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Development And Technology Dissemination Of Gender-Friendly Farm Machinery In Selected Agricultural Agencies In The Philippines

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Abstract

This study describes the gender sensitivity principles to be applied in the development of gender-friendly farm machinery. The study was conducted in selected agricultural agencies such as the Philippine Center for Postharvest Development and Mechanization (PhilMech), Philippine Sino-Center for Agricultural Technology (PhilSCAT) at Science City of Muñoz, Nueva Ecija, and Philippine Rice Research Institute (PhilRice) at Maligaya, Science City of Muñoz, Nueva Ecija. Furthermore, to assess the opinion of the end users of the agricultural machinery, the study was conducted on endorsed areas that adopted these technologies. The result shows that the engineers of PhilMech, PhilSCAT, and PhilRice have seldom exposure to gender-related topics, and some exhibits unfamiliarity with other terminologies used. The engineers' sex, age, and civil status were revealed to be significant in their exposure to gender-related topics. Generally, men farmers are more exposed to the identified agricultural machinery than women farmers who remain uninformed about controlling agricultural machinery. Today, women farmers are hindered by information and equipment accessibility. Gender disparity in the agricultural sector remains a problem but farmers agreed that there must be machinery that can be easily manipulated by women which is push-button, lightweight, height considerate, easy to fix, riding type, and economically affordable.

Keywords: gender, sensitivity, role, exposure, development, friendly, farm machinery

Introduction

In 2012, Global Food Report, produced by the International Food and Policy Research Institute (IFPRI) and published last 2018, recognizes the high level of attention attributed to gender– and the importance of gender equality for the promotion of agricultural growth and food security. It cites increases in funding and focuses on gender issues from international entities such as the Consultative Group for International Agricultural Research (CGIAR), the World Bank, Food and Agriculture Organization (FAO), Bill & Melinda Gates Foundation, and US Agency for International Development (USAID). But the report also stresses that the time has come to move from attention to action.

According to CGIAR (2013), that action means finding ways to close the

gender gap in access to agricultural resources, education, extension, and financial services. It includes investing in labor-saving and productivity-enhancing technologies and infrastructure to free women's time for more productive activities. This specifies the rights of women to facilitate their participation in rural labor markets and market value chains.

At present time, farming technologies developed by mechanical and agricultural industries are designed just to address the needs for farm mechanization not minding whether farmers who will be using it can operate and handle its characteristics. Farming technologies has distinctly huge and heavy enough to operate limiting their function for the patriarchal domain. In developing countries where the natural capital lies in agriculture, all delegates are shouldering the responsibility of fast production in agriculture to meet the needs of the world.

Women play an essential role in agriculture and development but have not been put into consideration in the development of farming technologies. Farming technologies developed can only accommodate dominant strength where patriarchy has only to operate. From these issues, women in the agricultural sector are limited in their rights to contribute to the expansion of agricultural development.

Several agricultural agencies attached to the Department of Agriculture like the Philippine Center for Postharvest Development and Mechanization (PhilMech) have been developing gender-friendly farming technologies to improve the means of agricultural practices designed to address issues of gender disparity on the field such as developing technology like brown rice huller, soybean grinder, a compact corn mill and a lot more.

The Department of Agriculture-PhilMech are also involved in the Gender and Development process where they shall design and promote the commercial use of improved postharvest processing facilities and equipment of selected commercial crops among women and men, farmer groups, processors, and small-holder entrepreneurs to reduce postharvest losses and increase income derived from value-added processing operation (MCW, IRR,).

There is a need to incorporate gender communication in the development of gender-friendly farm machinery technologies to help engineers from the agricultural sector observe gender sensitivity and consider the strength not only of men but of women in the agricultural sector as they both played an essential role in agricultural development and should have been receiving equal treatment as workers for good farming production.

Objectives of the Study

Generally, this study identified the development of gender-friendly farm machinery, accessibility and utilization of farm machinery for all farmers, and equitable decentralization of responsibilities in the workplace.

Specifically, this study was undertaken with the following objective:

1. To determine the socio-demographic profile of the engineers who are involved in the development of gender-friendly farm machinery and farmers as the end users of these machines.

2. To determine the gender sensitivity exposure of the engineer respondents towards developing gender-friendly technology.

3. To determine the gender role of engineers in conceptualizing, designing, and

constructing farm machinery and technology dissemination.

4. To identify the relationship between the sociodemographic profile of the engineer
respondents and its gender sensitivity exposure.

5. To analyze the relationship between the sociodemographic profile of the engineers to the enumerated gender-related topics

6. To determine the user accessibility and utilization of farm machinery technologies.

7. To identify gender-related problems encountered by the farmer users (both men and women) that affect the equitable accessibility and utilization of farm machinery.

8. To enumerate the characteristic of gender-friendly machines according to farmers' opinions.

Scope and Limitations of the Study

The study included three selected national headquarters in the Philippines which are located near CLSU under the Department of Agriculture namely the Philippine Center for Postharvest and Development Mechanization (PhilMech), Philippine Sino-Center for Agricultural Technology (PhilSCAT), and Philippine Rice Research Institute (PhilRice). The study included the engineering and mechanization division of each headquarters which are responsible for developing machinery which was participated by all engineers, researchers, technology developers, and users per headquarters. This was extended to the participation of men and women farmers in the agricultural sector who are working with these selected agricultural agencies.

Results and Discussions

Sociodemographic characteristics of Engineer and Farmer Respondents

Sex

In the line of defining the first objective of this study which primarily involves the engineers as respondents who made gender-friendly farm technology/machinery possible to enhance the means of agricultural productivity, data shows that 56.67% of the respondents are male engineers while 43.33% of the respondents are female engineers. The numerical interval of engineers' sex representation manifests the active involvement of both sexes to the engineering profession.

On the other hand, 70% of the farmers from the total respondents were identified as male and 30% were female. It can be seen that with the vast agricultural land we have, there are only a few female farmers who are involved in the agricultural practices and most of these agricultural functions were performed by men.

Age

In terms of age, 53.33% of the total engineer respondents are from ages 22-31 years old, 33.33% of the respondents were from ages 32-41 years old, and 13.33% ages from 42-50 years old. The findings show that majority of the engineer respondents involved in the development of gender-friendly farm machinery/technology were younger than those engineers ages 32-50 years old.

The average age of farmer respondents based on the data collected is approximately 47 years old which ranges from 19-58 years old. Most of the farmers involved which correspond to 70% of the total respondents are from ages 45-58,

23.33% of the respondents are from ages 32-44 years, and 6.67% of the respondents are from ages 19-31 years old. The result shows that majority of the farmers are from ages 32-58 years old and there were fewer young farmers involved in the study.

Civil Status

On the other hand, 56.67% of the engineers were identified as single and 43.33% of them are married. Farmer respondents also show that 73.33% are married, and farmers with single and widow status show similar numbers in the study with 10% of the total respondents and there were 6.67% of the total respondents who were identified as separated. It can be seen from the result that most of the farmers involved in the study are married and fewer farmers are single.

Religion

70% of the engineer respondents claimed to be Roman Catholic while 30% of these respondents are classified into different denominations such as Born Again Christian, Iglesia ni Cristo, Jehova's Witnesses, Bible Baptist, and Mormons.

To describe the religious denomination where farmers belong, the result shows that 76.67% of total respondents were identified as Roman Catholic, others with 20% were identified as Iglesia ni Cristo and Born Again Christian, and 3% of the respondents were not a member of any religious organization.

Educational Background

In terms of describing the engineer respondents' educational background, 83.33% of the respondents are tertiary graduates and 16.67% have earned advanced studies such as master's and doctorate. 90% of these respondents specialized in Agricultural Engineering while 10% of the respondents are Mechanical Engineers and Electrical Engineers.

The result implies that the majority of the engineer respondents are vertically practicing the development of machinery, particularly in addressing needs in agriculture while the minority of the engineer respondents are aligned on the practice of mechanical and electrical engineering functions in developing machinery. Also, the result indicates good collaboration of engineers to further improve the development of agricultural machinery.

In assessing the educational background of the farmers, the result shows that the majority of the respondents 56.67% have attained secondary education, 16.67% have earned their tertiary education, 13.33% of the respondents have earned their vocational education, and 13.33% of the respondents have at least attained primary education. It can be implied that the majority of the farmers have at least attained secondary, tertiary, and vocational education which gives them more educational and training experiences.

Working Years

Working experience is considered to be potentially relevant in describing how exposed the respondents are to the job identified in this study.

The estimated average working years of engineers involved in the development of gender-friendly farm machinery/technologies is 6 years which ranges from 6 months to 24 years. The shortest length of service among engineer

respondents is 6 months and the one with the longest service is 26 years. The result shows that the majority of the engineers 86.67% are in service for 6 months to 13.9 years and 13.33% are working as engineers for 14 to 26 years. It can be implied that there were more younger respondents with 14 years of service as engineers who are involved in the development of gender-friendly farm machinery than those engineers who are in engineering works with more than 14 years of service.

On the other hand, farmer respondents have shown long years of farming experience where the average working years of the respondents is approximately 18 years which ranges from 19-58 years. The majority (50%) of the respondents were identified to be farmers for 1-13.9 years, 33% of the total respondents were identified to be farmers for 27-42 years, and 16.67% of the total respondents were farmers for 14-26.9 years. It can be implied from the results drawn that 50% of the farmers were farmers 14-42 years-enough to say that they have been exposed to agricultural practices for long years.

Table 1. Socio-demographic profile of the engineers and farmers

PROFILE	ENGINEERS		FARMERS	
	Frequency	%	Frequency	%
Sex				
Male	17	56.67	21	70.00
Female	13	43.33	9	30.00
Age				
19-31	16	53.33	2	6.67
32-44	10	33.33	7	23.33
45-58	4	13.33	21	70.00
Civil Status				
Single	17	56.67	3	10.00
Married	13	43.33	22	73.33
Separated			2	6.67
Widow			3	10.00
Religion				
Roman Catholic	21	70.00	23	76.67
Others	9	30.00	6	20.00
Highest Educational Attainment				
Primary			4	13.33
Secondary			17	56.67
Tertiary	25	83.33	5	16.67
Advanced Studies	5	16.67	4	13.63
Specialization				
BSAgEn	27	90.00		
Others	3	10.00		

Engineers' Exposure to Gender-Related Topics

Since most of the respondents from the engineering sector are generally represented by male engineers it can be seen from data interpreted that many of the engineers who are male are more exposed to gender-related topics which according to one of the respondents, male engineers are more likely to be hired in the agency and later the female; and most of the higher positions are assumed by male engineers.

Gender-related topics are concerned about gender considerations identified in the workplace, especially in the field of engineering and these concerns are encountered and addressed by the agencies.

Based on the data collected, male engineers have seldom exposure to topics like problems encountered about gender disparity with a mean of 2.19 since they believed that their office has treated all their employees equally without gender stratification and that everyone is expected to perform a task which is relevant to their department's function regardless of their gender preference. In extension, the table shows that topics for engineers' participation in gender-related campaigns and community extension with a mean of 2.25 and community extension program for gender gaps in the agricultural sector with a mean of 2.37 are not that active with seldom exposure since most of their field works were done in their agency hall. With this, engineers from these selected agencies only cater to community extension or field practice of mechanical equipment but have never emphasized gender-related campaigns which is relevant in agricultural practices since the concern focuses only on agricultural productivity alone. During seminar or field demonstration, engineers from PhilMech makes sure that the actual testing of the machinery will be operated by male and female participants in equal number but generally, this was never been practiced in the agricultural site since most of those who are operating are male operators.

Data interpreted also shows that engineers have seldom exposure to topics like Gender Laws and Policies with a mean of 2.44, Sex Segregated Careers with a mean of 2.18, and Gender Sensitive and Gender Biased Language with a mean of 2.37. These topics are generally taken from gender sensitivity seminars or symposiums and principles learned from these events may be applied in drafting engineering proposals.

In the Philippines, gender sensitivity is a concern that the government wants to address and with that agencies under it are developing programs and events that will surely involve all the people within their domain, and one way to materialize it is to implement programs and raise awareness to offices that need it most. Based on the data collected, engineers from selected engineering agencies are often exposed to seminars and training on gender sensitivity with a mean of 2.87 which focuses on principles and rights of both sexes and gender, especially in the workplace.

Some seminars were extracted into different topics focusing specifically on gender-related problems that are uncontrollably happening. It can be seen from the table above that male engineer respondents were often exposed to topics like Gender Division of Labor in Workplace with a mean of 2.75, Physical and Mental Strength differences of Opposite Sexes with a mean of 2.75, and Gender Sensitive Model in Developing Gender Friendly Farm Machineries with a mean of 2.81. According to an Engineer Scientist from PhilRice that they usually encounter gender-sensitive

models and sometimes apply them when developing new machinery but the disadvantage thing is it contradicts the economical aspect of the machine and may appear more expensive and that could be inequitable for others.

It can be implied from the data above that most of the male engineer respondents have exposure to gender-related topics but are not that active in involving themselves in gender campaigns which could strengthen engineering practices. Problems would likely happen if engineers don't know how to identify problems of gender disparity, associating gender concerns to agricultural practices, gender laws, and policies, sex-segregated career issues, gender-biased language, and in narrowing gender gaps among workers in the agricultural sector.

Women are the subordinated members of society and they are vulnerable to different kinds of inequality and which might be opportunities, accessibility of resources, education, financial control, and even in deciding for themselves.

Data shows that female engineers do not have exposure to topics like Sex Segregated Careers which records a mean of 1.62 and Gender Division of labor with a mean of 1.69. These topics emphasize how opportunities are distributed to all workers and who among the workers are prioritized and who are not. It can be implied from the data interpreted that women are not aware of the problems of how careers are segregated and the equal distribution of labor which causes them to be misinformed about whether they are left behind or subjected to inequalities.

On the other hand, female engineers have seldom exposure to eight topics like seminars and training on gender sensitivity with a mean of 2.08, problems encountered about gender disparity with a mean of 2.00, participating in campaigns and community extension with a mean of 1.85, discussion on gender laws and policies with a mean of 1.77, gender-sensitive and biased language with a mean of 1.77, physical and mental strength differences of opposite sexes with a mean of 2.08, gender-sensitive model in developing gender friendly farm machinery with a mean of 2.15, and community extension program for gender gaps in the agricultural sector with a mean of 2.08.

In general, the table shows that all engineers from selected agricultural agencies have seldom exposure to gender-related topics where male engineers have a mean of 2.46 and female engineers with a mean of 1.91. It can be implied based on the results that, male engineers from selected agricultural agencies have more exposure to gender-related topics or issues than female engineers although revealed to have the same level of exposure only because women are familiar with the topics but male engineers are more familiar and exposed about principles and issues.

Table 2. Exposure of engineers to gender-related topics before developing farm machinery classified according to sex

GENDER-RELATED TOPICS	MALE		FEMALE	
	Mean	Interpretation	Mean	Interpretation
Attending seminars and training on gender sensitivity	2.87	Often	2.08	Seldom

Problems encountered about gender disparity	2.19	Seldom	2.00	Seldom
Participating in gender-related campaigns and community extension	2.25	Seldom	1.85	Seldom
Discussion on gender laws and policies	2.44	Seldom	1.77	Seldom
Topics about sex-segregated careers	2.18	Seldom	1.62	Never
Gender-sensitive and gender-biased language	2.37	Seldom	1.77	Seldom
Gender division of labor in the workplace	2.75	Often	1.69	Never
Physical and mental strength differences of opposite sexes	2.75	Often	2.08	Seldom
Gender-sensitive model in developing gender-friendly farm machinery	2.81	Often	2.15	Seldom
Community extension program for gender gaps in the agricultural sector	2.37	Seldom	2.08	Seldom
OVERALL MEAN	**2.46**	**Seldom**	**1.91**	**Seldom**

Note: 1-1.74 "Never", 1.75-2.49 "Seldom", 2.50-3.24 "Often", 3.25-4 "Always"

Engineers' opinions on who must perform different engineering responsibilities

Based on the data presented in the table, the researcher has identified 15 common responsibilities of an engineer upon performing their functions as developers of machines for the agricultural sector. 80% of the engineers believed that both men and women can carry out production, inspection, packaging, and machine operation duties. Simply because they claimed that both genders have similar backgrounds in engineering during their college days and both are trained in all functions to contribute to the fast development of engineering projects. On the other hand, 20% of the engineers claimed that women cannot carry out these functions and should be limited to paper works alone.

On the second engineering function, 63.33% of the engineer respondents claimed that both male and female engineers are capable of setting up machinery and ensuring all materials are readily available. Many of the respondents who supported this claim have expressed that their office counts no sex qualification for the job and gives the function to those who are more trained and capable to do so. The 33.33% of engineer respondents believed that this function is mainly delegated to male engineers since this function involves expertise in machine operation and its technicalities upon using the machine in the field since it has hard to operate keys and requires more strength. The remaining 3.33% of the respondents claimed that female engineers should be delegated for this kind of function to utilize their strength and optimize their ability to set up farm machinery and secure other materials for the operation.

Monitoring everything in the research laboratory is an attitude that is highly observed by engineers where 93.33% of the respondents agreed that both male and female engineers can effectively monitor production equipment since everybody knows how to secure all the equipment needed. 3.33% of the total respondents assumed that male engineers can perform it alone and 3.33% of the respondents believed that women can do it by themselves.

Intellectual and physical assistance is also important to help that every engineer needs upon developing farm machinery. 86.67% of the engineer respondents answered that both males and females can both perform or assist shop technicians and materials clerks as necessary. The 10% of the engineer respondents claimed that it should be delegated to women as their technical job and the remaining 3.33% of the engineer respondents agreed to be the male engineer's job.

An organized and clean environment to perform engineering duties is an important influence to develop a quality invention and materializing this function 93.33% of the engineer respondents that both male and female engineers can do it and be best done by involving everyone in the organization of the workplace since all are responsible in initiating responses on the needs of the laboratory. The 6.67% of the engineer respondents believed that this organization in maintaining a safe and clean workplace must be performed by a female since they can organize things and put everything in good condition.

Engineering functions cannot be completely exercised if no one knows the standard operating procedure. 96.67% of the engineer respondents claimed that all engineers must follow established safety rules and regulations to assure security for all and so that failures will be easily identified and measures will be eventually applied to avoid accidents or uncontrollable circumstances that trigger the security of the people around. Regardless of gender. Everyone in the engineering field must be knowledgeable and apply the standards to everyone's safety. 3.33% of the respondents expressed a different claim that women must the ones who will follow the established safety rules and regulations since most of the female engineers in their offices are new and must practice this standard.

Technical designing of machinery with the use of digital format or software is an important tool to assure quality, especially on the specifications of machinery, and having a proficient skill for this function must be present to all engineers. The majority or 100% of the engineer respondents agreed that all engineers are expected to design agricultural machinery components and equipment, using computer-aided design (CAD) technology. Designing machinery in digital format gives an avenue for engineers to integrate the parts that should be secured with good keys and a way to revise the design when some parts are incompatible with the weight of the objects being used. This function is not a gender-dependent function but is extended to the ability of the engineer regardless of gender to design and packaging machinery with technical expertise respectively.

A proposal of design and organization is as important when explaining the purpose of a newly developed idea. Most of the engineers or 93.33% of the respondents answered that designing presentations and results organization for machinery must be done by all engineers since this talks about the intellectual capacity to look forward to what is needed in the agricultural sector and engineers are encouraged to contribute for

this plans addressing the problems in food sufficiency. The remaining 6.67% of the engineer respondents expressed that this function must be given or must be performed by female engineers since they have the skill to organize paper works and have patience in the comprehensive preparation of this function.

Other functions in designing such as designing structures to store and process crops claimed by 93.33% of the engineer respondents must be both performed by male and female engineers and 6.67% of them classified this job as male designed function. The 93.33% of the engineer respondents claimed that discussing plans with clients, contractors, consultants, and other engineers so that the plans can be evaluated and any necessary changes made must be done for both male and female engineers since this assesses the ability of the engineers to extend the reach of the machinery to the public until it reaches commercialization. On the other hand, 3.33% of the engineer respondents claimed that this will be performed by male engineers and the other 3.33% claimed to be the function of female engineers since this talks about commercializing or mainstreaming the machinery. Design housing and environment to maximize animals' comfort, health, and productivity according to 93.33% of the respondents must be performed by both male and female engineers while 6.67% of the engineers agreed to be performed by male engineers alone. Another designing function such as designing and supervising land reclamation projects in agriculture and related industries according to 93.33% of the engineer respondents is performed by male and female engineers, 3.33% of the respondents claimed to be the job male engineers, and the other 3.33% of the respondents claimed to be performed by female engineers.

When talking about testing the performance of the developed machinery, many viewed this as functions that should be delegated to those with optimal strength but the result shows that 73.33% of the engineer respondents believed that both male and female engineers must be delegated and perform in testing agricultural machinery and equipment to ensure that they perform properly. Since proposals for farm machinery are not limited to gender basis, all engineers who can submit proposals are held responsible from the proposal up to the testing of machinery. 26.67% of the respondents claimed that this function must be performed by male engineers for some parts are hard to operate and has required physical strength.

In terms of modifying engineering functions to designing specific gender-friendly farm machinery, 93.33% of engineer respondents believed that designing food-processing parts and supervising manufacturing operations must be performed by both male and female engineers and 6.67% of the respondents claimed that this must be performed by men alone.

To go deeper with the functions of the engineering sector to improve agricultural practices, 83.33% of the engineer respondents that planning and direct construction of rural electric-power distribution systems must be performed by both male and female engineers and the other 16.67% of the engineer respondents must be performed by male alone believing that direct construction and installation of electric materials are dangerous for female engineers to delegate it to someone who can firmly handle the situation.

In general, 80% of the engineer respondents believed that all functions must be performed by both male and female respondents since all engineers are expected

to perform all engineering functions from the designing up to the commercialization of the machinery. The table shows that not all of the engineer respondents believed that males and females have only limited functions to perform and must not be delegated to all engineering works.

Table 3. Engineers' opinions on who must perform the different responsibilities

RESPONSIBILITIES	MALE		FEMALE		BOTH	
	Frequency	%	Frequency	%	Frequency	%
Carry out production, inspection, packaging, and machine operation duties	6	20.00	0	0.00	24	80.00
Set up machinery and ensure all materials are readily available	10	33.33	1	3.33	19	63.33
Effectively monitor production equipment	1	3.33	1	3.33	28	93.33
Assist the shop technicians and materials clerk as necessary	1	3.33	3	10.00	26	86.67
Maintain a safe and clean workspace	0	0.00	2	6.67	28	93.33
Follow established safety rules and regulations	0	0.0	1	3.33	29	96.67
Design agricultural machinery components and equipment, using computer-aided design (CAD) technology	0	0.00	0	0.00	30	100.00
Design presentation and results organization	0	0.00	2	6.67	28	93.33
Test agricultural machinery and equipment to ensure that they perform properly	8	26.67	0	0.00	22	73.33
Design food-processing plants and supervise manufacturing operations	2	6.67	0	0.00	28	93.33
Plan and direct construction of rural electric-power distribution systems	5	16.67	0	0.00	25	83.33

Design structures to store and process crops	2	6.67	0	0.00	28	93.33
Discuss plans with clients, contractors, consultants, and other engineers so that the plans can be evaluated and any necessary changes made	1	3.33	1	3.33	28	93.33
Design housing and environments to maximize animals' comfort, health, and productivity	2	6.67	0	0.00	28	93.33
Design and supervise land reclamation projects in agriculture and related industries	1	3.33	1	3.33	28	93.33

Associating Socio-demographic Profile of the Engineers and Gender Sensitivity Exposure

In determining the factors that significantly influence the application of principles in the development of gender-friendly farm machinery, the researcher identified three sociodemographic characteristics which justify the gender sensitivity exposure of the engineer respondents to some gender-related topics.

The table below shows the p-values for each gender-related topic versus the sociodemographic profile of the respondents. Numerical values with an asterisk indicate significance at the 5% level.

Table 4 shows that age is significantly related to the gender sensitivity exposure of engineer respondents to gender-related topics about their attendance to gender sensitivity seminars and training. Based on the data collected 53.33% of the engineer respondents is on ages between 22-31 years old which is classified in this study as those with younger respondents.

It can be implied from the data presented that the majority of the engineer respondents are young and they are more exposed to gender sensitivity training as they assumed their responsibilities as engineers.

Age with p=0.027 and civil status with p=0.035 is significantly influential in the exposure of engineer respondents to the gender-related topic "Gender-sensitive and gender-biased language." As engineer respondents are from ages 22-50 years old and are academically aware of the language to be used in the workplace especially in addressing people, their age tells that they are aware of what words are offensive and gender-neutral or appropriate to address anyone in the office. It also tells that age determines the exposure of the engineers in dealing with gender-related topics and being familiar with that gender-biased language. The more that they stayed longer in their workplace, the more they are exposed to

gender training and seminars, and the more that they will be familiar with the use of words. According to an interview conducted by the researcher, engineers are familiar with these words not just because of seminars but also in related studies and they applied those words in drafting research proposals that may influence the development of machinery. Their civil status also determines their exposure to gender-sensitive and gender-biased language regardless and their differences cause them to exchange understanding and interpretation of these words.

Sex with p=0.027 and age with p=0.045 are significantly related to the gender-related topic "Gender division of labor and workplace." This means that the sex and age of the engineer can be considered in their exposure to the topic of gender division of labor and workplace before developing gender-friendly farm machinery.

Age with p=0.016 is significant to the gender-related topic "Physical and mental strength differences of opposite sexes." This means that the engineer has been considering the physical attributes and mental capacity of the engineers when delegating responsibilities before, during, and after the development of gender-friendly farm machinery. Because of the classification of their age from younger engineers to engineers with more experience in engineering operations, they were to utilize the skills and abilities of their engineers, and they applied gender sensitivity in their place. Distribution of job in the workplace according to one of the engineer respondents is not according to sex but of course to skill and ability of the engineers to perform and they treated every engineer equally but sometimes job which requires more physical strength is given to male workers or engineers and so that they could prevent accident upon handling heavy equipment.

Sex with p=0.020 is significant to the gender-related topic "Gender-sensitive model in developing gender friendly farm machinery." This means that their sex determines how exposed the engineer respondents are to the topic. Gender-sensitive model is a model used as a preference to develop machinery that addresses the specific concern in agricultural practices and all are using the model to apply a specific approach that is relevant to function. According to an interview conducted by the researcher, every engineer uses a model when developing machines but there are only a few engineers who modified their models and has applied gender sensitivity to make it inclusive for all end user.

Table 4. The association between the socio-demographic profile of the engineers and gender sensitivity exposure in terms of gender-related topics.

GENDER-RELATED TOPICS	SOCIO-DEMOGRAPHIC PROFILE					
	Sex	**Age**	**Civil Status**	**Religion**	**Educational Attainment**	**Years of Working**
Attending seminars and training on gender sensitivity	0.060	0.035*	0.573	0.809	0.513	0.072

Problems encountered about gender disparity	0.128	0.180	0.802	0.480	0.443	0.417
Participating in gender-related campaigns and community extension	0.405	0.625	0.934	0.492	0.298	0.825
Discussion on gender laws and policies	0.077	0.487	0.347	0.440	0.206	0.754
Topics about sex-segregated careers	0.310	0.603	0.965	0.678	0.195	0.673
Gender-sensitive and gender-biased language	0.171	0.027*	0.035*	0.638	0.786	0.193
Gender division of labor in the workplace	0.027*	0.045*	0.375	0.421	0.142	0.257
Physical and mental strength differences of opposite sexes	0.100	0.016*	0.079	0.254	0.120	0.177
Gender-sensitive model in developing gender-friendly farm machinery	0.020*	0.704	0.188	0.995	0.563	0.217
Community extension program for gender gaps in the agricultural sector	0.178	0.931	0.837	0.667	0.330	0.907

Note: an asterisk (*) indicates significance at a 5% level ($p<0.05$)

Farmers' source of information for accessibility and utilization of farm machinery and technologies according to sex

The development of gender-friendly farm machinery is a big help to integrate agricultural practices and in reaching the goal of our country to be rice self-sufficient. Engineers developed machinery to help farmers in their day-to-day duties in preparing agricultural land for plowing. In line with this, different agricultural agencies developed programs or ways to extend the information to the farmers and make them informed and experience new principles which will not only improve their farm productivity but also in addressing gender sensitivity while assuming their responsibilities.

Table 5, which is the farmers' source of information for accessibility and utilization of farm machinery and technologies according to sex shows that the majority of farmers accessed information through Training and Seminars they attended. The 47.62% of the male farmer respondents answered that they get information about gender-friendly farm machinery through Training and Seminars since they are affiliated with the three selected agencies such as PhilMech, PhilSCAT, and PhilRice, and they are invited to the gender sensitivity events conducted by these agencies. Usually, according to the farmers, this gender sensitivity seminar served as the extension program of the agencies to inform and educate the farmers about the rights and equitable distribution of opportunities to all farmers.

On the other hand, women farmers who account for 44.44% of the respondents expressed that like men, they also gathered information about gender-friendly farm machinery from Training and Seminars and said that in their cooperatives where they belong, women, farmers are usually invited for gender sensitivity training which is included on topics for women empowerment.

Apart from that 57.14% of the male farmers and 33.33% of female farmers answered that they have enough knowledge in operating machinery that are accessible in their workplaces. To be specific, female farmers are referring to gender-friendly farm technologies that do not require physical strength such as multi-solar tunnel dryers, coffee pulper, and other tools which they can carry on whatever places they are comfortable to work with.

In terms of determining where farmers learned how to operate farm machinery, 52.38% of the male respondents said that they gained their experience in manipulating agricultural machinery such as tractors and others through Field Technology Demonstration where after the seminar they were given chance to take a look on the keys and have tried to manipulate it. Unlike male farmers, 44.44% of the female farmers usually learned how to operate these technologies through seminars or training. This means that female farmers learned about machines in a theoretical approach while male farmers learned through actual demonstration and are more immersed in the technology. Female farmers used to operate small-sized technologies and need not exert more effort since knowledge could be gained through observation and the machines being demonstrated have keys that are not complicated to deal with. In comparison, through field technology demonstration, male farmers experienced learned the keys, and exert physical effort making them immersed in agricultural machinery.

In the line of learning how to handle the machinery, it is also important that farmers or end users must know about maintaining the condition of the mechanical parts. 61.90% of the male farmers and 55.68% of the female respondents claimed that they learned the measures on how to maintain the condition of the mechanical parts in Training and Seminars. This means that farmers are more likely to learn the process when it is being discussed or through demonstrations associated during the lecture period.

Information about the specification and physical features of machinery that is designed for female farmers according to 38.10% of the male farmers is through Training and Seminars while 33.33% of the female farmers are informed about these projects when they attend Machinery Expo and Exhibits when machines are displayed. Accordingly, during the exhibit, there is personnel who can explain the specifications and purpose of the machine thoroughly. Other female farmers who account for 33.33% stressed that they gathered the information from Publication/Printed materials where some of these materials were translated into popularized terms which made them understand better. Aside from that, personnel also explains the content of the printed materials so that it appears relevant and familiar to them.

Knowledge of equal treatment of women in the agricultural sector is also a concern that needs to be addressed since not all who work on the farm are male farmers little bit they know that women also play a big role in the agricultural sector. The 61.90% of male farmers and 77.79% of female farmers believed that information that emphasizes the rights and equal treatment of women in the agricultural sector from Training and Seminars where in this way, they were able to interact with the resource speakers and participate to open forums which establish healthy discourse together with the opposite sex. In extension, 61.90% of the male farmers and 88.89% stressed that equal opportunity for all in the agricultural sector is best packaged or discussed in Training and Seminars. In this way, the interactive discussion appears convening for the farmers to be familiar with and internalize the concept of equality for all.

Having a skill in familiarizing different keys of farm machinery comes with sufficient information from any platform. 71.43% of the male farmers and 55.59% of the male farmers claimed that they gathered the information for training in operating agricultural machinery from Training and Seminars. Farmers have retained the knowledge from the training and seminars since this shows actual parts of the machines and involves people in the promotion of the training.

Furthermore, 85.71% of the male farmers and 88.89% of female farmers supported their claims that they learned about new techniques for agricultural productivity through Training and Seminars. Farmers said that seminars about new techniques, rice variety, and preparation can be best discussed through this source of information. Aside from that, 80.95% of the male farmers and 88.89% of the female farmers learned how to improve their skills in handling agricultural practices and interventions through training and seminars where host agencies invited resource speakers and champion farmers who can share good stories. This kind of approach is more reflective of other farmers as champion farmers share the challenges he/she encountered and the interventions used to address difficulties in farming.

Table 5. Farmers' source of information for accessibility and utilization of farm machinery and technologies according to sex

INFORMATION/TOPICS	MALE (n=21) %				FEMALE (n=9) %			
	T/S	MEE	FTD	P/PM	T/S	MEE	FTD	P/PM
Gender-friendly farm machinery	47.62	14.29	19.05	14.29	44.44	22.22	33.33	-
Sufficient knowledge in manipulating gender-friendly farm machinery	57.14	-	33.33	-	33.33	11.11	11.11	11.11
Experience in controlling agricultural machinery	33.33	9.52	52.38	-	44.44	-	11.11	11.11
Knowledge about conditioning and maintenance of agricultural machinery	61.90	19.00	9.52	-	55.68	-	11.11	11.11
Physical features of machinery that can be manipulated by women farmers	38.10	9.52	19.00	19.00	22.23	33.33	11.11	33.33
Fair treatment of women and men in the agricultural sector	61.90	-	9.52	-	77.79	-	-	11.11
Equal opportunity in agricultural farming	61.90	-	19.05	4.76	88.89	-	-	11.11
Training/workshop about manipulating agricultural machinery	71.43	9.52	19.05	-	55.59	-	-	11.11
Enough knowledge about farming	85.71	4.76	9.52	-	88.89	-	-	11.11
Integrating skills for easier agricultural activities	80.95	4.76	9.52	4.76	88.89	-	-	11.11

Legend: T/S - "Training/Seminars", MEE - "Machinery Expo and Exhibit", FTD - "Field Technology Demonstration", P/PM - "Publication/Printed Materials

Farmer's level of usage of different farm machinery and technologies according to sex

Table 6, which is the farmers' level of usage of different farm machinery and technologies according to sex shows that male farmers have a high exposure (always) to hand tractors with a mean of 3.90 where they claimed that this farm machinery is basic farming equipment and is more beneficial than other expensive farming tools. Apart from that, farmers are often exposed to machinery like Combine

Rice harvesters, Transplanter, and ride-on attachments for hand tractors. These machines are generally associated with the hand tractor and are used for pre and post-production.

Male farmers also claimed that they are seldom exposed to drum seeder, Laboy tiller, multi-commodity solar dryer, micro tiller, and seed cleaner since these machines or technologies are expensive and they could only use these machineries by renting them from cooperatives who have access to these. Other farmers also stressed that some agencies transferred technologies as part of their extension projects so that time they can avail themselves of the convenience that these machines brought for them.

In extension, some of the male farmers claimed that they do not have access to five agricultural technologies as mobile flash dryer, cashew nut sheller, cassava digger, manual coffee pulper, and multi-crop flour mill which has domesticated design and are generally used by women. According to the male farmers, they only have access to farm equipment for rice farming.

In contrast, women in the agricultural sector experienced inaccessibility to farm machinery where they generally do not have enough background in these machines but are only depending on the conventional way of farming. According to the data collected, female farmers with a mean of 2.33 are seldom exposed to the multi-commodity solar dryer as a tool used to dry goods in a fast period and controlled environment since this technology is used by some cooperatives who are processing agricultural products such as mushroom and ginger tea that involves drying. This technology is easy to operate and does not require physical strength to complete the entire operation. Other machines are not accessible for female farmers, especially those that require physical, and since male farmers take the control of these machines and not allowing women to use these machines.

To present the general status of the farmers' usage of farm machinery in terms of sex, the table shows that male farmers have seldom usage of this machinery with a mean of 2.03 than female farmers whose mean is 1.09 or have never been exposed to the usage of the identified machinery simply because many of the machinery for rice farming is physically designed with heavy parts and that requires enough physical strength for farming operations.

It can also be implied from the results presented that even if farmers are exposed to training and seminars as they are invited by agricultural agencies, still, they do not have enough access to these machinery because machines are typically manipulated by men. Women in the agricultural sector function only in conventional or manual rice planting and drying after harvesting. They think that women can do better things if they will be provided with machines that are designed according to their capacity to carry loads.

Table 6. Farmers' level of usage of different farm machinery and technologies according to sex

TECHNOLOGY/AGRICULTURAL MACHINERY	MALE		FEMALE	
	Mean	Interpretation	Mean	Interpretation
Hand Tractor	3.90	Always	1.00	Never

Combine Rice Harvester/ Reaper	2.81	Often	1.00	Never
Mobile Flash Dryer	1.43	Never	1.00	Never
Transplanter	2.67	Often	1.00	Never
Drumseeder	2.38	Seldom	1.00	Never
Laboy tiller	2.19	Seldom	1.00	Never
Cashew nut sheller	1.14	Never	1.00	Never
Cassava digger	1.10	Never	1.00	Never
Multi-Commodity Solar Tunnel Dryer	1.81	Seldom	2.33	Seldom
Manual Coffee Pulper	1.10	Never	1.00	Never
Corn Mill	1.43	Never	1.00	Never
Microtiller	2.19	Seldom	1.00	Never
Ride-on attachment for hand tractor	2.71	Often	1.00	Never
Seed Cleaner	2.24	Seldom	1.00	Never
Multi-crop Flour Mill	1.33	Never	1.00	Never
OVERALL MEAN	**2.03**	**Seldom**	**1.09**	**Never**

Note: 1-1.74 "Never", 1.75-2.49 "Seldom", 2.50-3.24 "Often", 3.25-4 "Always"

Farmers' opinion on who is the most affected by problems related to agriculture

Table 7, which is the Farmers' opinion on who is the most affected by problems related to agriculture and farming shows that 66.67% of the farmers claimed that all farmers regardless of gender face problems with the equal distribution of work in the agricultural sector.

Limited access to agricultural equipment that could be used by both male and female farmers is also an identified problem where 83.33% of the farmer respondents believed that female farmers experienced limited accessibility only because most of the machinery was operated by male farmers.

Due to limited access to mechanical services, 56.67% of the farmers believed that women have experienced the selection of farmers who can only use farm machinery which is commonly generated by men. 33.33% of the farmer respondents stressed that both male and female farmers experienced the same thing.

In terms of assessing the skill and ability of farmers to engage themselves in operating farm machinery, 96.67% of the farmers said that women farmers cannot handle farm machinery because it is hard to control and requires optimal physical strength to perform well in the field. The agricultural sector viewed women as those that should be limited to dangerous and complicated functions on the farm since men are more capable of doing it.

Because of the above claim that women cannot handle functions that requires physical strength, 90% of the farmer respondents expressed that women farmers do not have enough knowledge in handling farm equipment and should be limited at home.

Accessibility of mechanical services is evident in the agricultural sector, the data also shows that 80% of the farmers agreed that women farmers do not have a chance to touch and learn about handling the farm

machinery where generally it is operated by men.

Limited access to mechanical tools is not just a problem in the agricultural sector but also in the limited job that was given to all farmers. The result shows that 86.67% of the farmer respondents stressed that female farmers usually face problems with limited jobs since men are more likely to be functional in the field and women are only needed in the planting season and drying of the harvested grains.

In terms of information accessibility, the result shows that 50% of the respondents emphasized that both male and female farmers experience lacking knowledge about gender-friendly farm machinery and which appears new and unfamiliar to them. They shared that they only knew machines that are heavily designed for those with optimum physical strength. 43.33% of the respondents expressed that female farmers do not have enough knowledge about this since they do not much about machinery.

The decision is also part of integrating agricultural practices on which one must have an eye to all steps associated with agricultural production. The result shown in the table shows that 46.67% of the respondents answered that female farmers are generally not included in the decision-making because it is basically by men whom they believed to be capable of choosing appropriate agricultural machinery. On the other hand, 43.33% of the respondents assumed that both male and female farmers are challenged by these problems since some of the farmers involved their wives in the decision-making and tries to ask the ideas of the other half, while 10% of the respondents claimed that male farmers usually face this problem since not all male farmers have enough knowledge about what to purchase or how to allocate budget considering its cost and on how it becomes efficient to the entire process. Women also experience difficulty in absorbing the challenge and maintenance of the machinery that will be used which is supported by the 60% of the respondents who claimed that it is generally a women's problem and 40% of the respondents expressed that it is a shared challenge by both male and female farmers.

Table 7. Farmer's opinion on who is the most affected by problems related to agriculture and farming

PROBLEMS	MALE		FEMALE		BOTH	
	FREQUENCY	%	FREQUENCY	%	FREQUENCY	%
Equal distribution of work	1	3.33	9	30.00	20	66.67
Limited farm equipment that can be used by both men and women farmers	2	6.67	25	83.33	3	10.00
Farm machinery can only be used by selected farmers	3	10.00	17	56.67	10	33.33

Unable to use agricultural machinery because of its complicated parts and its heavy weight design	0	0.00	29	96.67	1	3.33
Insufficient knowledge about manipulating farm machinery	1	3.33	27	90.00	2	6.67
Only men can access and utilize farm machinery	2	6.67	24	80.00	4	13.33
There are limited agricultural jobs given to women	1	3.33	26	86.67	2	6.67
Information about gender-friendly farm machinery	2	6.67	13	43.33	15	50.00
Decision-making in distributing responsibilities in farming	3	10.00	14	46.67	13	43.33
Limited knowledge about existing machines being used	0	0.00	18	60.00	12	40.00

Farmers' Ideal Farm Machinery for all Gender

Based on the study conducted, the majority (92%) of the farmer respondents believed that it is right to develop machinery that can be easily manipulated or controlled by women farmers simply because of three reasons namely education and experience, matriarchal responsibility, and gender equitability.

Firstly, farmers expressed that developing agricultural machinery which prioritizes women farmers' ability is for them to be educated and gain experience in manipulating machinery. Farmers believed that it is difficult if women do not have enough knowledge about manipulating machinery and simply letting men be more knowledgeable about it. Being educated about the specifications and functions of a machine makes it easy for them to familiarize its parts and how it will be conditioned as technical problems may be encountered.

Secondly, for matriarchal responsibility, simply because they wanted to help men or their spouse in farming while men are resting or being sick. They think that fast agricultural production will be attained if the wives of male farmers can replace them by manipulating farm machinery and

assuming responsibilities on the farm. Today, farmers believed that men and women should work together, especially towards fast farming operations.

Lastly, for gender equitability; men are not the only farmers working, some women want to help manipulate machines that are suitable for their physical strength. Machines which can be easily manipulated are convenient for those women who are independently working on the farm and who can harvest crops especially when they don't have any correspondents or partners in life. To prove that women can do things that men can do because there are women who are very interested and brave enough to learn about manipulating machinery and perform like how men perform the job.

Farmers also gave their opinion about what should a machine looks like when it is designed for all farmers, especially for the convenience of women farmers. This study came up with five characteristics describing the machines which are suitable for all. Many of the farmer respondents thought that it should be a push button. Push-button means, everything must be one click and should not require a large amount of energy for operation and it should be automatic. In this way, women can move comfortably and perform farm duties without any hesitations.

Respondents also claimed that it should be lightweight so that whenever they wanted to condition or clean the farm machinery it is not difficult to clean with or change its parts when needed. They also want it to be considerate with the height of the farmers especially women whose height is not that ideal for height-required machinery. Machinery designed must be small type so that women can easily access the driving part and reach all of its parts. This machinery must be riding type so that women will no longer do it manually and ease the problems in production especially since all farmers especially women are vulnerable to health problems when consuming too much energy on the farm lastly, farmers want it to be inexpensive for them to feel that machines are not there as enemies, it is developed for them to ease the difficulties on the farm which are designed for all.

In contrast, one engineer respondent claimed that it is difficult to develop gender-friendly farm machinery that is economically cheaper than the usual machinery used in the field because gender sensitizing machines require the replacement of lightweight parts which are more costly. Today, farmers want to focus on low-cost production and bring back production expenses. In the agricultural sector, cost efficiency is always been considered so farmers are prioritizing the cost of the machinery over those purchasing gender-sensitive machines. For them, gender-sensitive machines are those that are cost-friendly and can perform farm tasks fast.

Conclusion

Since there all laws passed in the country that highlights the implementation of gender sensitivity programs in all government offices, the three selected agricultural agencies that are responsible for developing farm machinery have implemented gender and development programs but have not applied gender sensitivity principles in the development of machinery. The result shows that not all engineers have enough exposure to gender-related topics and those in the higher position have more exposure than those engineers in the lower position.

Generally, the selected agricultural agencies involved in this study are not that exposed fully to the concepts and principles of gender sensitivity and find it hard to apply

the gender sensitivity approach to engineering functions. They were not able to develop a homogenized method of developing gender-friendly farm machinery that will address issues of gender disparity in the accessibility of information and the availability of machines. Their unfamiliarity with some gender-related topics or terminologies makes it evident that gender disparity happens in their workplace which affects the ability of the office to equally distribute jobs and apply gender-sensitive considerations in delegating responsibilities and in developing machinery.

Unminding gender issues create a ripple effect on the end users of the machines who assumed that farmers regardless of sex will be given equal opportunity to utilize information and existing equipment for farming. Many women farmers are interested to drive farm machinery for fast production since mechanization shows remarkable records in agriculture but what hinders them to pursue this function is their lacking knowledge about the machinery developed and the chance to be immersed with these machines. The traditional delegation of agricultural functions makes women settle for subordination among dominance shown by men in the agricultural field. This limits their opportunity of strengthening their abilities and independently work productively.

The lacking exposure of to gender communication and ideas in the agricultural agencies affects the gender sensitivity of the farming technologies being used and their accessibility to women farmers. In this way, gender engineers who developed machines are not that aware of the considerations on gender issues and disparity so it is extended to those who are utilizing the machines being developed knowing that machines are not only designed for men with dominant strength but are also be utilized by women when consideration is highlighted. Technologies developed must not be limited to domestication but also extended to mechanical operation.

Recommendation

Based on the conclusion developed, the following recommendations were made:

1. The women farmers must be eager to attend expos and exhibits on farm machinery and gender sensitivity. They should immerse themselves in the ideas of maintaining the farm machinery, identifying its parts, and being an ever-ready farmer who can help men farmers on the farm in operating fast in the agricultural sector.
2. For the Engineers from selected agricultural agencies, they must develop a model that will identify all the considerations in the development of machinery from gender sensitivity aspects, cost, accessibility, sustainability, and community extensions. They should develop ways to extend mechanical gender sensitivity in their workplace and also to the community which is utilizing the machines, especially the farmers. They should continue to develop more gender-friendly machinery and address issues in the agricultural field.
3. For future researchers, they may continue this research and provide a model which is uniformly designed for the engineers to easily develop a machine.

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