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# Extension workers' linkage mechanisms of smallholder rice farmers to market in Edo State, Nigeria

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## ABSTRACT

This study assessed the mechanisms for linking smallholder rice farmers to markets by extension workers in Edo State, Nigeria. A two-stage sampling procedure was adopted for the simple random sampling of 80 respondents through the use of questionnaire. Data collected were analyzed using descriptive and inferential statistics. Results showed that more than half (57.5%) of the extension workers were males with a mean age of 40 years. The results also indicated that access to credit ($\bar{x}$ = 2.98) was the most significant strategy for linking smallholder rice farmers to the market input. With respect to the output market, the direct linkage of small-holder farmers to consumers ($\bar{x}$ = 2.69) was the prominent strategy used by extension workers. Linkage to subsidized fertilizer suppliers ($\bar{x}$ = 2.93) had the strongest linkage strength between extension workers and smallholder rice farmers while elimination of middlemen influence ($\bar{x}$ = 2.79) was highest in the output market. Education level ($\bar{x}$ = 4.93), transportation cost ($\bar{x}$ = 4.30), farming system adopted ($\bar{x}$ = 4.55) and topography ($\bar{x}$ = 4.80) were the personal, economic, social/cultural and environment respective factors influencing extension workers market linkage mechanisms with smallholder rice farmers. The study concludes that access to credit and direct links to consumers were the major linkage mechanisms used by extension workers for linking smallholder rice farmers to the input and output markets respectively. The need to further strengthen the major market linkage mechanisms used by extension workers was strongly recommended by this study without neglecting others that were not regularly used by them.

**Keywords:** Market linkage; mechanisms; small-holder rice famers

## INTRODUCTION

Rice (*Oryza sativa*) is a major staple food in Nigeria grown in all the States of the Federation at varying degrees (Ademiluyi *et al.,* 2021; Bulus *et al.,* 2023). In recent times, the rice sector has witnessed remarkable development both in production and consumption. Its consumption has evolved into a habitual food preferred for its intrinsic values such as taste, nutrition and ease of preparation (Ogunleke *et al.,* 2024). It has changed from being a luxury to a necessity among Nigerian households whose consumption will continue to increase with per capita GDP growth (Onu, 2018). The high acceptance of rice in the Nigerian

diet has projected the crop a formidable candidate for policy discourse in the agricultural extension service delivery and food system frameworks of the country (Ogunleke *et al.,* 2024).

There has been a perennial production-consumption gap in the rice sector which had made its importation an alternative option, thus causing substantial loss in foreign exchange amounting to billions of Naira (Ekundayo, 2023; Ugalahi *et al.*, 2016, Ayanwale and Amusan, 2012). To alleviate the detrimental effect of importation, some policy measures were initiated by the Nigerian government to encourage the local production of the crop. According to Udemezue (2018) these policies were ineffective and have sparked up policy review among researchers. It was in attempt to sustainably address this national dilemma; that the Federal Government of Nigeria in August 2019 announced a border closure policy, which comprised a ban on rice importation to provide opportunity to boost local rice production and to assist producers who are largely smallholder to earn greater market share of their produce (Udeh and Nwokorobia, 2022, Sherif *et al.*, 2023; Owoade *et al*, 2021; and Campbell, 2019). It was also expected that local rice in Nigeria should be able to compete with global brands if the production standard is channeled towards the attributes desired by the consuming households (Obih and Baiyegunhi, 2017).

Smallholder farmers produce about 90% of rice in farm sizes ranging from 0.9 to 3 hectares (ha), with an average farm size of 1.3 ha (Rugumamu, 2014; Mauki, 2023). According to Alidu *et al.,* (2022) smallholder rice farmers are accosted by various socioeconomic factors ranging from discriminatory societal class, low access to capital resources, poverty, inadequate credit facilities, high cost of inputs, poor electricity supply, insufficient irrigation facilities, bad roads which further escalate the vulnerabilities of their households to poverty. Most smallholder rice farmers are under pressure to sell off their produce due to unexpected fluctuation in prices arising from inefficient market system (Zalkuwi, *et al.,* 2024). At times a sufficient supply of rice is available in some localities, but there is poor access to such locations due to scanty information as regards its availability. The middlemen usually explore this opportunity by purchasing rice at cheaper rate and selling exorbitantly to the consumers with greater margin and the increment does not in any way get to the smallholder farmers who are the primary producers (Nuraini, 2024). This scenario therefore presents a huge challenge to the extension workers saddled with responsibility of information delivery to the smallholder farmers and providing appropriate linkages to market their produce. The extension workers must therefore be able to fill this gap by ensuring that smallholder farmers are privy to relevant information to enable them to have access to target markets in time and regular basis. This is because, information assists smallholder farmers to balance supply and demand in particular market and thus avoid gluts and surpluses with the corresponding fluctuation in prices (Mensah, 2020).

Market linkage by the extension worker is a communication and collaborative relationship established between two or more individuals or organizations for commonly shared objectives in order to have regular contact and improved productivity (Debele, *et al.*, 2019). According to Omoregie and Koyenikan (2020), agricultural research and extension are examples of two systems that are constantly linked by information flow and feedback. The farmer occupies a central position between research and extension and is expected to be the main target and beneficiary of their activities. Therefore, as the agricultural food production chain is changing, a strong coordinated link is expected between smallholder farmers, traders, processors and others in the production and supply chain. This assertion has been greatly challenged considering the submission by Petros *et. al.*, 2022 that a major limitation to effective marketing

of agricultural produce is the fact that many individuals responsible for extension service delivery are poorly motivated and inefficient for extension work. In fact, most agents in charge of market information dissemination are not trained for the job but rather recruited from fields virtually unrelated to the scheme (Ozowa, 2004; Whillans, *et al.*, 2022).

This study becomes necessary due to scanty literature in the area of investigating different approaches for linking smallholder farmers to the market by the agricultural extension workers especially in Edo State, Nigeria. It is against this backdrop that this study was designed to assess the market linkage mechanisms between extension workers and smallholder rice farmers in the study area.

## METHODOLOGY

### Description of the Study Area

The study was carried out in Edo State, Nigeria. The State is bounded to the North and East by Kogi State, to the South by Delta State and to the West by Ondo State. It lies approximately between Latitude 6.6342$^{o}$ N and Longitude 5.9304$^{o}$ E with a land mass of 17,802 km$^2$ and an estimated population of 4,777,000 (National Bureau of Statistics, 2020). The State is delineated into three zones based on Agro-ecologies in the State by the State's Agricultural Development Programme (ADP) which are Edo South, Edo North and Edo Central. The North of Edo State is mainly Derived Savannah while its central of Esan plateau is made up of diverse vegetation, and the riverine communities in the south have mainly mangrove swamp vegetation and forest. By implication, this presents Edo State in the advantage position of rice production in Nigeria. Other food crops cultivated include yam, cassava, maize and assorted vegetables.

### Sampling Procedure and Sample Size

A two-stage sampling procedure was adopted in selecting the respondents for the study. The first stage involved a purposive selection of 10 out of the 18 Local Government Areas (LGAs) in Edo State; based on the significant involvement of extension workers in rice marketing information dissemination to smallholder farmers. The second stage was a simple random sampling of eight (8) extension workers from each of the 10 LGAs which gave a total of 80 respondents for the study.

### Data Collection

Primary data for the study were collected through the administration of 80 copies of structured questionnaire to the extension workers. Secondary information was obtained from relevant literature, agricultural journals, periodicals, textbooks, bulletins and the internet.

### Measurement of the Study Variables

The ordinal level for measuring mechanisms used for linking smallholder rice farmers to the market was adopted and rated at 3-point Likert type scale, scored as: Not used = 1, Rarely used = 2 and Always used = 3. A Mean score of 2.0 and above ($\bar{x} \geq 2.0$) implied that a particular market linkage mechanism was significantly used by extension workers. Also, the perceived market linkage strength was measured at 3-point Likert-type scale and scored as: No linkage = 1, Weak linkage = 2 and Strong linkage = 3. The Mean value of 2.0 and above ($\bar{x} \geq 2.0$) suggested strong market linkage strength. However, the factors influencing respondents' linkage mechanisms were measured at 5-point Likert scale and scored as:

Strongly Agree = 5, Agree = 4, Undecided = 3, Disagree = 2 and Strongly disagree = 1. A mean score of 3.0 and above ($\bar{x} \geq 3.0$) was perceived as a strong factor influencing market linkage mechanism in the study area.

**Data Analysis**

Data obtained were analysed using descriptive statistics such as frequency counts, simple percentages and mean scores while inferential tool like the Spearman's Rank Correlation analysis was used to draw relevant inferences. The model of the Spearman's Rank Correlation analysis is given below:

$$r_s = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

Where:
r = Correlation coefficient
$d_i$ = difference in paired ranks between market linkage mechanisms and linkage strength
$n$ = Number of estimated variables
$\Sigma$ = Sigma sign or Summation of established differences

## RESULTS AND DISCUSSION

**Socio-Economic Characteristics of Extension Workers in Edo State**

Result in Table 1 shows that more than half (57.5%) of the extension workers were males while the remaining (42.5%) were female with a mean age of 40 years.

Table1: Distribution of respondents according to their socio-economic characteristics (n = 80)

| Variables | Description | Freq. | Perc. | Mean |
|---|---|---|---|---|
| Sex | Male | 46 | 57.5 | |
| | Female | 34 | 42.5 | |
| Age | 20 – 30 | 10 | 12.5 | |
| | 31 – 40 | 35 | 43.8 | 40.06 |
| | 41 – 50 | 28 | 35.0 | |
| | 51 – 60 | 7 | 8.8 | |
| Marital Status | Married | 60 | 75.0 | |
| | Single | 15 | 18.8 | |
| | Divorced | 1 | 1.3 | |
| | Widow/Widower | 4 | 5.0 | |
| Years of Experience | 1 – 10 | 32 | 40.0 | |
| | 11 – 20 | 35 | 43.8 | 13.64 |
| | 21 – 30 | 11 | 13.8 | |
| | 31 – 40 | 2 | 2.5 | |
| Academic Qualification | OND | 20 | 25.0 | |
| | B.Sc./HND | 58 | 72.5 | |
| | MSc. /PhD | 2 | 2.5 | |
| Annual Income (₦) | 100000 – 300000 | 2 | 2.5 | |
| | 300001 – 600000 | 25 | 31.3 | 675750.00 |
| | 600001 – 900000 | 50 | 62.5 | |
| | 900001 – 1000000 | 3 | 3.8 | |

This result indicates that there were more male extension workers in Edo State who were within the economically active age group. This result agrees with the findings of Omoregie and Koyenikan (2020) in which extension service delivery was male dominated. The majority (75.0%) of the extension workers were married with an average of 14 years working experience. All the extension workers possessed one form of formal education or another with the majority (72.5%) possessing bachelor's degree (BSc.) or a Higher National Diploma (HND) with a mean annual income of ₦675,750.00. This result is similar to the findings of Adesoji and Aratunde (2012) where greater proportion of extension workers had HND as their highest educational level.

**Mechanisms for Linking Smallholder Rice Farmers to the Market**

Results in Table 2 indicated that access to credit ($\bar{x}$ = 2.98) was the most significant strategy used by extension workers for linking smallholder rice farmers to input market. This was followed by linkage to subsidized fertilizers ($\bar{x}$ = 2.91), links to modern farm tools and ($\bar{x}$ = 2.84) and access to efficient labour ($\bar{x}$ =2.46). The result infers that extension workers use many linkage mechanisms (Osabuohien *et al.,* 2023) and their access to credit was the profound mechanism for linking smallholder rice farmers to the input market by extension workers. This result agrees with the findings of Konkwo *et al.,* (2022) and Asogwa *et al.,* (2014) that access to credit is fundamental for the smooth running of farming operations and performs a vital role in economic development of any nation.

Table 2: Mechanisms used by extension workers for linking smallholder rice farmers to the market (n = 80)

| Linkage mechanisms | Not used | | Rarely used | | Always used | | | |
|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | Mean | Rank |
| Input supply/Market | | | | | | | | |
| Access to credit | 0 | 0.0 | 2 | 2.5 | 78 | 97.5 | 2.98* | 1st |
| Link to subsidized fertilizer suppliers | 0 | 0.0 | 7 | 8.8 | 73 | 91.3 | 2.91* | 2nd |
| Link farmers to modern farm tools | 2 | 2.5 | 9 | 11.3 | 69 | 86.3 | 2.84* | 3rd |
| Access to efficient labour | 3 | 3.8 | 34 | 42.5 | 42 | 52.5 | 2.46* | 4th |
| Link with herbicides suppliers | 0 | 0.0 | 45 | 56.3 | 34 | 42.5 | 2.40* | 5th |
| Linking farmers to seed suppliers | 0 | 0.0 | 57 | 71.3 | 23 | 28.8 | 2.29* | 6th |
| Provision of advisory services | 15 | 18.8 | 35 | 43.8 | 30 | 37.5 | 2.19* | 7th |
| Intensifying research | 34 | 42.5 | 20 | 25.0 | 23 | 28.8 | 1.79 | 8th |
| Output handling/market | | | | | | | | |
| Link farmers to consumers | 0 | 0.0 | 25 | 31.3 | 55 | 68.8 | 2.69* | 1st |
| Eliminate the influence of middlemen | 1 | 1.3 | 30 | 37.5 | 49 | 61.3 | 2.61* | 2nd |
| Effective drying technique | 0 | 0.0 | 29 | 36.3 | 50 | 62.5 | 2.60* | 3st |
| Linking farmers to millers | 0 | 0.0 | 33 | 41.3 | 47 | 58.8 | 2.59* | 4th |
| Access to efficient transport system | 1 | 1.3 | 32 | 40.0 | 47 | 58.8 | 2.58* | 5th |
| Link to de-stoning factories | 1 | 1.3 | 34 | 42.5 | 44 | 55.0 | 2.56* | 6th |
| Provide marketing information | 0 | 0.0 | 36 | 45.0 | 44 | 55.0 | 2.55* | 7th |
| Efficient bookkeeping and farm records | 2 | 2.5 | 32 | 40.0 | 46 | 57.5 | 2.55* | 7th |
| Provision of trading centers | 0 | 0.0 | 37 | 46.3 | 43 | 53.8 | 2.54* | 8th |
| Improved polishing, grading and sorting | 0 | 0.0 | 38 | 47.5 | 42 | 52.5 | 2.53* | 9th |
| Improve farm to market roads | 3 | 3.8 | 32 | 40.0 | 45 | 56.3 | 2.53* | 9th |
| Linkage to quality bags for packaging | 2 | 2.5 | 35 | 43.8 | 43 | 53.8 | 2.51* | 10th |
| Access to modern threshers and winnowers | 1 | 1.3 | 40 | 50.0 | 39 | 48.8 | 2.48* | 11th |
| Linking farmers to hullers | 5 | 6.3 | 39 | 48.8 | 36 | 45.0 | 2.39* | 12th |

* Mean $\geq$ 2.0 significantly used mechanisms

With respect to the output market, the direct linkage of smallholder farmers to consumers ($\bar{x}$ = 2.69) was the prominent mechanism used by extension workers. Next to this were linkages to eliminate the influence of middlemen ($\bar{x}$ = 2.61), for effective drying technique ($\bar{x}$ = 2.60) and for smallholder farmers to millers ($\bar{x}$ = 2.59). This result implies that extensions workers were proficient in linking smallholder rice farmers to sell their farm produce directly to consumers thereby eliminating the activities of middlemen. Middlemen traditionally interact with smallholder farmers on individual basis, either buying from them at local markets or at the farm gate. However, in the absence of reliable marketing information, purchases at farm gate level becomes highly inefficient and may translate to high marketing costs usually associated with the exploitation of smallholder farmers by middlemen. The extension workers can eliminate such costs by organizing smallholder farmers together for group transportation and sales to competing buyers.

**Perceived Market Linkage Strength by Extension Workers**

Table 3 presents that extension workers had strongest linkage with smallholder rice farmers to suppliers of subsidized fertilizer ($\bar{x}$ = 2.93). It further shows that there was a strong linkage of smallholder rice farmers to sources of quality seeds varieties ($\bar{x}$ = 2.79), herbicide suppliers ($\bar{x}$ = 2.61 and advisory services ($\bar{x}$ = 2.61). This result implies that extension workers were most efficient in linking smallholder rice farmers to reliable sources of subsidized fertilizers. This result is not surprising counting on the findings of Konkwo and Michael (2021) where fertilizer recommendation was zenith among the input sourcing by smallholder arable crop farmers. According to Suprianto *et al.*, (2022), subsidies on fertilizer aim to increase food production and smallholder farmers' income. Fahmid *et al.*, (2022) stated that in order to optimize the benefits of fertilizers, it is important to sensitize smallholder farmers to six basic conditions such as the right amount, dose, type, price, quality, and right time, hence they need for effective extension services.

On the output market, result indicates that linkage strength to eliminating the influence of middlemen ($\bar{x}$ = 2.79) was highest among the examined variables. Others were efficient bookkeeping and farm records ($\bar{x}$ = 2.76), access to an effective transport system ($\bar{x}$ = 2.63) and effective drying technique ($\bar{x}$ = 2.63). By implication, effort at eliminating the influence of middlemen in the sales of rice directly to consumers by smallholder farmers was paramount in the output market. The need for direct access to agricultural markets by smallholder farmers to ensure sustainable supply of farm produce has been seriously emphasized in recent times (Donkor *et al.*, 2018). This is because most researchers tend to perceive the activities of middlemen as parasitic who often take a huge share of the consumer price (Sudrajat, *et al.*, 2021). Hence, by prior linkage of smallholder farmers with buyers in advance of production is useful approach to connecting them to markets thereby significantly bypass the activities of the wholesalers (Taku-Forchu, 2019). Extension agents can perform a vital role by directly linking farmers to new markets and grouping them into formal or informal units as well as organize bulk marketing of farm produce to reduce transportation costs. This could guarantee active participation of smallholder farmers in different markets and assist them obtain fair share from the ales of produce (Ahmad and Winarno, 2023).

Table 3: Linkage strength between extension workers and rice farmers in rice marketing (n = 80)

| Linkage strength | No linkage | | Weak linkage | | Strong linkage | | Mean | Rank |
|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | | |
| Input supply/market | | | | | | | | |
| Link to subsidized fertilizer suppliers | 0 | 0.0 | 6 | 7.5 | 74 | 92.5 | 2.93* | 1st |
| Link with quality seed varieties | 0 | 0.0 | 17 | 21.3 | 63 | 78.8 | 2.79* | 2nd |
| Link with herbicides suppliers | 0 | 0.0 | 31 | 38.8 | 49 | 61.3 | 2.61* | 3rd |
| Access to advisory services | 3 | 3.8 | 25 | 31.3 | 52 | 65.0 | 2.61* | 3rd |
| Access to efficient labour | 2 | 2.5 | 29 | 36.3 | 49 | 61.3 | 2.59* | 4th |
| Link with seed suppliers | 0 | 0.0 | 36 | 45.0 | 44 | 55.0 | 2.55* | 5th |
| Link with credit sources | 21 | 26.3 | 1 | 1.3 | 58 | 72.5 | 2.46* | 6th |
| Link to modern farm implements | 46 | 57.5 | 14 | 17.5 | 20 | 25.0 | 1.68 | 7th |
| Output handling/market | | | | | | | | |
| Eliminate the influence of middlemen | 0 | 0.0 | 63 | 78.8 | 17 | 21.3 | 2.79* | 1st |
| Efficient bookkeeping and farm records | 1 | 1.3 | 17 | 21.3 | 62 | 77.5 | 2.76* | 2nd |
| Access to effective drying technique | 1 | 1.3 | 28 | 35.0 | 51 | 63.8 | 2.63* | 3rd |
| Access to efficient transport system | 0 | 0.0 | 30 | 37.5 | 50 | 62.5 | 2.63* | 3rd |
| Link to destoning factories | 0 | 0.0 | 35 | 43.8 | 45 | 56.3 | 2.56* | 4th |
| Access to marketing information | 1 | 1.3 | 33 | 41.3 | 46 | 57.5 | 2.56* | 4th |
| Link to trading centers | 0 | 0.0 | 40 | 50.0 | 40 | 50.0 | 2.50* | 5th |
| Link to millers | 0 | 0.0 | 43 | 53.8 | 37 | 46.3 | 2.46* | 6th |
| Link to hullers | 0 | 0.0 | 44 | 55.0 | 36 | 45.0 | 2.45* | 7th |
| Improved polishing, grading and sorting | 39 | 48.8 | 22 | 27.5 | 19 | 23.8 | 1.75 | 8th |
| Linkage to quality bags for packaging | 53 | 66.3 | 13 | 16.3 | 14 | 17.5 | 1.51 | 9th |
| Improved farm to market roads | 58 | 72.5 | 8 | 10.0 | 14 | 17.5 | 1.45 | 10th |
| Link with consumers | 66 | 82.5 | 8 | 10.0 | 6 | 7.5 | 1.25 | 11th |

* Strong linkage: Mean $\geq$ 2.0

**Perceived Factors Influencing the Linkage Mechanisms Used by Extension Workers**

Result in Table 4 shows the perceived factors influencing extension workers linkage mechanisms with smallholder rice farmers. With respect to the personal factors, educational level ($\bar{x}$ = 4.93) and farmer/extension ratio ($\bar{x}$ = 4.14) were the most significant factors that influenced extension workers' market linkage mechanisms in the study area. This result therefore implies that extension workers perceived educational attainment as one of the key determinants of extension workers effective market linkage mechanisms. This result conforms to the findings of Ma *et al.*, (2024) in which educational level significantly eliminated barriers to farmers' linkage with produce buyers.

Again, Table 4 points that the extension workers significantly perceived transportation cost ($\bar{x}$ = 4.30), market inaccessibility ($\bar{x}$ = 4.30), insufficient capital ($\bar{x}$ = 4.29) and price of commodities ($\bar{x}$ = 3.00) as the major economic factors that influenced their market linkage mechanisms. The result clearly infers that the extension workers perceived transportation cost was a remarkable factor influencing their linkage with smallholder rice farmers to the

market. This result strongly agrees with the findings of Gyeltshen and Osathanunkul (2021) where high transportation cost was a major barrier to small-scale farmers Market linkage system.

Finally, Table 4 displays that the type of farming system adopted by smallholder farmers ($\bar{x}$ = 4.55), social organization ($\bar{x}$ = 4.53) and topography ($\bar{x}$ = 4.80) were the most significant perceived social, cultural and environmental factors that influenced respondents' market linkage mechanisms with smallholder rice farmers. The result therefore suggests that the respondents perceived the adoption of an improved farming system as the most significant factor influencing smallholder rice farmers' linkage to the market. This result corroborates with similar findings of Mishra *et al.,* (2022) where integrated farming system provided viable solutions by diversifying crop production, enhancing soil fertility, and improving climate resilience.

Table 4: Perceived factors influencing the linkage mechanisms used by extension workers (n = 80)

| Perceived factors | SD | | D | | U | | A | | SA | | Mean | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | F | % | F | % | | |
| Personal factors | | | | | | | | | | | | |
| Education level | 1 | 1.3 | 0 | 0.0 | 0 | 0.0 | 2 | 2.5 | 77 | 96.3 | 4.93* | 1st |
| Farmer/Extension ratio | 1 | 1.3 | 4 | 5.0 | 3 | 3.8 | 47 | 58.8 | 25 | 31.3 | 4.14* | 2nd |
| Population density | 43 | 53.8 | 4 | 5.0 | 4 | 5.0 | 13 | 16.3 | 16 | 20.0 | 2.44 | 3rd |
| Family size of farmers | 50 | 62.5 | 0 | 0.0 | 2 | 2.5 | 5 | 6.3 | 23 | 28.8 | 2.39 | 4th |
| Inadequate farm size | 55 | 68.8 | 0 | 0.0 | 1 | 1.3 | 16 | 20.0 | 8 | 10.0 | 2.03 | 5th |
| Economic factors | | | | | | | | | | | | |
| Transportation cost | 2 | 2.5 | 1 | 1.3 | 4 | 5.0 | 37 | 46.3 | 36 | 45.0 | 4.30* | 1st |
| Market inaccessibility | 2 | 2.5 | 1 | 1.3 | 4 | 5.0 | 37 | 46.3 | 36 | 45.0 | 4.30* | 2nd |
| Insufficient capital | 2 | 2.5 | 0 | 0.0 | 8 | 10.0 | 33 | 41.3 | 37 | 46.3 | 4.29* | 3rd |
| Price of commodities | 36 | 45.0 | 0 | 0.0 | 1 | 1.3 | 14 | 17.5 | 29 | 36.3 | 3.00* | 4th |
| Cost of labour | 37 | 46.3 | 1 | 1.3 | 1 | 1.3 | 21 | 26.3 | 20 | 25.0 | 2.83 | 5th |
| Cost of land | 52 | 65.0 | 0 | 0.0 | 3 | 3.8 | 10 | 12.5 | 15 | 18.8 | 2.20 | 6th |
| Immigration laws | 59 | 73.8 | 0 | 0.0 | 0 | 0.0 | 8 | 10.0 | 13 | 16.3 | 1.95 | 7th |
| Social/Cultural factors | | | | | | | | | | | | |
| Farming system adopted | 2 | 2.5 | 0 | 0.0 | 3 | 3.8 | 22 | 27.5 | 53 | 66.3 | 4.55* | 1st |
| Social organization | 2 | 2.5 | 0 | 0.0 | 1 | 1.3 | 28 | 35.0 | 49 | 61.3 | 4.53* | 1st |
| Ethics and values | 2 | 2.5 | 0 | 0.0 | 1 | 1.3 | 34 | 42.5 | 43 | 53.8 | 4.45* | 2nd |
| Religious beliefs | 3 | 3.8 | 0 | 0.0 | 4 | 5.0 | 33 | 41.3 | 40 | 50.0 | 4.34* | 3rd |
| Land ownership | 43 | 53.8 | 0 | 0.0 | 1 | 1.3 | 25 | 31.3 | 11 | 13.8 | 2.51 | 2nd |
| Food choices | 47 | 58.8 | 0 | 0.0 | 3 | 3.8 | 6 | 7.5 | 24 | 30.0 | 2.50 | 4th |
| Environmental factors | | | | | | | | | | | | |
| Topography | 2 | 2.5 | 0 | 0.0 | 1 | 1.3 | 6 | 7.5 | 71 | 88.8 | 4.80* | 1st |
| Climate | 2 | 2.5 | 0 | 0.0 | 0 | 0.0 | 9 | 11.3 | 69 | 86.3 | 4.79* | 2nd |
| Soil | 71 | 88.8 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 9 | 11.3 | 1.45 | 3rd |

*Agreed: Mean $\geq$ 3.0

SA: Strongly Agree = 5, A: Agree = 4, U: Undecided = 3, D: Disagree = 2 and SD: Strongly disagree = 1

**Relationship between the Linkage Strength and the Mechanisms Used for Linking Rice Farmers to the Market by the Extension Workers**

Table 5 shows that there was a positive and significant relationship ($r= 0.315$, $p < 0.05$) between the linkage strength and the mechanisms used by the extension workers in the study area. This implies that the extension workers greatly utilized those linkage mechanisms which they perceived to possess stronger linkage strength while reaching out to the smallholder rice farmers. This result corroborates with the findings of Adesoji and Aratunde (2012) in which there was strong linkage strength between extension workers and farmers. According to Agbamu (2005) one of the problems that bedeviled agricultural extensions in Nigeria was ineffective agricultural research extension linkages, and poor input supply. Hence, the existence of strong inter-organizational relationship between extension and research guarantees that research results get to the reach of farmers (Adesoji *et al.,* 2006, Debele, *et al.,* 2019).

Table 5: Relationship between the linkage strength and the mechanisms used by the extension workers in linking rice farmers to the market

| Variable | Coefficient (r) | P-value |
|---|---|---|
| Linkage strength | $0.315^{**}$ | 0.004 |

** Significant at the 0.01 level

## CONCLUSION

The study has shown that greater proportion of the extension workers were males in their active economical age. It further indicates that access to credit was the most significant strategy for linking smallholder rice farmers to the input market. With respect to the output market, direct linkage of smallholder farmers to consumers was the prominent mechanism used by extension workers. Again, it was found that linkage to subsidized fertilizer suppliers had the strongest linkage strength between extension workers and smallholder rice farmers while elimination of middlemen influence was highest in the output market. Educational level, transportation cost, farming system adopted, and topography were the personal, economic, social/cultural and environmental factors respectively influencing extension workers' linkage mechanisms with smallholder rice farmers. The study concludes that access to credit and direct links to consumers were the major linkage mechanisms used by extension workers for linking smallholder rice farmers to the input and output markets respectively. The need to further strengthen the major linkage mechanisms used by extension workers was strongly recommended by this study without neglecting others that were not regularly used by them. This is because, by constantly linking with buyers in advance of production, smallholder farmers potentially have a more assured market that guarantees sales of produce at preferred price.

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