultural context, 'sustainability' denotes the ability of the agro-system to

harmonize economic efficiency with social acceptability and the mitigation of adverse environmental impacts (ACF-International, 2014).

Figure 1

Agro-Ecology and Sustainable Rural Livelihood Framework (ASRLF)



Source: Addinsallab et al. (2015)

A research design framework positions the rural smallholder at the core, encircled by their agro-ecological and sustainable livelihood assets. Within this framework (ASRLF), solid arrows represent the impacts and interactions among social, economic, biophysical, and sustainability factors, while hollow arrows indicate the flow of research activities and processes. Culture functions as a contextual backdrop within the ASRLF, underscoring the necessity for research activities, processes, and outcomes to be tailored to suit the local context effectively (ASRLF). This adaptation to local culture is crucial for ensuring the relevance and applicability of research within the specific community setting.

3. Methodology

3.1. Research Design

This study employed a quantitative approach, crucial for delineating and elucidating the socio-economic status of local farmers using regression analysis. Regression, a quasi-experimental evaluation method, utilizes a treatment assignment mechanism grounded in a

continuous eligibility index—a variable with a continuous distribution—to gauge the impact of a particular intervention or program. This method is invaluable for assessing the effectiveness of agricultural interventions or programs for rural farmers in Goa, Camarines Sur. It also aids in elucidating the relationship and significance between independent and dependent variables within the study context.

3.2. Research Instrument

The study used primary data from the respondents through house-to-house interview. In order to collect data, the study used survey questionnaire and interview guide/questions. The questionnaire utilized in this study encompasses a range of critical variables aimed at assessing the socio-economic status of respondents in relation to agricultural interventions. These variables include poverty status (P_S), educational attainment of the household head (Educ), cash assistance received (CASH), seeds received (SD), fertilizer received (FERT), access to water irrigation system (IR), access to farm-to-market road (FMR), available machineries, tools, and equipment (MET), age of the respondents (AGE), gender of the respondents (GEN), marital status of the respondents (MS), highest educational attainment of the respondent (HEA), household size (HS), and average monthly income (AMI).

To ensure the questionnaire's validity and reliability, content validity was maintained by aligning the variables with research objectives and theoretical frameworks. Construct validity was established by designing the questionnaire based on established theoretical constructs and expert reviews. The reliability of the questionnaire was assessed through measures such as test-retest reliability and internal consistency checks like Cronbach's alpha.

The data collection process involved house-to-house interviews with respondents, utilizing the survey questionnaire and interview guide/questions. This approach facilitated the direct collection of primary data from the target population, providing a personalized and in-depth understanding of respondents' circumstances. The structured questionnaire enabled systematic data collection on specific socio-economic characteristics and access to agricultural resources, while the interview guide ensured consistency in data collection by guiding discussions towards relevant topics. Through these methods, the study aimed to gather comprehensive and reliable data to analyze the impact of agricultural interventions on rural farmers' socio-economic status, elucidating relationships between various factors and outcomes effectively.

3.3. Research Participants

The study focused on registered farmers in the locality of Goa, Camarines Sur, Philippines, specifically from barangays Lamon, Scout Fuentebella (Laki-Laki), and Tamban (Mabini), with a total of 155 participants selected from the 199 total population using the Cochran Sampling Technique. To collect data effectively, stratified proportional sampling was employed due to the large and dispersed nature of the population. This method involved dividing the population into subgroups, as illustrated in table 1.

Table 1

The respondents from the treatment and the control group per barangay

Name of Barangay	Treatment Group (Registered Farmers)			Control Group (Unregistered Farmers)		
	Population	Proportion	Sample	Population	Proportion	Sample
Lamon	67	0.3	54	67	0.3	54
Scout Fuentebella (Laki-Laki)	100	0.5	73	100	0.5	73
Tamban (Mabini)	32	0.16	28	32	0.16	28
Total	**199**	**0.96**	**155**	**199**	**0.96**	**155**

Figure 2

The treatment and control groups for the impact evaluation

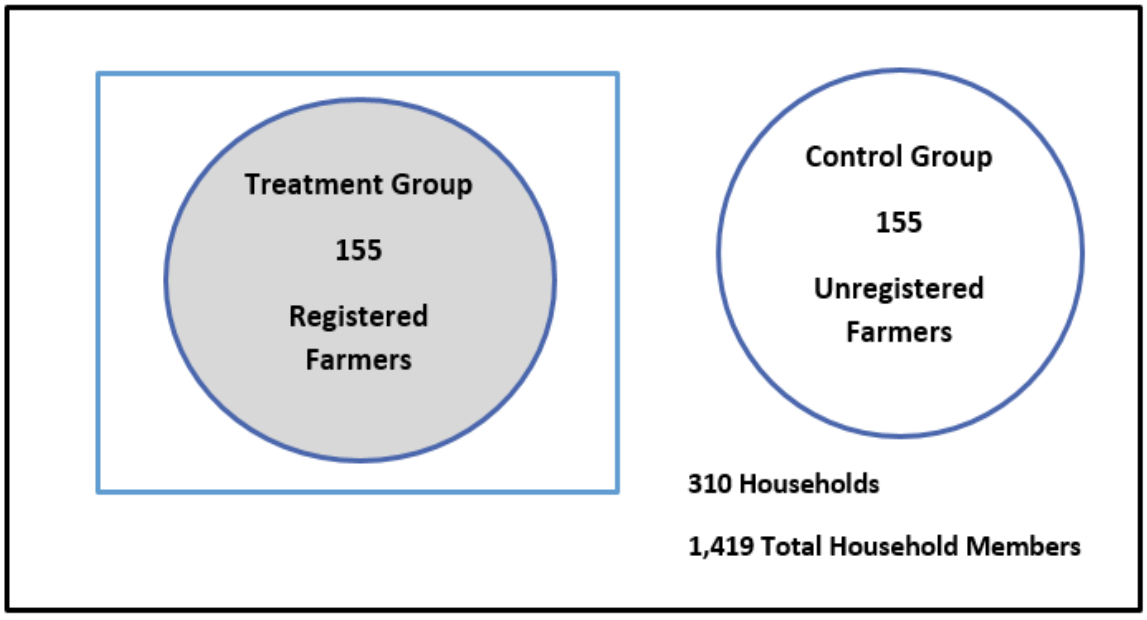


Table 2

Socio-economic profile of participants from treatment and control community

Characteristics		Registered Farmers			Unregistered Farmers		
		F	%	Rank	F	%	Rank
Age	21-30	6	3.87	5	8	5.16	5
	31-40	25	16.13	4	39	25.16	2
	41-50	47	30.32	1	38	24.52	3
	51-60	40	25.81	2	41	26.45	1
	61-70	32	20.64	3	22	14.19	4
	71-80	5	3.23	6	6	3.87	6
	81-90	0	0	0	1	0.65	7
Gender	Male	85	54.84	1	90	58.06	1
	Female	70	45.16	2	65	41.94	2
Marital Status	Single	0	0	0	3	2.56	3
	Married	133	85.81	1	128	82.58	1
	Widowed	22	14.19	2	17	10.98	2
	Live – in	0	0	0	3	1.93	4
	Separated	0	0	0	3	1.93	4
Highest Educational Attainment	Elementary Level	80	51.61	1	84	54.19	1
	High School Level	73	47.10	2	65	41.94	2
	College Level	2	1.29	3	6	3.87	3
Name of Commodities	Rice	152	96.06	1	131	84.52	1
	Coconut	50	32.26	2	53	34.19	2
	Corn	2	1.29	4	1	0.65	4
	Others	8	5.16	3	8	5.16	3
Average Monthly Income	Below 3000	1	0	0	2	0	0
	3001-5000	9	0	0	9	0	0
	5001-7000	3	0	0	10	0	0
	7001-9000	8	0	0	11	0	0
	9001-11000	7	0	0	18	0	0
	11001-13000	11	0	0	18	0	0
	13001- 15000	12	0	0	19	0	0
	15001 above	7	0	0	114	0	0

Table 2 shows the socio-economic profile of the respondents from treatment and control community. In terms of age distribution, the data reveals that among registered farmers, the largest group falls within the 41-50 age range, accounting for 30.32% of the total, closely followed by the 51-60 age group at 25.81%. On the other hand, unregistered farmers show a different pattern, with the highest percentage in the 51-60 age group at 26.45%, followed by the 31-40 age group at 25.16%. Gender-wise, both registered and unregistered farmers are predominantly male, with males constituting 54.84% and 58.06%, respectively. Marital status data indicates that a significant majority of both registered (85.81%) and unregistered (82.58%) farmers are married. When looking at educational attainment, the primary level achieved by most farmers in both groups is at the elementary level. This highlights a potential area for

educational support or training programs to enhance the skills and knowledge of farmers. Rice emerges as the predominant commodity for both registered and unregistered farmers, with a substantial percentage engaged in rice cultivation compared to other commodities like coconut and corn. In terms of income distribution, the data suggest that a considerable number of unregistered farmers report incomes of 15,001 and above, indicating a potential income disparity between the two groups. Understanding these demographic and socio-economic characteristics is crucial for tailoring targeted agricultural interventions and support services effectively. By leveraging these insights, programs can be designed to address the specific needs and challenges faced by farmers, whether in terms of educational support, income generation opportunities, or agricultural training, ensuring a more impactful and sustainable approach to rural development.

3.4. Data Analysis

Microsoft Excel and R Studio were utilized in the statistical analysis of the data. The study employed the frequency method, ranking, percentage techniques, empirical procedures, as well as econometric models, the logit regression and multivariate regression. Logit Regression is an econometric technique focused on establishing causal relationships between variables. It was utilized to uncover the connection between agricultural interventions and the multidimensional poverty index. Multivariate Regression, on the other hand, examines the effects of government agricultural interventions on the quality of life among registered upland farmers, utilizing continuous dependent variables. The dependent variables considered in this analysis are the quality of life and education levels of registered upland farmers, while the independent variable is the government's agricultural intervention.

Logit Model

$$y= \beta_0 + \beta_1 x\,1 + \beta_2\, x\,2 + \beta_3\, x\,3 + \beta_4\, x\,4 + \ldots\ldots \mu$$

(1) $$P_S = \beta_0 + \beta_1 \text{CASH} + \beta_2 \text{SD} + \beta_3\, \text{FERT} + \beta_4 \text{IR} + \beta_5 \text{FMR} + \beta_6 \text{MET} + \beta_7 \text{AGE} + \beta_8 \text{GEN} + \beta_{09} \text{MS} + \beta_{10} \text{HS} + \beta_{11} \text{AMI} + \beta_{12} HEA + \mu$$

(2) $$Educ = \beta_0 + \beta_1 \text{CASH} + \beta_2 \text{SD} + \beta_3 \text{FERT} + \beta_4 \text{IR} + \beta_5 \text{FMR} + \beta_6 \text{MET} + \beta_7 \text{AGE} + \beta_8 \text{GEN} + \beta_{09} \text{MS} + \beta_{10} \text{HS} + \beta_{11} \text{AMI} + \beta_{12} HEA + \mu$$

where:

P_S= Poverty status of the respondents

Educ= educational attainment of the household head

CASH= cash assistance received

SD = seeds received

FERT = fertilizer received by the respondents

IR = access to water irrigation system

FMR= access to farm-to-market road

MET= available machineries, tools, and equipment

AGE= age of the respondents

GEN = Gender of the respondents

MS = Marital status of the respondents

HEA= Highest educational attainment of the respondent

HS = Household size

AMI= Average monthly income

β_0 = Coefficient of constant

β_1 = The coefficient of the independent variable

μ= error term

Table 3

List of variables, sources and descriptions

Variables		VAR	Descriptions/ Definition	Prior Expectations
DEPENDENT VARIABLES	Quality of Life	P_S	This refers to the status of farmers based on their socio-economic status (Average Monthly Income and House Structure)	0 (Yes/Poor/HH Living below Poverty Threshold), 1 (No/Non-Poor/ HH Not Living below Poverty Threshold)
	Education	*Educ*	This is the status of household members in terms of education .	1 = Enrolled (member attending class) 0 = Not Enrolled (member not attending class)
INDEPENDENT VARIABLES	Cash Assistance	*CASH*	Cash received by the upland farmers	Positive (+)
	Seeds	*SD*	Upland farmers who received seeds	Positive (+)
	Fertilizer	*ERT*	Upland farmers who received fertilizer	Positive (+)

Variables		VAR	Descriptions/ Definition	Prior Expectations
INDEPENDENT VARIABLES	Irrigation	*IR*	Upland farmers who have an access to irrigation	Positive (+)
	Farm to Market Roads	*FMR*	With access to farm-to-market roads.	Positive (+)
	Machineries, Tools and Equipment	*MET*	Upland farmers who received farm machineries, tools and equipment	Positive (+)
	Age	*AGE*	This refers to the age of the respondent or farmers.	Age of the respondents
CONTROL VARIABLES	Gender	*GEN*	This refers to the gender of the respondent or farmers.	Gender of the Respondents 1= Male 2= Female
	Marital Status	*MS*	This refers to the marital status of the respondent or farmers.	Single, Married , Separated x Widowed
	Household Size	*HS*	This refers to the number of household member.	Number of household member
	Average Monthly Income	*AMI*	This refers to the average monthly income of the family or of the household.	Average Monthly Income of the Household
	Highest Educational Attainment	*HEA*	This refers to the highest educational attainment obtained by the respondent	None, Elementary Level, High School Level , College Level etc.

3.5. Ethical Considerations

Prior to commencing the research, ethical approval was obtained from the Partido State University. This approval ensures that the study adheres to ethical guidelines and safeguards the rights and well-being of the participants. All participants involved in the study were provided with detailed information about the research objectives, procedures, potential risks, and benefits. Informed consent forms were distributed, outlining the voluntary nature of participation and emphasizing the participants' right to withdraw from the study at any time without facing any consequences. Only those individuals who voluntarily agreed to participate and provided explicit consent were included in the study, ensuring that their participation was based on full understanding and autonomy. Maintaining the confidentiality of information obtained from participants was a paramount ethical consideration. All data collected during the study were treated with strict confidentiality to protect the privacy and anonymity of the

participants. Measures were implemented to ensure that individual responses and personal details were kept secure and accessible only to authorized research team members. Data were anonymized and aggregated wherever possible to prevent the identification of individual participants, further safeguarding their confidentiality and privacy throughout the research process.

4. Findings and Discussion

The role of agriculture in driving socio-economic advancement is undoubtedly substantial, particularly in the Philippine economic landscape. Through the application of various statistical analysis and Regression Discontinuity Design, this investigation examines the socio-economic status and poverty levels of local farmers concerning the agricultural support they have received. The results demonstrate that the provision of crucial resources like seeds, fertilizers, and financial aid notably boosts the agricultural yields of upland farmers. These enhancements not only lead to increased productivity but also play a pivotal role in ameliorating the overall financial circumstances of these farmers and their households. Each table offers a comprehensive analysis of significant aspects.

Table 4

Logistic Regression on poverty status of the upland farmers

Determinants	Coef.	Std. Err.	Z	P>z	95% Conf.	Interval
Age	-0.036	0.02	2.39	0.02	-0.07	-0.01
Gender	-0.51	0.28	-1.81	0.07	-1.06	0.04
Highest Educational Attainment	0.12	0.29	0.4	0.69	-0.45	0.69
Marital Status	-0.59	0.41	-1.43	0.15	-1.40	0.22
Other Source Of Income	-0.15	0.45	-0.34	0.74	-1.04	0.74
Monthly Salary	2.21	0.00	0.63	0.53	-4.6E	9.06E
No. of Household Members	-0.15	0.07	-2.11	0.04	-0.28	-0.01
No. of Years as a Farmer	-0.03	0.02	-1.75	0.08	-0.05	0.00
Total Land Area	-0.08	0.08	-0.95	0.34	-0.24	0.08
No. of Parcel	-1.04	0.33	-3.17	0.00	-1.68	-0.40
_cons	5.67	1.05	5.38	0	3.60	7.74

The results of the logistic regression analysis shed light on crucial factors influencing the poverty outcomes of upland farmers in the researched communities. Age emerges as a significant predictor, with older farmers likely contributing more to socio-economic development as they engage in economic activities. Conversely, the number of household members plays a pivotal role, with larger families facing increased poverty risks, particularly when members are not actively employed. Land ownership, indicated by the number of parcels, significantly impacts poverty status, suggesting that farmers with more land have a greater potential to escape poverty through increased cultivation capacity. Furthermore, the duration of farming experience correlates positively with improved livelihoods, emphasizing the value of expertise in agricultural practices for poverty alleviation. The statistical significance of these variables underscores their importance in determining farmers' poverty status. These findings not only enhance the understanding of the socio-economic dynamics affecting upland farmers but also highlight the need for targeted interventions that consider age, household size, land ownership, and farming experience. For government and other intervention providers, these results underscore the necessity of tailored approaches to address specific needs and circumstances, ultimately aiding in effective poverty reduction strategies. In alignment with the research objective of evaluating the impact of government agricultural interventions on poverty status in upland communities, these results provide actionable insights to inform future policies and interventions geared towards enhancing the socio-economic well-being of farmers in these regions.

Table 5

Multivariate Regression on LNYa (Yield after receiving the interventions)

Determinants	Coef.	Std. Err.	T	P>t	95% Conf.	Interval
Seeds	141.88	78.35	1.81	0.051	-12.30	296.06
Fertilizer	25.06	78.47	0.32	0.08	-129.36	179.48
Machineries & Equipment	-11.14	275.05	-0.04	0.09	-552.39	530.12
Cash	17.41	44.37	0.39	0.07	-69.89	104.72
Irrigation	43.88	67.35	1.21	0.06	-13.41	296.06
Livelihoods	11.88	48.35	1.04	0.08	-23.41	321.17
_cons	-166.81	21.67	-7.7	0	-209.45	-124.17

The results derived from the multivariate regression analysis in Table 5 offer crucial insights into the effectiveness of various interventions on agricultural yields following the

implementation of the intervention programs. The distribution of seeds appears to have a notably positive impact on farmers' yields, as evidenced by a significant coefficient of 141.8806 and a p-value of 0.051. This emphasizes the importance of providing high-quality seeds to farmers to enhance agricultural productivity. Furthermore, the presence of irrigation, with a coefficient of 43.8806 and a p-value of 0.057, demonstrates a positive influence on yields, highlighting the significance of adequate irrigation systems in improving crop growth and overall yield outcomes. Additionally, the distribution of cash, fertilizers, and agricultural equipment all exhibit positive impacts on yields, as indicated by their respective coefficients and p-values. Cash injections can facilitate essential investments, while fertilizers and equipment enhance farming efficiency and output. The inclusion of livelihood support, as indicated by a coefficient of 11.8806 and a p-value of 0.081, emerges as a crucial predictor of agricultural yields, underlining the importance of providing farmers with diversified livelihood options to boost overall productivity. These results collectively suggest that interventions such as seed distribution, irrigation enhancement, cash injections, provision of fertilizers, and access to machinery and equipment have a significant positive influence on agricultural yields. By recognizing these key factors that affect agricultural productivity, the study offers valuable insights for policymakers and intervention providers. Tailoring interventions to focus on these critical aspects can lead to heightened agricultural productivity and improved livelihoods for farmers, ultimately contributing to sustainable agricultural development and economic growth within the studied communities.

Table 6

Multivariate Regression on the effects of the intervention

Determinants	Coef.	Std. Err.	Z	P>z	95% Conf.	Interval
Seeds	1.60	0.60	2.67	0.01	0.42	2.77
Fertilizer	0.99	0.61	1.63	0.10	-0.19	2.18
Machineries & Equipment	0.13	0.30	0.42	0.69	-0.46	0.79
Cash	-0.21	0.40	-0.53	0.60	-1.00	0.58
Irrigation	0.22	0.30	0.38	0.59	-0.56	0.85
Livelihoods	0.23	0.28	0.43	0.48	-0.34	0.73
_cons	-1.00	0.18	-5.58	0	-1.35	-0.65

The results of the analysis in table 6 underscore the pivotal role of different factors in augmenting agricultural yields among farmers. Notably, the distribution of seeds emerges as a primary predictor, with a coefficient of 1.60 and a significant p-value of 0.01, indicating its substantial impact on yield increase. This underscores the critical importance of quality seed provision in enhancing crop productivity. Furthermore, factors such as fertilizer, machinery, tools and equipment, cash, and irrigation are also identified as key influencers in elevating agricultural yields. The strikingly low p-values of 0.000 associated with these variables highlight their significant predictive power in driving yield improvements in agriculture. These findings collectively emphasize the essential nature of various inputs and resources in bolstering agricultural productivity. By recognizing the significance of these factors, policymakers and stakeholders can craft tailored interventions and support strategies aimed at improving farmers' access to these vital resources, ultimately fostering enhanced yields and overall agricultural outcomes for the benefit of farming communities.

Table 7

Result of the multivariate regression in the paid workers

Determinants	Coef.	Std. Err.	T	P>t	95% Conf.	Interval
Seeds	1.15	1.00	1.15	0.25	-0.82	3.12
Fertilizer	-0.59	1.00	-0.59	0.56	-2.56	1.38
Machineries & Equipment	4.88	3.51	1.39	0.17	-2.04	11.79
Cash	0.70	0.57	1.23	0.22	-0.42	1.81
Irrigation	-2.52	4.92	0	1	-9.69	9.69
Livelihoods	0.73	0.63	1.24	0.30	-0.43	1.92
_cons	3.86	0.28	13.97	0	3.32	4.41

Table 7 shows the result of the Multivariate Regression in the paid workers. According to the results, among registered and unregistered upland farmers, government agricultural intervention was significant as an overall model with a significance level of 5%. However, there was no specific determinant showing effect on the payment to workers. The government efforts in farming are important for both registered and unregistered farmers in the uplands. This means that these interventions have a noticeable impact on how farming is done in these areas. However, when it comes to paying workers, the study did not find any specific reasons or factors that clearly affect how much workers are paid. This suggests that the reasons behind

worker payment in these farming communities are likely influenced by many different things that were not looked at in this study. This shows that paying workers in farming is more complicated and involves many factors that were not considered in this research. To better understand and improve how workers are paid in these areas, further investigation into these factors is needed. This can help policymakers and others make better decisions to improve how workers are compensated and ultimately their lives in these farming communities.

Table 8

Result of the multivariate regression on the expenses of farmers

Determinants	Coef.	Std. Err.	T	P>t	95% Conf.	Interval
Seeds	26.67	36.60	0.73	0.47	-45.35	98.69
Fertilizer	4.79	36.66	0.13	0.90	-67.34	76.92
Machineries & Equipment	-0.80	128.48	-0.01	0.10	-253.62	252.03
Cash	3.27	20.72	0.16	0.88	-37.51	44.05
Irrigation	-3.80	180.11	0	1	-354.41	354.41
Livelihoods	0.60	0.47	1.13	0.12	-0.32	1.92
_cons	-22.77	10.12	-2.25	0.03	-42.69	-2.85

The findings presented in table 8, derived from the multivariate regression analysis on farmers' expenses, reveal interesting insights. While the model overall is considered significant, the specific variables examined in the study do not appear to have a direct impact on farmers' expenses. This implies that the factors under consideration in the analysis do not individually influence the expenses incurred by upland farmers. Interestingly, the overall model and the variables related to the expenses of upland farmers did not demonstrate a significant relationship. However, an underlying constant variable seems to play a role in affecting farmers' expenses. This suggests that there might be an underlying, unexplored factor that consistently influences farmers' expenditures in these settings. Moreover, the analysis indicates that there is a correlation between the level of expenses and its impact on the overall outcome. The more expenses that farmers incur, the greater the effect on the final results or outcomes they experience. This highlights the importance of understanding and managing expenses effectively, as they can significantly influence the overall performance and outcomes in agricultural practices.

Table 9

Result on the Tobit Regression on LNEX (expenses)

Determinants	Coef.	Std. Err.	t	P>t	95% Conf.	Interval
Seeds	0.54	0.39	1.4	0.16	-0.22	1.30
Fertilizer	0.09	0.39	0.23	0.81	-0.67	0.85
Machineries & Equipment	1.53	1.35	1.13	0.26	-1.13	4.19
Cash	3.27	20.72	0.16	0.88	-37.51	44.05
Irrigation	-3.80	180.11	0	1	-354.42	354.41
Livelihoods	0.60	0.47	1.13	0.12	-0.32	1.92
_cons	8.81	0.11	82.63	0	8.60	9.02
/sigma	1.34	0.05			1.23	1.45

The Tobit Regression analysis conducted on the natural logarithm of expenses reveals detailed insights into the determinants affecting farmers' expenditures. Among the examined factors, seeds exhibit a coefficient of 0.54 with a standard error of 0.39, showing no statistically significant impact with a t-value of 1.4 and a p-value of 0.16. Similarly, fertilizer's coefficient of 0.09, standard error of 0.39, t-value of 0.23, and p-value of 0.81 suggest that it does not significantly influence expenses. Machineries & equipment, with a coefficient of 1.53 and a standard error of 1.35, also fails to reach statistical significance with a t-value of 1.13 and a p-value of 0.26. Cash, displaying a coefficient of 3.27 and a high standard error of 20.72, lacks statistical significance with a t-value of 0.16 and a p-value of 0.88. Irrigation, despite a coefficient of -3.80, is statistically insignificant with a t-value of 0 and a p-value of 1 due to a substantial standard error of 180.11. Livelihoods, with a coefficient of 0.60 and a standard error of 0.47, also falls short of statistical significance with a t-value of 1.13 and a p-value of 0.12. Notably, the constant term holds significant influence on expenses, with a coefficient of 8.81, a low standard error of 0.11, a high t-value of 82.63, and a p-value of 0. Moreover, the standard deviation of the error term is 1.34 with a standard error of 0.05, emphasizing the variability in predicting expenses. These results collectively highlight the intricate nature of expense determinants in farming, suggesting the presence of unexplored variables that play a crucial role in shaping farmers' spending behaviors.

Table 10 shows the Tobit Regression analysis on the natural logarithm of yield (yield), providing valuable insights into the determinants influencing agricultural productivity.

Table 10

Result of the Tobit Regression on LNYa (yield)

Determinants	Coef.	Std. Err.	t	P>t	95% Conf.	Interval
Seeds	0.89	0.68	1.32	0.18	-0.44	2.23
Fertilizer	-0.29	0.68	-0.43	0.67	-1.62	1.04
Machineries & Equipment	1.43	2.37	0.6	0.55	-3.25	6.10
Cash	0.82	0.38	2.14	0.03	0.07	1.58
Irrigation	0.98	0.59	1.42	0.19	-0.45	2.27
Livelihoods	0.72	0.24	1.36	0.37	0.08	1.66
_cons	3.56	0.19	18.73	0	3.18	3.93
/sigma	2.35	0.10	0	0	2.15	2.55

Among the factors examined, seeds demonstrate a coefficient of 0.89 with a standard error of 0.68, indicating a non-significant effect with a t-value of 1.32 and a p-value of 0.18. Fertilizer, with a coefficient of -0.29 and a standard error of 0.68, also lacks statistical significance, as evidenced by a t-value of -0.43 and a p-value of 0.67. Machineries and equipment show a coefficient of 1.43 and a standard error of 2.37, suggesting no significant impact with a t-value of 0.6 and a p-value of 0.55. Cash, on the other hand, displays a coefficient of 0.82 with a standard error of 0.38, indicating a significant positive effect on yield with a t-value of 2.14 and a p-value of 0.03. Irrigation, with a coefficient of 0.98 and a standard error of 0.59, shows no significant impact on yield, as reflected in the t-value of 1.42 and the p-value of 0.19. Livelihoods exhibit a coefficient of 0.72 and a standard error of 0.24, suggesting a non-significant effect on yield with a t-value of 1.36 and a p-value of 0.37. The intercept term (_cons_) holds substantial importance, with a coefficient of 3.56 and a low standard error of 0.19, yielding a high t-value of 18.73 and a p-value of 0. The standard deviation of the error term is 2.35 with a standard error of 0.10, highlighting the variability in predicting yield. While factors like seeds, fertilizer, and machineries & equipment do not significantly impact yield, cash emerges as a significant determinant, emphasizing the importance of financial resources in enhancing agricultural productivity.

The results of the Logistic Regression analysis on house structure reveal important insights into the impact of government agricultural intervention on the housing conditions of upland farmers as shown in table 11.

Table 11

Result of the Logistic Regression of house structure

Determinants	Coef.	Std. Err.	z	P>z	95% Conf.	Interval
Seeds	0.25	0.64	0.39	0.69	-0.99	1.49
Fertilizer	0.55	0.64	0.85	0.39	-0.71	1.80
Cash	0.44	0.41	1.06	0.28	-0.37	1.24
_cons	0.41	0.16	2.49	0.01	0.09	0.72

The coefficients for the determinants show that seeds have a coefficient of 0.25 with a standard error of 0.64, indicating a non-significant effect with a z-value of 0.39 and a p-value of 0.69. Fertilizer, with a coefficient of 0.55 and a standard error of 0.64, also shows no significant impact with a z-value of 0.85 and a p-value of 0.39. Cash demonstrates a coefficient of 0.44 with a standard error of 0.41, suggesting a non-significant effect on house structure with a z-value of 1.06 and a p-value of 0.28. The intercept term (cons) holds particular importance, with a coefficient of 0.41 and a standard error of 0.16, resulting in a z-value of 2.49 and a significant p-value of 0.01. The logistic regression model indicates that government agricultural intervention has a significant effect on the housing condition of upland farmers overall, with a significance level of 5%. This suggests that the interventions implemented by the government have influenced the housing conditions of the farmers. However, the exact nature and specifics of the interventions that have the most impact remain unclear, indicating that further investigation or analysis may be needed to understand the specific interventions that are driving these effects on house structure in the studied population.

Table 12

Regression analysis on poverty status and agricultural interventions

Source	SS	df	MS	Number of obs	=	155
				F(2, 152)	=	101.21
Model	22.12	2	11.05	Prob > F	=	0
Residual	16.60	152	0.12	R-squared	=	0.57
				Adj R-squared	=	0.57
Total	38.71	154	0.25	Root MSE	=	0.33

Poverty Status	Coef.	Std. Err.	t	P>t	95% Conf.	Interval
watts_index_left	-0.52	0.08	-6.43	0	-0.68	-0.36
watts_index_right	-0.60	0.07	-9.18	0	-0.73	-0.47
Eligible	-0.42	0.06	-8.86	0	-0.75	-0.51
_cons	0.56	0.04	14.02	0	0.49	0.64

At the poverty index, a discontinuity can be observed from point delta to point omicron. The fit of the registered group was at a higher level compared to the fit of the unregistered group. The distance between these levels reflects the discontinuity, which can be interpreted as follows: for those eligible to receive the program or part of the treatment group, both yield and quality of life will increase. This increase can be measured through the regression model shown in table 12. The overall model was significant, and all p-values were also significant. The coefficient for eligibility was -0.41613, indicating that a unit increase in eligibility (or when those farmers become eligible for the program), the yield or quality of life will decrease by -0.41613. Since households on both the left and right sides of the cut-off line have similar attributes and characteristics, the difference in quality of life and number of yields between farmers on these sides can be attributed to eligibility. The left side was eligible to receive or become beneficiaries of the program, while the right side was not. Table 12 presents the local average treatment effects on eligibility, with a coefficient of -0.41613, a standard error of 0.064, and a t-value of -8.86. In the vicinity of the eligibility cutoff, where the treatment and control groups exhibit similarity, the regression discontinuity design provides estimates of the Local Average Treatment Effect (LATE). The degree of similarity between households on the left and right sides of the cutoff line can be inferred by how close the estimate is to the 58-index. Regression discontinuity analysis evaluates the impact on the treatment and comparison groups around the 58-index. Consequently, LATE is not suitable for assessing individuals who are far from the 58-index. When the characteristics of participants on the left and right sides of the 58-index are not comparable, the LATE estimate lacks the ability to validate measurements accurately. This underscores the importance of ensuring similarity between groups in regression discontinuity designs to reliably gauge the treatment effects.

5. Conclusion

This study concludes that the distribution of seeds, fertilizers and cash assistance to the upland farmers can improve the overall outputs of the farmers. The study proved that government agricultural interventions had a positive and significant impact on the lives of the upland farmers in Goa, Camarines Sur. This in turn had a positive impact in alleviating poverty and improving the quality of life of the local farmers. Hence, irrigation and farm-to-market

road need to be considered and prioritized by the government to ensure increased in production output.

Several limitations need consideration for interpreting the findings and guiding further research. Firstly, establishing causality between government interventions and improved agricultural outputs is complex, although the paper used rigorous experimental designs for stronger causal claims, additional locale relative to the vicinity of the study's locale must be examined. Additionally, the study's context-specific results may lack generalizability to regions with different agricultural practices and socio-economic conditions, emphasizing the importance of replication in diverse settings. Thus, implementing the same methods to other regions is prescribed. Measurement and data limitations, such as biases in self-reported impacts and data reliability, could be addressed through secondary data utilization. Long-term sustainability and durability of observed benefits warrant investigation, as short-term outcomes may not capture lasting impacts. Unaccounted variables, like imputed costs, should be considered for a more comprehensive understanding of intervention effectiveness. For future research, examining the sustainability of benefits over time, exploring differential impacts on farmer subgroups, assessing cost-effectiveness of interventions, and analyzing broader social and economic implications of scaling successful interventions are recommended. By addressing these limitations and pursuing comprehensive research paths, policymakers can make informed decisions to design effective interventions supporting upland farmers, alleviating poverty, and promoting sustainable agricultural development.

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Appendices

Appendix A

The government interventions received by the farmers

Interventions	F	%	Rank
Seeds	151	97.42	1
Fertilizer	142	91.62	2
Cash Assistance	59	38.06	3

Appendix B

Sources of the government interventions received

Name of Agency	F	%	Rank
Municipal Agriculture Office	155	100	1
Provincial Government	57	36.77	2

Appendix C

Benefits of farming on the farmers

Benefits of Farming	Registered Farmers			Unregistered Farmers		
	F	%	Rank	F	%	Rank
Fixed/build their own house	95	61.29	3	66	42.58	3
Own consumption	141	90.97	1	146	94.19	1
Purchase farm tools	26	16.77	4	5	3.23	6
Buy own land/ property	2	1.29	7	12	7.74	5
Additional help on Business	6	3.87	6	16	10.32	4
Buy own transportation	6	3.87	6	0	0	0
Payment for debt	106	69.39	2	77	49.68	2
Additional budget on education	20	12.90	5	3	1.74	7

Appendix D

Type of irrigation in selected upland barangay of Goa, Camarines Sur

Irrigation Type	Registered Farmers			Unregistered Farmers		
	F	%	Rank	F	%	Rank
Fully Irrigated	2	1.29	4	0	0	0
Partially Irrigated	1	0.65	5	3	1.94	3
Communal Irrigation	8	5.16	3	1	0.65	4
Rainfed	105	67.74	1	92	59.35	1
Burabod	39	25.16	2	59	38.06	2
TOTAL	**155**	**100%**		**155**	**100 %**	

Appendix E

House structure of the farmers

House Structure		Registered Farmers			Unregistered Farmers		
		F	%	Rank	F	%	Rank
Roof	Nipa / Anahaw	29	18.71	2	57	36.78	2
	Galvanized Iron	124	80	1	91	58.71	1
	Concrete (Top)	2	1.29	3	7	4.52	3
Wall	Concrete	94	60.64	1	55	35.49	1
	Half Wood, Half Concrete	48	30.97	2	48	30.97	3
	Wood	12	7.74	3	50	32.26	2
	Bamboo	1	0.65	4	2	1.29	4
Floor	Concrete	147	94.84	1	144	92.90	1
	Earth, Sand	5	2.23	2	8	5.16	2
	Half Concrete , Half Sand	3	1.94	3	3	1.94	3