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Research Article

Impact of Age and Farming Experience on Sugarcane Productivity in the Visayas, Philippines

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ABSTRACT

Knowledge, experience, and collaboration work hand in hand with one another to improve productivity. The global demographic trends highlight an inversion of the farming-community age pyramid, with those age 65 years and over constituting the fastest growing subgroup of the farming population. The study aims to determine the relationship between the farmers experience and age relative to the production of sugarcane crop in the Philippines. Descriptive method of research was employed in the study. The respondents were the 320 sugarcane farmers that were randomly identified at the seven locations in the Visayas area of the Philippines. An instrument used was the validated survey questionnaire used by Oñal (2021). The result show that there a significant difference in the production of sugarcane among seven location in the Visayas, Philippines. Significant differences among the years of experience and farmers age had an effect on the production. Those who are in farming between 11-12 years and aging 36-50 years old have a high production of >65 TC/ha (alpha=0.01) least experience and young farmers. Furthermore, the farmers experience and their age level are moderately correlated (alpha=0.01). Government and other people organization should provide more scholarship or trainings to include private colleges or universities offering courses in agriculture. Tech-voc courses or trainings offered by TESDA be made available to everyone especially the out of school youth.

Keywords: *Aging farmers, Farming experiences, Sugarcane tonnage, Sustainable sugarcane production, Tech-voc trainings*

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Introduction

Knowledge, experience, and collaboration work hand in hand with one another to improve productivity.

The global demographic trends highlight an inversion of the farming-community age pyramid, with those age 65 years and over constituting the fastest growing sub-group of the faming population (Conway et al, 2024).

Aging farmers have a limited knowledge of their benefits. Their education and income had a significant relationship to their knowledge, among others (Dupa et al, 2024). The aging experience in the agriculture industry looks different from the aging experience in urban labor market.

Filipino farm workers have a healthy psychological well-being, however it does not change their struggle to survive (Ancheta et al, 2023).

Economically sugarcane industry is one of the major dollar income industries in the Philippines. Despite the continuous extent of services to the farmers' momentum on production could not be realize until this time.

On the production side, the Philippine raw sugar production for 2025 is project to reach a volume of 1.85 million metric tons because of the improvement of weather conditions that could directly cater the expansion in harvest area (Pelonia, 2024). Relatively, as of February 2, 2025, the total raw sugar production in the country is 1.92 million metric tons with a total tonnage of 2.14 million or an average of 55.33 TC/ha (SRA, 2025) way below the targeted 75.00 TC/ha.

Outside the country, it is noteworthy that sugarcane productivity in Eastern Brazilian Amazon showed a significant increase from 2012-13 to 2021-22 (Cardoso et al, 2024).

Back in the Philippines, the vast plantation are located in Regions 6, 7, and 8 specified as follows: 207,909 hectares for Region 6; 57,663 hectares for Region 7; and, 10,200 hectares for Region 8, respectively. The total area of the three regions is 275,772 hectares or 71.01% of the total area of sugarcane plantation in the Philippines (Balita, 2024).

On the number of farmers and laborers, statistics show that there are more than 80,000 farmers who are tilling the 388,378 hectares (out of the total land area of 30 million hectares devoted to agriculture), of sugarcane fields all over the country. Of the total number of sugarcane farmers mentioned-above the majority of them are considered small (farms are 5 hectares or below). In Crop Year 2015-16: 79% are small farmers, in which 17% are cultivating an area of 5.01 to 50.00 hectares and only 4% have an area of 50.01 hectares and above (Overview of the Sugarcane Industry, 2017).

The total number of agricultural and industrial workers directly employed in the industry is about 700,000. Over and above, the total workers mentioned there is an additional 70,000 more or less seasonal plantation workers who are augmenting the laborer in sugarcane plantation and estates nationwide. Relatively, the latest survey mentioned by Crisostomo (2018), indicates that sugarcane farms have 32,000 laborers, which is second to the banana plantation with 49,866 workers. Moreover, the agriculture sector has a share of 24.3% in the country's total employment (PSA, 2019).

The group of Reza (2016) had found out on their study that almost 50 percent of the cost in sugarcane farming is spend in the hiring of laborers. It indicates that sugarcane is a labor-intensive crop in Bangladesh and on average 90-110 man-days labor is needed per acre of sugarcane production. Hence, effective innovations especially in sugarcane production must be employ to increase the volume of production.

This study aims to determine the relationships of the experiences of farmers in sugarcane industry, age level, and their production. The result will be a great contribution to the pool of knowledge especially in agriculture, more so on sugarcane farming in the Philippines.

Objectives

The general objective of the study is to determine the relationship between the age level, experiences of farmers, and production.

Specifically, it aims to;

a. Gather data on sugarcane production of farmers in seven location;

b. Re-calibrate the effect of farming experiences and age level of the farmers on their sugarcane production, and;
c. Correlate sugarcane production with the farmers experience as well as their age.

Methodology

The descriptive correlational study was used in this study. It focuses on the sugarcane farmers' areas, farm profile, level of production in tonnage in correlation with the age and farming experiences of sugarcane farmers at the seven locations of the Visayas, Philippines.

Research Environment

Areas planted with sugarcane were chosen as sampling area. There are seven provinces in the Visayas where majority of the sugarcane crops are planted. For this study only six provinces is included namely: Negros Occidental, Negros Oriental, Capiz, Iloilo, Cebu, and Leyte. As of Crop Year 2021-2022, the total area cultivated with sugarcane for the above-mentioned provinces was 271,622.89 hectares and produces 15.58 million tons of cane with an average of 57.63 tons per hectare (SRA 2025).

Specifically, the study covered the following location, namely: CEB or Cebu province; LEY or Leyte; ILO or Iloilo; CAP or Capiz; BYN or Bayawan in Negros Oriental; SCR or San Carlos and VIC or Victorias for Negros Occidental. For the seven location the total area planted is 93,354.03 hectares and had produced a total of 5,073,484.90 tons with an average tonnage of 54.35 per hectare.

Distribution of the Respondents

The respondents of the study were the sugarcane farmers in the Visayan area, Philippines. Employing the *Slovins* formula, out of 18,539 (Crop Year 2021-2022) sugarcane farmers from the seven locations covered by this study, the sample size of 320 farmers were selected randomly as the actual respondents. The number of respondent was determined by computing the percentages viz-a-viz to the total number of sugarcane farmers per location. The percent distribution of the respondents per location is shown on Figure 1.

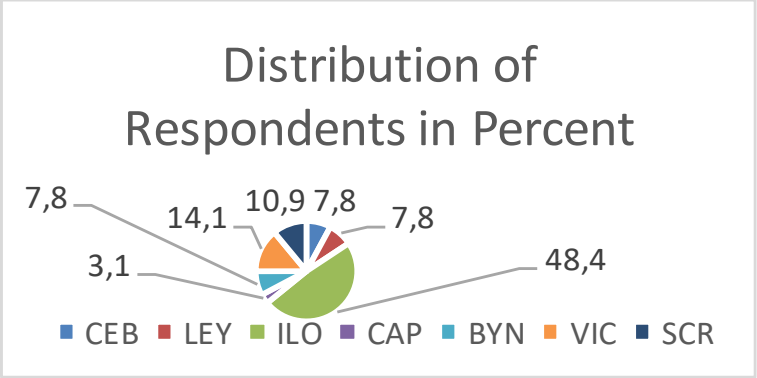

Fig.1 Distribution of respondents at seven location in the Philippines

Research Instrument

The instrument used to gather data was the validated document use by Oñal, et al (2021). It includes the farmers' profile, farm profile, age, farming experiences, and level of production among others.

Data Gathering Procedure

Instrument Preparation

The researchers had personally prepared the questionnaire/instrument. The instrument had undergone the reliability and validation tests in 2021, yet.

Distribution of Instrument and Gathering and Data

The researchers had done the actual orientation on how to fill-out the questionnaire with the field enumerators. The researchers had personally distributed the instrument per location.

Thereafter, data gathering started with the assistance of agricultural enumerators at the different location.

Retrieval of Instruments

The researchers had personally retrieved the instruments from the enumerators others were send thru public courier.

Encoding and Statistical Analysis

Upon retrieval of the questionnaire, the researcher had tallied and analyzed the data using the Statistical Package for Social Sciences (SPSS) software under the closed supervision and guidance of the statistician.

The procedure is presented on Figure 2.

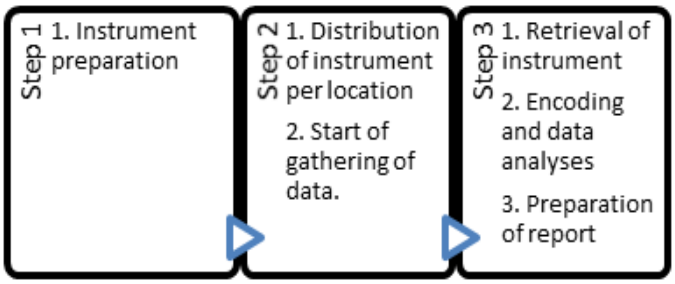

Fig. 2 Data gathering procedure

Statistical Tool

In the analysis of data, the following statistical tools were used in accordance with the nature of the specific objectives.

Frequency and percentage was use to describe the profile of the sugarcane farmers' and of the farms.

The mean was used to determine the level of production with the age and farming experiences.

Likert's scale was used in determining and describing the production mean.

One way Analysis of Variance (ANOVA) was used to determine the difference in the level of production, when respondents are grouped according to location, the age and farmers experiences

Pearson r Moment Correlation was utilized to determine the significant relationship between the level of production versus the age and farmers experiences.

Results and Discussions

Profile of farmers and the farms

Table 2 and 2a revealed the farmers and farm profile at the seven location in the Visayas in terms of gender, age, level of education, number of years in sugarcane farming, average size of land holdings, and production of sugarcane.

The findings reveal that out of 320 farmers involved in the study, 69.7% are male and 30.3% are female.

Furthermore, the findings revealed that 51.2% of the farmers were 51 years old and above, 36.9% are between 36-50 years old , and 11.9% are 35 years old and below, respectively.

As to the educational attainment, 47.2% of the farmers were secondary level and 3.8% had undergone vocational courses.

The findings on Table 2 and 2a, implies that the farmers at the seven location in the Visayan area were majority male, aged 51 years old and above, secondary level, have been sugarcane farming with more than 20 years, and had a small landholding area of 25 hectares and below. Majority of the land slope ranges from 6 to 24 degrees and the average production is less than 49 TC/ha.

The findings is related with the work of Gallen (2015) which is using Danish matched employer-employee data, the paper estimates the relative productivity of men and women and finds that gender "productivity gap" is 8 percent implying that just under two thirds of the residual wage gap can be accounted for by productivity differences between men and women.

The productivity gap was measured by estimating the efficiency units lost in a firm-level

production function if a worker is female, holding other explanatory covariates such as age, education, experience, occupation, and hours worked constant. Furthermore, both mothers and non-mothers were paid less than the male but the (low) relative pay of mothers is completely explained by productivity for women without children.

In India women perform a crucial role in agricultural either directly or indirectly starting from producing, processing and ultimately marketing of agricultural produce (Mallick & Anshuman, 2023).

Furthermore, Hyland, et al (2020) found out the global picture of gender discriminations especially on law that affects women's economic opportunity. They had find a positive correlations between a more equal laws pertaining to women workforce and more equal labor markets outcomes such as higher female labor participation and a smaller wage gap between men and women.

In the Philippines, employment in agricultural sector by gender in the year 2019 was 28.70% male and 13.60% female.

For the number of years in sugarcane farming 38.4% have been in sugarcane farming for more than 20 years, while only 26.5% have been doing it for 10 years or less.

Table 2. Farmers' profile at the different location of the Visayas, Philippines

Variables	Number of Farmers	Percentage
Gender		
Male	223	69.7
Female	97	30.3
Age		
35 years old & below	38	11.9
36-50 years old	118	36.9
51 years old & above	164	51.2
Level of Education		
Elementary	54	16.9
Secondary	151	47.2
College	103	32.2
Vocational	12	3.8
Number of Years in Sugarcane Farming		
10 years & below	85	26.6
11-20 years	112	35.0
20 years & above	123	38.4
TOTAL	**320**	**100.0**

For size of farm holding, 69.7% of the respondents have an area below 25 hectares while 6.6% have an area of 51 hectares or more.

As to the land topography, 65.3% of the area has a soil gradient of 6.24 degrees while 15.9% have a slope gradient of less than 5 degrees.

Around 53.9% of the area had an average production of less than 49 TC/ha and 18.8% have an average production of 56 to 64 TC/ha.

Table 2.a. Farm Profiles at the different location in the Visayas, Philippines.

Variables	Number of Farmers	Percentage
Average Size of Land Holdings		
51 ha & above	21	6.6
26-50 hectares	76	23.8
25 ha & below	223	69.7
Land Topography		
>25 degrees	60	18.8
6-24 degrees	209	65.3
<5 degrees	51	15.9
Average Production		
>65 TC/ha	88	27.5
50-64 TC/ha	60	18.8
<49 TC/ha	172	53.8
TOTAL	**320**	**100.0**

Difference on the volume of production of sugarcane in the Philippines when group by age of farmers

The data in Table 3 presents the difference on sugarcane production in the Visayas, Philippines when farmers are grouped by their age level using One-way ANOVA. It revealed that there is a significant difference on sugarcane production when farmers are grouped by their age level have an average production of 50-64 TC/ha (m=1.97, alpha=0.01).

The results revealed that sugarcane production in the Visayas, Philippines when farmers are grouped by their age level are not comparable. Specifically those farmers ages between 36-50 years old had an average production of >65 TC/ha (m=2.65). On the other hand, farmers who are 35 years old and below have a production average of 50-65 TC/ha (m=2.11) while the 51 years old and above farmers had produced an average of <49 TC/ha only (m=1.44).

Aquino, et al (2021) commented that two of the major problems all over the world are the decreasing number of new farmers and aging of the existing ones. The cited problems was correlate to the challenges of the decreasing demand food production of the growing population.

On coffee industry, Wondemu (2017) observed that on coffee industry in Africa there's an inverse relationship between age and yield particularly on those ages 50 years old and above. The aging population in coffee farming has been claim to be one cause of declining the yield of coffee.

Table 3. Analysis of Variance of sugarcane production in the Philippines when grouped by age of farmers

Farmers Age	Mean	Description
35 years old & below	2.11	Medium production
36-50 years old	2.65	High production
51 years old & above	1.44	Low production
Total Mean	**1.97**	**Medium production**
F	111.60	
Sig	<0.001**	

***significant at 1% level*

Difference on the volume of production of sugarcane in the Philippines when farmers are group by number of years in farming

The data in Table 4 presents the difference on sugarcane production in the Visayas, Philippines when farmers are grouped by number of years in farming using One-way ANOVA. It revealed that there is a significant difference on sugarcane production when farmers are grouped by their number of years in farming with an average production of 50-64 TC/ha (m=1.97, alpha=0.01)

This further indicates that sugarcane production in the Visayas, Philippines when farmers are grouped by the number of years in farming of experience are not comparable as well. Specifically those farmers that doing the endeavor between 11-20 years had produced more with an average of >65 TC/ha (m=2.518). Farmers who are farming 10 years and below had an average production of 50-64 TC/ha (m=2.094) while those that had been in farming for 20 years and above had a production of <49 TC/ha (m=1.553).

Experience farmers operate more efficient. Accordingly, the survival of agricultural industry is highly dependent on the level of experience of the farmers (Lippsmeyer, 2023).

Table 4. Analysis of Variance of sugarcane production in the Philippines when farmers are grouped by the number of years in farming

Number of Years in Sugarcane Farming of Farmers	Mean	Description
10 years &below	2.094	Medium production
11-20 years	2.518	High production
20 years & above	1.553	Low production
Total Mean	**2.05**	**Medium production**
F	42.400	
Sig	<0.001**	

***significant at 1% level*

Difference on sugarcane production in the Visayas, Philippines when group by location

The data in Figure 3 presents the difference on sugarcane production in the Visayas, Philippines when grouped by location using One-way ANOVA. It further revealed that there is a significant difference on sugarcane production when grouped by location that had an average production of 50-64 TC/ha (F value=2.816, alpha=0.05).

This shows that sugarcane production in the Visayas, Philippines when grouped by location are not comparable. Specifically, the average production for each location is 50-64 TC/ha namely; CEB (m=1.88), LEY (m=2.31), ILO (m=2.20), CAP (m=2.13), and BYN (m=2.22), respectively. The other two locations with higher average production of >65 TC/ha are VIC (m=2.63) and SCR (m=2.60), respectively.

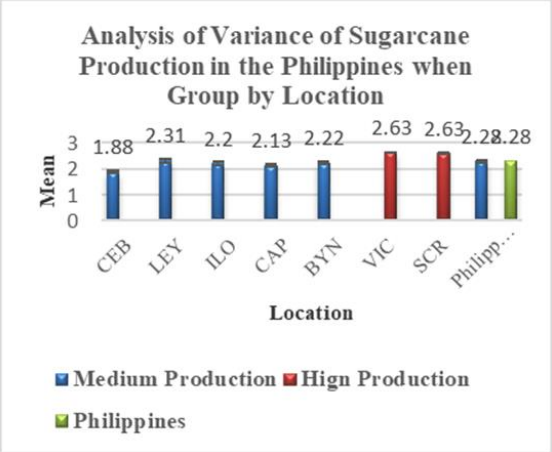

Fig 3. ANOVA of sugarcane production in the Philippines when group by location

Relationship between the age level of sugarcane farmers and volume of production

The data in Table 5, showed the relationship on the age level of sugarcane farmers and the volume of production in the seven location of Visayas using Pearson's r. It could be deduced from the data that there is a moderate relation between the average age of sugarcane farmers and their production (alpha=0.01)

In China as cited by Liu, et al (2023) the country is facing with a rapid aging farming population and the persistent exodus of young farmers. The results shows a negative effect of an aging farming population on labor-intensive agricultural production.

Table 5. Correlation analysis between the age of sugarcane farmers and the volume of production

Variables Compared	Pearson r	Sig	Strength of Relationship
Age level Sugarcane production	0.473	<0.001**	Moderate relationship

***significant at 1% level*

Relationship between the average number of years of farming in the sugarcane industry and the volume of production of the farmers

The data in Table 6, showed the relationship on the average number of years of farming in the sugarcane industry and the volume of production of the farmers in the seven location of Visayas using Pearson's r. It could be deduced from the data that there is a moderate relation between the farmers average years of farming experience and their volume of production (alpha=0.01).

The results relates to the study of Fried and Tauer (2016) which shows that the productivity of age group between 35-44 years old is 3% more productive than the youngest farmers ages 25 years and below. However, the productivity for 65 years old is 10% lower than the youngest but, they remain efficient which was contributed primarily by their long years in farming.

Table 6. Correlation analysis between the number of years of farming in sugarcane and the volume of production of the farmers

Variables Compared	Pearson r	Sig	Strength of Relationship
Years in sugarcane farming Sugarcane production	0.479	<0.001**	Moderate relationship

Conclusion and Recommendation

This study aims to determine the relationship of farming experiences and farmers age level at the seven locations in the Visayas, Philippines and their production volume in tons per hectare.

There were 320 respondents involved in the study covers six provinces within the four regions of the Philippines. Majority of the respondents were male, 51 years old and above, with secondary education, has been in sugarcane farming for more than 20 years and are tilling an average area of 25 hectares and below.

The study indicates that on per location it realized a medium production that ranges from 50 to 64 TC/ha at five locations while the two have a high production of more than 65 tons/ha.

In terms of farmers experiences those that are doing this occupation for 11-20 years have a higher production of more than 65 TC/ha, same with those farmers aging between 36 to 50 years old.

The age level of farmers in the different location in the Visayas, Philippines and their number of years of farming experience have a moderate relationship with their production.

The present status of the sugar industry in the Philippines, specifically in the Visayas has a medium production that ranges from 50 to 64 TC/ha. Hence, the study recommends to improve the agricultural research and be package the same into a technology that can be extended to aging farmers.

Young generations be encourage to engage in agriculture. Scholarship be given impetus, whether for higher education or non-formal training which is given out by TESDA. Out of school youth be given a chance to avail the techvoc courses.

Conflict of Interest

No other group is involved in this study. No monetary contribution is given to this study.

Ethical Consideration and Data Privacy

The researcher takes responsibility for securing the sanctity and confidentiality of all information/data generated through this instrument used. Data will be used for academic/research and in designing programs/projects for the industry.

The respondents agreed for publishing all generated data.

Acknowledgement

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