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Empowering Agriculture: Mitigating Postharvest Losses in Tomatoes and Peppers among Male and Female Farmers in Ekiti State, Nigeria with Indigenous Technology

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***Abstract* - This research focused on the application of local technologies to minimize postharvest losses of tomatoes and peppers in Ekiti State, Nigeria. Utilizing a two-stage sampling method, 138 male and 138 female vegetable farmers were randomly chosen for the study. Data collection involved questionnaires, Focus Group Discussions (FGD), and In-depth Interviews (IDI), with factor analysis employed for quantitative data and transcription according to FGD and IDI reporting standards for qualitative data. The study found that sack bags (86.2% of male and 61.2% of female farmers) and woven cane baskets (97.1% of male and 100% of female farmers) were the primary technologies used. Other methods like sun-drying, drying under fire, and blanching were less popular. Factors influencing the choice of local technologies included community (26.9%), cost/economic considerations (15.9%), education (12.9%), proximity to major towns (10.0%), and access to inputs/resources (8.4%). These factors collectively accounted for about 74.35% of the variation in technology utilization. The study concluded that reinforcing community beliefs and practices could promote the use of these indigenous technologies to reduce losses, while also encouraging farmers to adopt more of these available local methods.**
Keywords: **Postharvest Losses, Indigenous Technology, Tomato and Pepper**

I. INTRODUCTION

Globally, food production seems to be on the increase while hunger and malnutrition are also on the increasing trend. Food and Agriculture Organisation (FAO, 2015) [9] report stated that about 795 million out of the 7.3 billion people around the World experience chronic hunger, 1.2 billion live on less than US$1 a day and every six seconds, a child dies from hunger per day while seven out of ten of the world hungry's are women or girls and hunger and malnutrition kill more people per year than HIV/AIDs, Malaria and Tubercullosiscombined.

The above scenerios are predominant in Sub-Saharan Africa where Agriculture is the dominant occupation as 780 million of the hungry people live in developing countries of Africa (World Bank, 2015) [22]. In Nigeria, the recent World Bank Report of 2018 stated that over 91 million out of about 170 million Nigerians live in poverty (World Bank, 2018) [23].

One of the striking features of Agriculture in Africa is the poor handling of farm produce after harvest (World Bank, 2015) [22]. This usually result to a lot of wastages being generated at farm, household and market levels and subsequently resulting to artificial scarcity of foodstuff in the market especially during the off season. Thus, creating a gap between harvest and consumption especially in vegetable crops such as pepper, tomato, okra, and other leafy vegetables based on the preliminary study conducted for this study.

Interest in Postharvest Loss (PHL) dates back from the first World Food Conference of 1974 in Rome, where it was resolved that about 50% of waste generated between harvest and consumption of food crops should be reduced by 1985 (Parfitt, BarthelandMacnaughton, 2010; Hippolyte, Christopher, Pascal and Christian, 2015) [14], [20]. This informed the establishment of Special Action Programme for the Prevention of Food Losses in 1977 by the Food and Agriculture Organisation (FAO), Rome.

Initially, grains were the target crops, but by the early 1980s, the scope was broadened to cover other arable crops like roots and tubers, fruits and vegetables (FAO, 1989) [12]. There is, however, no account of progress toward the 1985 PHL reduction target at global level. Therefore, the world in general may be about 65 percent deficient in food production as roughly one-third of food produced for human consumption is lost or wasted globally (FAO, 2010 and Prusky, 2011) [11], [21]. This wastage that occurs mostly, between harvest and consumption when quantified amounts to about 1.3 billion tons per year in a world where over 870 million people go hungry everyday (Gustavsson, Cederberg, Sonesson, Van-Otterdijk and Meybeck, 2011 and FAO, 2012) [13], [10] and if unchecked, serious global food crisis is inevitable, most especially in Sub-Saharan Africa.

In Nigeria, agriculture is considered the largest sector of the economy; employing over 70 percent of the nation's labour force and contributes significantly to the nation's GDP (Ajekigbe, 2007) [1]. Nigeria's abundant land resources coupled with favourable climate allows the production of both cash and stable food crops. Common among the stable food crops are cassava, yam, cocoyam, maize, beans, sweet

potato, millet, rice, sorghum and a variety of fruits and vegetables (Fakayode, Rahji and Adeniyi, 2012) [15].

In African countries, and particularly in Nigeria, PHLs remain a persistent problem and it presents enormous threat to food security with attendant high prices of foodstuff, especially during the off-farming season (Dry season). However, during the rainy season, markets and streets are usually flooded with crops because farming is rainfed, hence, productivity is at its peak. Unfortunately, between 30 and 35% of these crops are usually wasted as a result of poor handling after harvest (Olayemi, Adegbola, Bamishaye and Awagu, 2013) [18]. Also, the non-usage of existing technologies such as sun-drying, blanching, sack bags etc. to preserve farm produce, particularly vegetables is another crucial factor contributing to PHLs in Nigeria.

The Federal Institute of Industrial Research (2016) report stated that over 45% of Nigeria's agricultural produce goes into waste. On tomatoes alone about 40% of the total 1.5 million tons Nigeria produces annually is lost due to poor handling. The study further stated that on average, a 350 basket truckload (18 metric tons) loses 144 baskets, representing financial loss of about N902,000 of the N2.2 million cost of the whole truckload. Similarly, in Okra and pepper, huge losses are also recorded as between 18.3% and 15.0% are lost, respectively (Kughur, Jornenge and Ityonongu, 2015) [17]. This loss may be responsible for the food insecurity that is currently experienced in Nigeria.

Interestingly, several interventions that have come into Nigeria from international donors over the past thirty years with the aim off alleviating food insecurity had over 95% of these funding on increased production while less than 5% was actually provided for postharvest area of concerns (World Bank, 2015) [22].

Without the use of modern technologies, some of our indigenous technologies like sun-drying, blanching, the use of woven cane baskets and sacks for tomato and pepper transportation in order to reduce deterioration are available but factors associated with usage are largely unknown in literature. Hence, the need for this study. The study therefore identified technology used by farmers and isolate critical factors that influenced usage with a view to unravelling determinants of technology usage.

II. MATERIALS AND METHODS

The research was conducted in Ekiti State. Ekiti State is situated entirely within the tropics. It is located between longitudes 40°51′ and 50°451′ East of the Greenwich meridian and latitudes 70°151′ and 80°51′ north of the Equator. It lies south of Kwara and Kogi State, East of Osun State and bounded by Ondo State in the East and in the south, with a total land Area of 5887.890sq km. Ekiti State has 16 Local Government Councils. By 1991 Census, the population of Ekiti State was 1,647,822 while the estimated population upon its creation on October 1st, 1996, was put at 1,750,000 with the capital located at Ado-Ekiti. The 2006 population census by the National Population Commission put the population of Ekiti State at 2,384,212 people. Agriculture provides income and employment for more than 75% of the population of Ekiti State.

A two stage sampling procedure was adopted as a framework to select respondents for the study using the Agricultural Development Programme (ADP) zoning pattern in the State. Based on this zoning structure, Ekiti State is divided into three ADP zones namely Aramoko, Ikere and Isan zones and all the three zones were purposively selected based on their involvement in NiCanVeg project between 2011-2015.

This project was sponsored by the International Development Research Council (IDRC) Canada to popularize the production and utilization of indigenous leafy vegetable in Southwest Nigeria. However, farmers that were captured also produce pepper and tomato due to their being indispensable in household meals in Nigeria. The population of the study area was shown in Table I.

Castelloe (2000) [8] formula for calculating sample size was used:

$$n = \frac{Z^2 xp(1-p)}{e^2} x \frac{e^2 N}{1 + Z^2 xp(1-p)}$$

Where:
n= sample size
Z= Z value and at 95% Confidence Level, Z = 1.96
P = Population proportion (In this case, 20% of the population was used) = 0.20 and
Me = Margin Error (5% = 0.05) was used.
N = population

Thus, 118, 78 and 104 farmers formed the representative sample of the population in Aramoko, Ikere and Isan ADP zones in Ekiti State, respectively. At the second and final stage, simple random sampling was used to select 300 farmers inEkiti State. The data obtained were disaggregated by sex as shown in Table I.

TABLE I SAMPLING PROCEDURE AND SIZE

ADP zone	Aromoko	Ikere	Isan	Total
Farmers' population/zone	310	205	270	785
Sample size	118	78	104	300
Gender composition				
Male	59	39	52	150
Female	59	39	52	150
Analysable sample				276
Male	56	31	51	138
Female	56	31	51	138

Source: Sample Size, 2022

Data were collected with the use of structured interview schedule for quantitative data while qualitative data were collected using Focus Group Discussion (FGD) and In-depth Interview (IDI). Quantitative data collected were analysed with the use of Factor analysis, frequency counts, percentages, and mean while qualitative data were transcribed in line with the guidelines for reporting FGD and IDI.

III. RESULTS AND DISCUSSION

A. Indigenous Technology Usage for Reducing Losses

Table II illustrates that a significant majority of farmers - 86.2% of males and 61.2% of females - reported using sack bags as a method to reduce postharvest losses, while 97.1% of male and all female farmers cited the use of woven cane baskets. The data indicate that these two methods, sack bags and woven cane baskets, were the only technologies employed by both male and female farmers to mitigate losses in tomatoes and peppers after harvesting. These tools are primarily utilized for transporting the produce from farms to homes and then to markets, typically within a day or two, due to the perishable nature of these crops. The use of baskets and sack bags helps in preserving the freshness of the produce, as fresh tomatoes and peppers fetch higher market prices compared to those processed using technologies like sun-drying or other postharvest handling methods.

This finding contrasts with the findings of Ofor and Ibeawuchi (2010) [19], who identified sun-drying as a key low-cost method for reducing postharvest tomato losses in Eastern Nigeria. This discrepancy may be attributed to geographical and cultural variations influencing farming practices between Southeast and Southwest Nigeria. Nonetheless, the study aligns with Arah, Kumah, Anku, and Amaglo (2015) [3], who found that inadequate transportation and poor access roads are major contributors to off-farm tomato losses in many African countries.

Similarly, Idah, Ajisegiri, and Yisa (2007) [16] reported that woven cane baskets are a prevalent technology for transporting tomatoes to minimize losses in Nigeria. The study further highlights the significant amount of losses in Nigerian tomato production, contrasting with developed countries where producers often have contracts with multinational supermarkets. These supermarkets utilize cool freezing technology to preserve tomato freshness for extended periods, a practice not commonly seen in Nigeria.

The findings from the quantitative data were further used to buttress the result of the FGD session as given thus:

In the excerpt from a Focus Group Discussion session in Aba Ikare, Ekiti State, farmers shared that they sell their tomatoes and peppers directly to consumers without the ability to preserve them. As a result, they transport the crops from the farms to markets while they are still fresh. However, they face significant losses both at the farm level and in the markets, especially during peak production times. Although they are aware of cooling machines as a preservation method, financial constraints and lack of electricity hinder their ability to utilize such technology. Consequently, they rely on woven cane and sack bags for transportation, which unfortunately still leads to considerable wastage during transit. To mitigate some of these losses, farmers use the waste to produce seeds and for consumption.… Excerpt from one of the FGD session in Aba Ikare in Ekiti State

Similarly, an excerpt from one of the In-depth interviewed further buttressed the assertions of the respondents by saying:

The excerpt from an In-depth Interview in Alapoto village, Ekiti State, reflects on past practices where farmers pre-boiled and then sun-dried tomatoes and peppers to preserve them during times of surplus. This method effectively reduced wastage. However, it has fallen out of favor in recent times as consumers in the market now prefer purchasing tomatoes in cans and bottles over those preserved using this traditional method. As a result, the popularity of sun-drying and pre-boiling has waned, although the techniques remain available. The interviewee suggests that with government assistance and education, these methods could be revitalized, especially considering concerns about the health implications of canned foods. The interview highlights a shift in consumer preferences and a potential opportunity for government intervention to promote healthier, traditional food preservation methods… Excerpt from IDI in Alapoto village, Ekiti State.

TABLE II INDIGENOUS TECHNOLOGY UTILIZED FOR MINIMIZING POSTHARVEST LOSSES

Variable	Male, n= 138	Female, n= 138
	F (%)	F (%)
Sun-Drying	44 (31.9)	53 (38.4)
Drying under fire	18 (13.0)	18 (13.0)
Blanching	33 (23.9)	6 (4.3)
Sack Bag	134 (97.1)	138 (100.0)
Woven Cane Basket	119 (86.2)	85 (61.6)

Source: Computed from the Field Survey Data, 2022
Figures in parentheses represent percentages

B. Frequency of Use of Indigenous Technologies

Table III indicates that both male (mean = 3.61 for sack bags and mean = 3.42 for woven cane baskets) and female (mean = 3.57 for sack bags and mean = 3.70 for woven cane baskets) farmers frequently utilize sack bags and woven cane baskets. The data suggest that in terms of postharvest technologies, these methods are predominantly used by both genders for reducing losses in tomatoes and peppers during transportation.

However, it appears that other technologies like sun-drying, which could also help in minimizing postharvest losses in vegetable production, are not widely used among male and female farmers in the study area. This could be due to the perception that the end products of some technologies, such as sun-dried vegetables, are less appealing. Additionally, cold storage systems, although effective, are considered too expensive for farmers. The fast deterioration of the end product is another concern, as highlighted in one of the Focus Group Discussion sessions.

During a Focus Group Discussion session in Alapoto village, Emure-Ekiti State, farmers expressed the challenges they face in preserving tomatoes and peppers. Even those with deep freezers find them inadequate for storing the large quantities produced, often over 40 baskets of tomatoes and more than 25 bags of peppers. Additionally, the lack of reliable electricity in the village, which was electrified in 2003 but lost power within two years, exacerbates the problem. With electrical cables either lying on the ground or stolen, using freezers for preservation is not feasible. The small amounts that some farmers manage to store in freezers, primarily used for cooling drinks, are for home consumption and spoil quickly once removed from the freezer.

The farmers' main priority is transporting their produce to markets with minimal damage, as improper handling can lead to significant financial losses. The use of sun-drying is not favored in the market, where consumers prefer canned tomatoes, and only becomes profitable during times of scarcity, as experienced two years prior to the discussion. The farmers' accounts highlight the difficulties they face in preserving and transporting their produce, along with the market's preference for canned over sun-dried or blanched products… Excerpt from the FGD session at Alapoto village in Emure-Ekiti State

Based on the above assertions, respondents primarily concentrate on the transportation aspect of postharvest, only to ensure that less damage is done to the produce from the farm to the market in order to command higher market price. This implies that other technologies that could be used for minimizing postharvest losses in tomato and pepper were not given priority. These findings corroborated the results of quantitative that reported that only sack bags and woven cane baskets recorded high frequency of usage among farmers in the study areas. The usage of sack bags and woven cane baskets are for transportation. This is because, they give room for proper aeration that prevent anaerobic respiration which promotes deterioration in tomato and pepper.

This study further confirmed the assertions of Akbudak, Akbudak, Seniz and Eris (2012) [2] that environmental heat also give rise to a sudden increase in metabolic activity hence prompt cooling after harvest to increase the rate of deterioration in tomato, giving rise to losses. This makes farmers to make use of facilities such as the use of aerated sacks and woven cane baskets that could reduce deterioration in vegetable. Similarly, Ofor and Ibeawuchi (2010) [19] and Emana, Afari-Sefa, Nenguwo, Ayana, Kebede and Mohammed (2017) [7], highlighted pertinent problems which still beset the sun-drying practice in the humid tropic areas in Nigeria, like inadequate packaging, and the problem of microorganisms in dried materials due to high moisture levels, especially in crops like tomato and other vegetables. This may be the reason why sun-drying, though very much available but does not record high frequency of use among farmers in the study area.

TABLE III FREQUENCY OF USE OF AVAILABLE TECHNOLOGY FOR MINIMIZING POSTHARVEST LOSSES

Variable	Male		Female	
	Mean	Std. Dev	Mean	Std. Dev
Sun-Drying	1.84	1.24	2.03	1.11
Drying under fire	1.12	0.32	1.14	0.35
Blanching	2.12	0.66	2.04	0.31
Sack qBags	3.61*	0.49	3.57*	0.50
Cane Baskets	3.42*	0.64	3.70*	0.46

Source: Computed from the Field Survey Data, 2022
*Mean≥ 2.5 = frequently used technology

C. Factors Influencing the Use of Postharvest Technology

In order to identify factors associated with the use of technology for minimizing postharvest losses in vegetable production, the relevant variables were inter-correlated and run with Varimax factor rotation pattern.

Table IV shows the result of the Varimax rotation of the variables included in the factor analysis and the principal components subsequently extracted. The results show that the inter-correlation between the independent variables yielded five (5) factors which accounted for a total of 75.4% variation in the dependent variables, with the remaining 25.6% of the variation accounted for by unknown factors.

The Kaiser-Meyer-Olkin (KMO) of 22 (df = 120) with Bartlett's Test of Sphericity Chi-Square of 6463.387; $p \leq 0.01$ Measure of Sampling Adequacy were significant. This shows that the sample collected for the study was adequate for factor analysis. The extracted factors were named as shown in Table V.

Factor 1 was named 'Community' factor and accounted for 26.9% variation; factor 2 'Cost related/economic status' factor with variance of 15.9%; factor 3 was labeled as 'Educational related' factor, which accounted for 12.9% variation, factors 4 was named 'Proximity to major towns' and this accounted for about 10.1% variation while factor 5 was labeled as 'input/resource accessibility' and this accounted for about 8.4% variance in the use of the identified technologies.

TABLE IV RESULT OF VARIMAX ROTATED COMPONENT MATRIX SHOWING EXTRACTED FACTORS WITH EIGEN VALUES

Variable	Factor				
	1	2	3	4	5
Cost of technology	-0.348	0.212	0.384	0.053	0.574
Available technology	-0.003	-0.191	0.19	0.313	0.718
Accessibility to technology	-0.472	0.295	-0.322	-0.479	0.665
Gender	0.471	0.165	0.596	-0.045	0.433
Culture of community	0.713	0.266	0.137	-0.049	-0.103
Belief system	0.759	0.178	-0.138	0.343	0.130
Health status of farmers	0.691	-0.114	-0.205	-0.12	0.555
Level of education	0.18	-0.016	0.905	0.064	-0.046
Other form of occupation	0.386	0.392	-0.116	-0.017	-0.137
Monthly income	0.377	0.819	0.014	-0.198	-0.015
Monthly expenditure	0.135	0.780	0.026	0.275	-0.313
Electricity supply	0.333	-0.461	0.311	-0.303	-0.666
Poor road network	-0.311	0.166	-0.186	0.514	0.357
Location of community	0.409	-0.453	-0.11	0.683	-0.363
Spatial factor	0.586	0.080	0.426	-0.22	-0.017
Training	0.132	-0.482	0.736	0.058	0.143
Eigen value	4.31	2.56	2.07	1.61	1.35
% variation	26.94	15.99	12.95	10.15	8.43
Cumulative % variation	26.94	42.94	55.88	65.93	74.35

Source: Computed from field Survey Data, 2022
*Figures in bold fonts indicate variables with high loading on each factor

TABLE V FACTOR NAMES AND PERCENTAGE VARIATION ACCOUNTED FOR BY EACH FACTOR

Factor	Name	% Variance	Cumulative % variance
1	Community related factor	26.94	26.94
2	Economic Status	15.99	42.94
3	Educational Related factor	12.95	55.88
4	Proximity to cities	10.05	65.93
5	Input/Resource	8.43	74.35

Source: Derived from the Result of Factor Analysis

1. Factor One: 'Community Related' Factor

In factor one, variables that loaded very high (>0.5) were culture of community (L=0.713), belief system (L=0.759), farmers' health status (L = 0.691) and spatial factor (L=0.586). These variables put together, point to what establishes an individual behavioral pattern within a given community as they dictate adoption and utilization of certain practices. This is because environment is a major factor that patterns individual attitude towards the use of some farming practices (Yusuf, 2014) [24]. Therefore, the belief system of a community and the culture of the inhabitants of such community that had the highest loading were used to name this factor as community related factor. The finding implies that cultural issues and the belief system of a community are strong variables which dictate people direction and ways of doing things as violation of culture may come with certain penalties (Ekong, 2003) [6] which every inhabitant will want to avoid. This factor explains about 26.94% variation in the utilization of technologies for reducing postharvest losses in tomato and pepper in the study area as shown in Table VI. This factor was regarded as the strongest with its percentage contribution. This means that community tradition is a crucial factor that influences people behavioral pattern, and this may also influence adoption of farming practices and technology among farmers.

2. Factor Two: 'Economic Status' Factor

In factor two in Table VI, two variables loaded high with the following loadings for monthly income (L = 0.819) and

monthly expenditure (L = 0.780). These variables determine the profit that may be obtained from an enterprise and the scale of production. The amount of expenses a farmer incurs, and the amount derived as income at the end of the month depends on the scale of production and this by extension, has influence on the utilization of certain farming practices and adoption of technologies for minimizing postharvest losses in vegetable production.

The variables were used to name this factor as 'economic status' of the farmers. The factor explained about 15.99% variation in the utilization of postharvest technologies for reducing losses in vegetable production. The implication of this finding is that farmers with huge expenditure are expected to have high income all things being equal, and this could be a function of the investment such a farmer must have invested in reducing postharvest losses through the use of technologies.

Results of one of the FGD sessions was used to buttressed this finding as given thus:
… we can only buy machines for preserving tomato if we have the opportunity of farming all year round and we have machines to cultivate large hectares of farmland. However, if you can help us talk to the government, we are ready to use but electricity has to be provided or do you think we can use the machines without electricity? Our sales for now are on a small scale and seasonal, although, wastages occur a lot during the peak period, but we still make some profit, especially in farming season when pest infestation is not high… Excerpt from one of the FGD sessions at Ago Ajayi in Ondo State.

Based on the above findings, the reason for the low usage of the available technologies emerged. Thus, high investment in vegetable production would bring about better profit and this in turn may enhance farmers' ability to use more technologies that may reduce losses for better profit.

3. Factor Three: 'Educational related' Factor

Factor three in Table VI was named as 'educational related' factor with the following variables; level of educational level (L = 0.905), number of training attended (L= 0.736) and gender (L = 0.596) which, loaded high among other variables that formed the factor. Owning to the high loadings of number of years spent in formal education and number of training attended, this factor was named as educational factor. This is in-line with the findings of Apata and Shitu (2013) and Apata, (2010) [4], [5], that reported education as a significant factor that contributed to the adoption and utilization of technology in farming. This factor contributed about 12.95% variation to the utilization of technologies for minimizing losses in tomato and peppers production in the study area.

The implication of this finding is that educated farmers and those that have attended training in the area of postharvest handling may be prone to using technologies for reducing losses than those with lesser level of education with no training attendance records. This means that to enhance technology usage among farmers in postharvest handling, education and training attendance should be encouraged.

4. Factor Four: Proximity to Cities

In factor four, poor road network (L= 0.514) and location of community (L = 0.683) were the two variables that had significant loadings and they contributed about 10.05% variation to the utilization of technologies for minimizing postharvest losses as shown in Table VI. The implication of this finding is that villages that are close to cities may have the privilege of benefiting from electricity and better methods of reducing postharvest losses in vegetables due to the regular and frequent extension contact than those villages/communities that have poor road network and far away from the major cities.

Usually, many head offices of research stations and agricultural related institutes are located in town and cities, hence, communities that are very close to the organizations stand to benefit more from the technological dissemination than those communities that are far from the cities. In Nigeria, where the farmer-extension ratio is far above the World Bank recommended and the few available extension workers lack mobility and logistic to effectively perform their responsibilities of meeting and disseminating useful information that may enhance farmers' productivity would definitely prefer to work within the locations that are nearby while those far locations suffer from lack of information. Thus, this will have unfavorable effect on their productivity and adoption and utilization of farm practices that may enhance production.

5. Factor Five: Input/Resource Factor

In factor five which explains about 8.43% variation in the utilization of technologies for minimizing postharvest losses in tomato and pepper in the study area had variables like cost of technology (L = 0.574), availability of technology (L = 0.718) and access to technology (L = 0.665) loaded very high under this factor and putting these variables together pointed to the input/resource factor that influence the usage of these technologies that could be used to reduce losses in postharvest handling of tomato and pepper in the study area as presented in Table VI. This implies that accessibility, availability and reduction in the cost of these technologies will enable farmers to use them for minimizing losses.

Resource availability and accessibility at times is a function of price. Therefore, resources with a reduced price if available will be more accessible than those with higher prices. Thus, resource availability and accessibility have the tendency to encourage usage and by extension, it brings about an increase in farmers' productivity.

TABLE VI VARIABLES CONTRIBUTIVE TO EACH OF THE IDENTIFIED FACTORS INFLUENCING UTILIZATION OF TECHNOLOGY

Variables	Loading (L)	L^2	$\sum L^2$
Community factor			
Community culture	0.713	0.508	
Belief system	0.759	0.576	2.12
Health system	0.691	0.691	
Spatial factor	0.586	0.343	
Economic factor			
Monthly income	0.819	0.671	1.28
Monthly expenditure	0.780	0.608	
Educational factor			
Years spent in formal education	0.905	0.819	1.717
Number of training attended	0.736	0.542	
Gender	0.596	0.356	
Proximity to cities			
Poor road network	0.514	0.264	0.73
Location of communities	0.683	0.466	
Input/resource factor			
Cost of technology	0.574	0.329	
Availability of technology	0.718	0.516	1.29
Accessibility of technology	0.665	0.442	

Source: Computed from Field Survey Data, 2022

IV. CONCLUSION

Minimizing postharvest losses in tomatoes and peppers is crucial for sustainable food security in Nigeria, as these crops are essential in the diets of most Nigerian households. Despite their importance and the favorable climate for their cultivation, Nigeria still spends a significant amount of money importing tomato paste due to substantial losses of locally produced tomatoes. In Ekiti State, various indigenous technologies are available, with transportation-related methods like woven cane baskets and sack bags being widely used by both male and female farmers. The reliance on these technologies is largely due to the farmers' inability to afford preservation machines and their limited farm size, coupled with a lack of access to irrigation. Furthermore, the unpopularity of other preservation methods such as sun-drying, drying under fire, and blanching has led to a limited use of indigenous technologies beyond those related to transportation. Factors influencing technology usage among farmers include community dynamics, cost and economic considerations, education levels, proximity to major towns, and the accessibility of inputs and resources. To address these challenges, it is recommended that agricultural stakeholders provide training and support to farmers, enabling them to effectively utilize a broader range of indigenous technologies to reduce postharvest losses.

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