RESEARCH ARTICLE

# REVISED Use of social media in the marketing of agricultural products and farmers' turnover in South-South Nigeria [version 2; peer review: 1 approved, 1 approved with reservations]

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## Abstract

**Background:** The study investigated the use of social media in the marketing of agricultural products and farmers turnover in South-South Nigeria. The purpose of the study was to determine the extent to which the usage of social media in the marketing of agricultural products in Nigeria can enhance efficiency and farmers' sales turnover.
**Methods:** It employed the survey research design and data were collected with the help of a structured questionnaire. Research data were analysed using a t-test and least squares method.
**Results:** The use of social media (WhatsApp and Instagram) in the marketing of agricultural products was found to enhance efficiency and turnover of farmers through a significant reduction in the cost of marketing agricultural products as well as increased demand for agricultural products.
**Conclusions:** The use of social media (WhatsApp and Instagram) in the marketing of agricultural products significantly influences cost reduction and hence efficiency in marketing as well as enhances turnover of farmers through increased demand for agricultural products.
**Contribution:** The examination of the implications of the usage of social media usage in agricultural marketing on marketing efficiency and sales turnover in Nigeria

**Open Peer Review**

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Any reports and responses or comments on the article can be found at the end of the article.

**Keywords**
Agricultural marketing, efficiency in marketing, optimal sales turnover, social media marketing, demand for agricultural products

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**REVISED** **Amendments from Version 1**

The major differences between this version and the previously published version include: Rewriting of the abstract, restructuring of the paper, copyediting and correction of grammatical errors, adjustment of the paragraphs, revision of the sentences for consistency, better inclusiveness of language, clarification of sentences perceived to be obscure by the reviewers as well as purposeful enhancement of the quality of the paper.

**Any further responses from the reviewers can be found at the end of the article**

## 1. Introduction

In many countries of the world, the agricultural sector is regarded as a stimulant of economic development (Food and Agricultural Statistics, 2004). There are shreds of evidence to show consistently that it is not possible for any country to successfully attain industrialized status without first achieving significant success in agricultural performance since the green revolution (investment in food production) is crucial to the industrial revolution (Inegbedion *et al*., 2020; as well as Inegbedion *et al*., 2018). The "agricultural sector performance, particularly through improved productivity, is one of the major ways of reducing poverty in developing countries" (Nebo & Ejionueme, 2017), which is consistent with the key macroeconomic goals of any economy and two of the United Nation's Sustainable Development Goals: "No Hunger" and "No Poverty".

Over time, the agricultural sector has suffered neglect in Nigeria that it is largely unattractive to the current generation of youths. It is for this reason that a different type of agricultural marketing deserves to be given due attention to ensure that the earnings potential of agriculture is not undermined. Given the popularity of the use of social media across the different age grades in Nigeria, it is logical to expect that its use in the marketing of agricultural products will make a significant impact on the demand for agricultural products and thus on sales. This explains the rationale for this study. The main objective of this study was to investigate the impact of the adoption of social media in agricultural marketing by farmers in South-South Nigeria on major performance indicators; such as cost of marketing, demand for agricultural products and turnover of farmers.

## 2. Literature review

### 2.1 Channels of advertisement

The traditional marketing of agricultural products consists of determining the farm products, producing in the right quality, storing to ensure that the products are available; and transporting the products to the places where they are required. It consists mainly of non-verbal communication between the producer and the consumer. The producer (farmer) conceives a product that is required by consumers, produces it in a manner perceived to be consistent with customers` requirement, stores it, and distributes to locations perceived to have adequate demand.

***Use of print and electronic media in advertising.*** Beyond the product-price-storage-distribution strategy, large organisations and government have been known to market their products through advertisements in print and electronic media. The essence of such advertisements is to create awareness of the availability of the products, the locations where they are available as well as the expected benefits of using those products, especially if the products can be substituted for other products.

***Adoption of social media for agricultural marketing in South-South Nigeria.*** Given the shortcomings of the print and electronic media in marketing agricultural products, the need for a more efficient strategy has been long overdue. The rapid growth of the mobile phone use around the world in the last few decades provided a viable marketing alternative for agricultural products in Nigeria and other emerging economies. Mobile phones have contributed significantly to the empowerment of people in developing countries in spreading information networking coverage in remote areas. Consequently, many rural areas are getting great benefit out of its usage in various spheres of endeavour. This has culminated in the improvement of the living standards of poor farmers in developed nations.

### 2.2 Theoretical review

***2.2.1 Technology acceptance model (TAM).*** As one of the frequently used theories to underpin internet usage, the major thrust of TAM is that the users' beliefs in perceived usefulness and perceived ease of use of the internet can be used to explain their acceptance of internet (Chuttur, 2009; Dwivedi *et al*., 2017). Thus, the extent to which the user believes that technology is useful for the cause and the extent to which he feels that he can easily use technology are critical to his/her willingness to use it. Recent modifications and refinement to TAM have culminated in the extension of its use to enable a better understanding of users` intention to use internet technology.

***2.2.2 Theory of agricultural marketing cooperatives.*** This theory visualizes a model that studies how an agricultural marketing cooperative (AMC), specifically an AMC that is made up of many farmers as members, can adopt a direct selling approach. Under this arrangement, the farmers who are the members of the AMC can sell their products either to the cooperative or in a local market. The model shows that if the farmers decide to sell to the AMC, the decision will induce an anti-competitive effect on the direct selling market, whereas, the option of direct selling has the propensity to create a "healthy emulation" among farmers (Agbo *et al*., 2013). This will then stimulate production and ultimately benefit the cooperative.

***2.2.3 Theoretical framework.*** This study adopts the TAM and the theory of agricultural cooperatives as its framework. TAM was chosen because the ease with which the farmers feel they can utilize social media to market their products and the usefulness of social media marketng to the attainment of their marketing

goals will influence adoption of social media in the marketing of their products. Furthermore, the cooperative societies to which the farmers belong can play a critical role in the marketing of the farmers' products because farmers that belong to an agricultural marketing cooperative (AMC) can be encouraged to sell directly to the AMC.

## 2.3 Empirical review

The empirical review focuses on cost of marketing agricultural products as well as sales turnover.

***2.3.1 Use of social media in marketing agricultural products and cost of marketing.*** Balkrishna & Deshmukh (2017) investigated the "role of social media in agriculture marketing and its scope." They employed questionnaire and in-depth interviews to collect data. Results indicated that social media is very useful in agricultural marketing.

Vassiliadou *et al*. (2011) investigated "the use of social media among students of Technology Agriculture and their role in promoting agribusiness." The results showed that social media usage enhances facilitation and flow of knowledge/information, as well as cheap advertisement of products. The results are thus consistent with those of Balkrishna & Deshmukh (2017). The outcomes of the two studies suggest that social media usage enhances efficiency in information flow and marketing, hence the likelihood that its usage will also enhance the efficiency of agricultural products marketing.

***2.3.2 Use of social media in agricultural marketing and sales turnover.*** Mwangi & Wagoki (2016) surveyed leading media groups to investigate "the effect of social media on the performance of advertisement business in the mainstream media in Kenya." They employed stratified random sampling to select 82 respondents. A questionnaire served as the research instrument. Descriptive and inferential statistics were employed. The indings indicate that the interactivity of social media had a significant positive relationship with the performance of the advertisement. Lashgarara *et al*. (2011) examined "ICT capabilities in improving the marketing of agricultural productions of Garmsar Township, Iran." The survey research design was employed with questionnaire serving as the research instrument. The results indicated that ICT capabilities determined 57% variance of agricultural products marketing. Mwangi & Wagoki's (2016) and Lashgarara *et al.'s* (2011) studies indicate that social media has a significant influence on the performance of advertisement and on agricultural products marketing respectively. Based on the outcomes of these studies, the following null hypotheses were formulated:

$H0_1$: There is no significant relationship between the use of social media in agricultural marketing and cost of marketing agricultural products

$H0_2$ : There is no significant relationship between the use of social media (Facebook, WhatsApp and Instagram) in agricultural marketing and farmers' turnover from agricultural products

Other related studies are "use of information communication technologies among agricultural extension officers in Lesotho" (Akintunde & Oladele, 2019), "adoption of agricultural e-marketing," (Alavion *et al*., 2017), as well as the studies of Eze *et al*. (2019), among others.

***2.3.3 Gaps in the literature.*** Adoption of social media and other communication technologies in the marketing of agricultural roducts is not deficient in the empirical literature. Balkrishna & Deshmukh (2017); White *et al.* (2014) as well as Khou & Suresh (2018), investigated use of social media in agricultural marketing; Akintunde & Oladele (2019) and Alavion *et al.* (2017) examined determinants of ICT usage in the marketing of agricultural products. Jose & Lokeswari (2018) investigated users and non-users of mobile communication technologies in agricultural marketing; Lashgarara *et al.* (2011) examined ICT capabilities in improving the marketing of agricultural productions, Ogunniyi & Ojebuyi (2012) investigated "Mobile phone use in agribusiness by farmers in Southwest Nigeria while Mwangi & Wagoki (2016) investigated the effect of social media on the performance of advertisement business in in Kenya. Although a few of the studies investigated the use of social media, none appears to have focused on the implications of the usage of social media in agricultural marketing on marketing efficiency; neither is adequate empirical evidence available on how the use of social media in the marketing of agricultural products can impact on efficiency and sales turnover. Besides, related studies on the research problem in South-South Nigeria are either scanty or non-existent. This study sought to fill these gaps.

## 3 Methods

The study employed the quantitative research method. Specifically, the conclusive research design consistent with Inegbedion (2018); Inegbedion *et al*. (2018) and Inegbedion *et al*. (2016) was employed while the survey method was used in data collection. The study was conducted over July–September, 2019

### 3.1 Study population

The population of the study consisted of 4280 farmers registered in cooperative societies. Of this number, 1620 are from Edo State, 1460 are from Ondo State and 1200 are from Delta state. Yamane's formula was used to estimate a sample size of 366 (Yamane, 1967). Thereafter, proportional allocation was used to assign 139, 125 and 102 to Edo, Ondo and Delta States, respectively to ensure that each State's representation was proportional to its' population. Of the 366 respondents that were sampled, 246, representing 67.2% of them voluntarily participated in the study. The participants were randomly selected from farmers' cooperative societies in the three states. The lottery method was used to achieve randomisation after stratifying the farmers on the basis of the type of farming that they engage in (crop, poultry and fish farming). Subsequently, the farmers were contacted through any of the social media that they use (Facebook, WhatsApp or Instagram). The major inclusion criterion was membership of farmers' cooperative while the exclusion criterion was the non-usage of any of the three social media platforms (Facebook, WhatsApp

or Instagram). The choice of these states was informed mainly by convenience. Specifically, samples were taken from the current members of the cooperative societies. The sample consisted of crop, poultry and fish farmers with evidence of usage of social media (Facebook, WhatsApp or Instagram). The sampling frame was requested from the management of the cooperative societies.

***3.1.1. Request for consent of respondents to participate in the study.*** After the sampling of the respondents, the verbal consent of the management of the cooperative societies was sought. Having obtained the consent of the leaders of the cooperatives, the consents of all the 366 sampled respondents across the three States were sought through the social media. Following the request to participate in the study, through social media 120 of them across the three states declined to participate in the study through their response to the social media message requesting their participation. While a few cited personal reasons for declining, majority of them did not advance any reason, they just refused to respond to the request. Of those approached, 246 gave their consent and thus participated in the study.

***3.1.2 Validity of instrument.*** A pilot test was conducted on 20 of the sampled respondents. Based on the results obtained from the pilot test, validity and reliability of the instrument were determined. For validity, two approaches were used. First, the instrument was given to experts in management and marketing in the authors' institution for their expert opinion, this served to fulfil the condition of face validity. Thereafter, content validity index (CVI) was computed. Both scale and item content validity measures were used. The results obtained were 0.66 for scale as well as 0.67 and 0.67 for item CVI of use of social media in marketing agricultural products and cost reduction as well as use of social media in the marketing of agricultural products and farmers' turnover respectively, thus showing that the instrument was valid since all the values are approximately 0.7 and a value of 0.7 is indicative of a valid instrument (see Table 1).

***3.1.3 Reliability of the instrument.*** Cronbach's alpha (α) was used to determine the reliability of the instrument. The computed Cronbach alpha values were 0.70 and 0.75 for use of social medial and cost reduction as well as use social media and sales turnover respectively while the computed alpha of the entire instrument was 0.84. These values were considered significant since they are approximately 0.7 or more, thus indicating that the items in the instrument are internally consistent. In other words, the instrument is reliable. The foregoing indicates that the instrument is valid and reliable (see Table 2).

**Table 1. Content validity index.**

| Construct | CVI |
|---|---|
| Use of social media and cost reduction | 0.67 |
| Use of social media and sales turnover | 0.66 |
| Entire Instrument | 0.67 |

**Table 2. Instrument reliability.**

| Construct | Cronbach alpha of Constructs |
|---|---|
| Use of social media and cost reduction | 0.70 |
| Use of social media and sales turnover | 0.75 |
| Entire Instrument | 0.84 |

## 3.2 Data Sources

Based on the sampling frame, a sample of respondents was selected. Thereafter, the sampled respondents were requested to participate in the study through social media. A survey was constructed and used to examine the use of social media in agricultural marketing and its implication for efficiency and sales turnover through the administration of a questionnaire, which served as the research instrument. The questionnaire contained bio-data questions and 5-point Likert scale questions dealing with social media usage in agricultural marketing and its implication for efficiency and sales turnover in South-South Nigeria. Information was elicited from the respondents via structured questionnaires through the social media channels (Facebook, Instagram and WhatsApp). The questionnaire is available as Extended data (Inegbedion *et al.*, 2020).

The authors sought and got ethical approval to conduct the study from the Landmark University Research Ethical Board. Furthermore, the authors complied with conventional ethical standards in conducting the study, including the request for the consent of the sampled respondents to participate in the study

## 3.3 Model specification

$$CMAP = f(UFB, UWA \text{ and } UINS) \quad \ldots \quad (1)$$

$$DAP = f(UFB, UWA \text{ and } UINS) \quad \ldots \quad (2)$$

In specific terms, equations 1 and 2 yield

$$CMAP = \beta_0 + \beta_1 UFB + \beta_2 UWA + UINS + e \quad \ldots \quad (3)$$

$$DAP = \beta_0 + \beta_1 UFB + \beta_2 UWA + UINS + e \quad \ldots .. \quad (4)$$

Where

CMAP = Cost of marketing agricultural products;

DAP = Demand for agricultural products;

UFB = usage of Facebook;

UWA = usage of WhatsApp;

UINS = usage of Instagram; and

e. = random error observed along with the variables

## 3.4 Estimation technique

Research data were analysed using the one-sample t-test and least-squares regression. One sample t-test was used to test for

significance of the usage of social media constructs in cost reduction and sales turnover while the least-squares method was used to test for the predictive power of the entire constructs (collectively) with respect to cost reduction and sales turnover; besides, the signs of the coefficients of the constructs in the regression model were used to infer the direction of the relationships between usage of social media in agricultural marketing and cost of marketing agricultural products on one hand as well as usage of social media in agricultural marketing and sales turnover on the other hand. Data analysis was conducted with SPSS 20.

## 4 Results

The results focus on the impact of social media usage on cost reduction in the marketing of agricultural products and on sales turnover of the farmers. *Underlying data* are available from Dryad (Inegbedion *et al*., 2020).

### Social media usage and reduction in cost of advertising agricultural products

A comparison of the usage of Facebook in agricultural marketing with cost reduction in marketing of agricultural products revealed that respondents who agreed that the usage of Facebook enhances cost reduction had a mean score 3.11. Given the five-point Likert scale, a test value of 3 was used. The computed t- and p-values were 2.04 and 0.046 respectively. This shows that the test was significant at five percent level. We thus conclude, at the 95% confidence level, that usage of Facebook in marketing agricultural products significantly reduces the cost of marketing (see Table 3).

A comparison of the usage of WhatsApp in agricultural marketing with cost reduction in marketing of agricultural products revealed that respondents who agreed that the usage of WhatsApp enhances cost reduction had a mean score 3.59. Given the five-point Likert scale, a test value of 3 was used. The computed t- and p-values were 14.58 and 0.001, respectively. This shows that the test was significant at the one per cent level. We thus conclude, at the 99% confidence level, that usage of WhatsApp in marketing agricultural products significantly reduces the cost of marketing (see Table 3).

A comparison of the usage of Instagram in agricultural marketing with cost reduction in marketing of agricultural products revealed that respondents who agreed that the usage of Instagram enhances cost reduction had a mean score 3.09. Given the five-point Likert scale, a test value of 3 was used. The computed t and p values were 1.99 and 0.048, respectively. This shows that the test was significant at the five per cent level. We may thus conclude, at the 95% confidence level, that usage of Instagram in marketing agricultural products significantly reduces the cost of marketing (see Table 3).

A regression model of usage of social media in the marketing of agricultural products and cost of marketing agricultural products revealed that the R-Square value was 0.48, thus implying that 48% of the variation in the cost of marketing agricultural products is explained by variation in the usage of social media channels (see Table 4). The ANOVA table shows a

**Table 3. Use of social media in marketing agricultural products and cost reduction.**

| Channel | Mean | SD | Mean Diff | Test Value | T | Sig. 2-tailed | N |
|---|---|---|---|---|---|---|---|
| Facebook | 3.11 | 0.41 | 0.11 | 3.00 | 2.04 | 0.046 | 246 |
| WhatsApp | 3.59 | 0.63 | 0.59 | 3.00 | 14.58 | 0.000 | 246 |
| Instagram | 3.09 | 0.454 | 0.09 | 3.00 | 1.99 | 0.048 | 246 |

**Table 4. Usage of social media and cost of marketing agricultural products.**

| Model Summary | | | | |
|---|---|---|---|---|
| R | R-square | Adjusted R Square | Std. Error of Estimate | Durbin-Watson |
| 0.694 | 0.48 | 0.43 | 0.707 | 1.67 |
| ANOVA | | | | |
| F =10.935 | | | Sig. = 0.000 | |
| Coefficients | | | | |
| Model | B | Std Error | Beta | t | Sig |
| Constant | 1.334 | 0.423 | | 3.152 | 0.002 |
| Facebook cost reduction | 0.020 | 0.059 | 0.020 | 0.317 | 0.076 |
| WhatsApp cost reduction | 0.360 | 0.071 | 0.304 | 5.015 | 0.000 |
| Instagram cost reduction | 0.257 | 0.100 | 0.155 | 2.570 | 0.011 |

calculated F of 10.94 with an associated significant probability of $p < 0.001$, thus indicating that the F value is significant. The implication is that the overall significance of the model is good (see Table 4). The regression coefficients show that the computed t-values and associated p-values were 3.152 (0.002), 0.337 (0.076), 5.015 ($p < 0.001$) and 2.570 (0.011) for constant, Facebook usage, WhatsApp usage and Instagram usage, respectively (see Table 4). The implication is that the explanatory variables, consisting of the usage of social media channels (WhatsApp and Instagram) are significant and are thus predictors of cost reduction in the marketing of agricultural products. However, Facebook usage is not significant and is thus not a predictor of cost reduction in the marketing of agricultural products.

### Social media usage and sales turnover from agricultural products

A comparison of the usage of Facebook in agricultural marketing with sales turnover of farmers revealed that respondents who agreed that the usage of Facebook enhances farmers' sales turnover had a mean score 3.214. Given the five-point Likert scale, a test value of 3 was used. The computed t and p values were 5.44 and $p < 0.001$ respectively. This shows that the test was significant at one percent level. We thus conclude, at the 95% confidence level, that usage of Facebook in marketing agricultural products significantly enhances the sales turnover of farmers (see Table 5).

A comparison of the usage of WhatsApp in agricultural marketing with sales turnover of agricultural products revealed that respondents who agreed that the usage of WhatsApp enhances sales turnover had a mean score 3.289. Given the five-point Likert scale, a test value of 3 was used. The computed t and p values were 5.84 and ($p<0.001$), respectively. This shows that the test was significant at the one per cent level. We thus conclude, at the 99% confidence level, that usage of WhatsApp for marketing agricultural products significantly optimises the sales turnover of farmers (see Table 5).

A comparison of the usage of Instagram in agricultural marketing with sales turnover of agricultural products revealed that respondents who agreed that the usage of Instagram enhances sales turnover had a mean score 3.115. Given the five-point Likert scale, a test value of 3 was used. The computed t and p values were 4.32 and $P < 0.001$ respectively. This shows that the test was significant at one percent level. We thus conclude, at the 99% confidence level, that usage of Instagram in marketing agricultural products significantly optimises the sales turnover of farmers (see Table 5).

**Table 5. Use of social media in marketing agricultural products and sales turnover.**

| Channel | Mean | SD | Mean Diff. | Test Value | t | Sig. 2-tailed | N |
|---|---|---|---|---|---|---|---|
| Facebook | 3.214 | 0.62 | 0.214 | 3.00 | 5.44 | 0.000 | 246 |
| WhatsApp | 3.289 | 0.78 | 0.289 | 3.00 | 5.84 | 0.000 | 246 |
| Instagram | 3.115 | 0.418 | 0.115 | 3.00 | 4.32 | 0.000 | 246 |

A regression model of usage of social media and turnover of agricultural products revealed that the R-Square value was 0.58, thus implying that 58% of the variation in turnover of agricultural products is explained by variation in the usage of social media (see Table 6). The ANOVA table shows a calculated F of 7.21 with an associated significant probability of $P < 0.001$. The implication is that the overall significance of the model is good (see Table 6). Lastly, the regression coefficients show that the computed t and associated significant probabilities were 12.58 (0.00), 0.816 (0.415), 2.77 (0.006) and 4.614 ($p < 0.001$) for constant, Facebook usage, WhatsApp usage and Instagram usage, respectively (see Tables 6). The implication is that WhatsApp and Instagram usage are predictors of turnover of agricultural products.

### Demographic variables and social media usage

F test was conducted to compare respondents' perception of the use of social media in the marketing of agricultural products with their demographic variables. A comparison of respondents' perception of usage of social media in cost reduction and demographic variables had the following computed F and associated significant probabilities 1.12 (0.348), 1.36 (0.25), 0.673 (0.671) and 1.28 (0.28) for age, sex, educational qualification and farm categories, respectively. The implication is that respondents' perception of the significance of the usage of social media in the reduction of agricultural marketing cost is not influenced by demographic variables (see Table 7).

Lastly, a comparison of respondents' perception of the significance of the usage of social media in enhancing the turnover of agricultural products had the following computed F and associated p-values 0.29 (0.83) 1.26 (0.27), 0.961 (0.51) and 0.734 (0.73) for age, sex, educational qualification and farm categories, respectively. The implication is that respondents' perception of the significance of the usage of social media in enhancing the turnover of agricultural products is not influenced by demographic variables (see Table 8).

## Discussion

Results of the study indicate that the use of social media channels (Facebook, WhatsApp and Instagram) in the marketing of agricultural products has a positive influence on the reduction of the cost of marketing agricultural products. However, while the use of WhatsApp and Instagram were found to be significant predictors of reduction in the cost of marketing agricultural products, the use of Facebook was not found to be significant. The implication of the significance of social media channels (WhatsApp and Instagram) in the reduction of the cost of marketing agricultural products is that the use of social media channels in the marketing of agricultural products enhances efficiency in the marketing of agricultural products. The results are consistent with the findings of Balkrishna & Deshmukh (2017); Mwangi & Wagoki (2016); Ogunniyi & Ojebuyi (2012); White *et al.*, (2014); as well as Vassiliadou *et al.* (2011).

**Table 6. Usage of social media and turnover of agricultural products.**

| Model Summary | | | | | | |
|---|---|---|---|---|---|---|
| R | R-square | Adjusted R Square | Std. Error of Estimate | Durbin-Watson | | |
| 0.76 | 0.58 | 0.47 | 0.528 | 1.966 | | |
| ANOVA | | | | | | |
| F =7.209 | | | Sig. = 0.000 | | | |
| Coefficients | | | | | | |
| Model | | B | Std Error | Beta | t | P-value |
| Constant | | 2.436 | 0.264 | | 18.79 | 0.000 |
| Facebook Turnover | | 0.038 | 0.044 | 0.082 | 0.816 | 0.415 |
| WhatsApp Turnover | | 0.123 | 0.044 | 0.254 | 2.77 | 0.006 |
| Instagram Turnover | | 0.322 | 0.070 | 0.358 | 4.614 | 0.000 |

**Table 7. Demographic variables and respondents' perception of cost reduction.**

| | Age | Sex | Educational Qualification | Farm Category |
|---|---|---|---|---|
| F | 1.12 | 1.36 | 0.673 | 1.28 |
| Sig. | 0.348 | 0.25 | 0.671 | 0.28 |

**Table 8. Demographic variables and respondents' perception of turnover.**

| | Age | Sex | Educational Qualification | Farm Category |
|---|---|---|---|---|
| F | 0.29 | 1.26 | 0.961 | 0.734 |
| Sig. | 0.83 | 0.27 | 0.51 | 0.730 |

Results of the study further indicate that the use of social media channels (Facebook, WhatsApp and Instagram) in the marketing of agricultural products has a positive influence on the enhancement of the turnover of farmers. However, just like in the previous model, the use of Facebook did not demonstrate a significant predictive power on sales turnover. Thus, only the use of WhatsApp and Instagram have strong predictive powers on sales turnover. The results are consistent with the findings of Mwangi & Wagoki (2016), Khou & Suresh (2018) as well as Ogunniyi & Ojebuyi (2012).

The first regression model shows that WhatsApp and Instagram usage in the marketing of agricultural products are significant predictors of cost reduction in the marketing of agricultural products while Facebook was not significant. Thus, usage of WhatsApp and Instagram in the marketing of agricultural products has significant implications on the marketing of agricultural products. This tends to suggest that the usage of Facebook by farmers in the marketing of agricultural products is minimal compared to the usage of WhatsApp and Instagram. The coefficient of determination of 0.48 shows that 48% of the variation in advertising cost of farmers is attributable to the usage of social media in advertising. In the same vein, the second regression model shows that the usage of WhatsApp and Instagram are significant predictors of enhanced sales turnover from agricultural products because the two channels of social media help in speedy dissemination of information about the agricultural products to a wide audience of customers, thus leading to increased demand on the short-run. The two regression models indicate that WhatsApp and Instagram are predictors of efficiency of cost of marketing agricultural products and sales turnover from agricultural products.

## Proposed model of usage of social media and expected outcomes

Based on the research findings, a model of social media marketing of agricultural products, efficiency of agricultural marketing and sales turnover was proposed. The model shows that two social media channels (WhatsApp and Instagram) predict social media impact on the marketing of agricultural products in terms of efficiency and enhanced turnover. The model shows that the use of social media (WhatsApp and Instagram) leads to optimal marketing cost and thus efficient marketing of agricultural products. The optimal cost of marketing agricultural products translates to cost savings and hence optimal turnover in agricultural products. Also, effective use of social media (WhatsApp and Instagram) stimulates demand which also results in optimal sales turnover from agricultural products (see Figure 1).

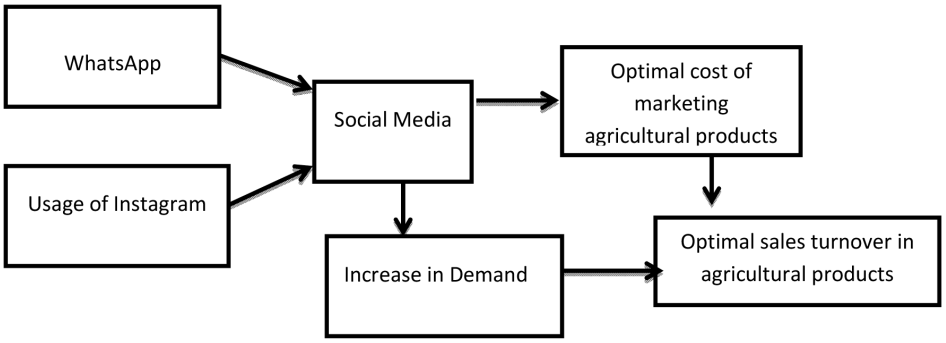


**Figure 1. A model of social media marketing of agricultural products and sales turnover.**

## Conclusions

Given the problem definition and findings, the research concludes that: The use of social media channels (WhatsApp and Instagram) in the marketing of agricultural products significantly influences cost reduction and hence efficiency in marketing as well as enhances turnover of farmers through increased demand for agricultural products. Thus, the adoption of social media in the marketing of agricultural products enhances the efficiency of agricultural marketing and sales turnover of farmers in south-south of Nigeria, specifically the use of WhatsApp and Instagram predicts efficiency of agricultural marketing and sales turnover of farmers.

This study has made significant contributions to marketing and management knowledge. First, it is among the few studies that have examined the influence of social media marketing on marketing efficiency and farmers' sales turnover in Nigeria. Secondly, it is among the very few studies to have studied the adoption of social media in agricultural marketing in south-south Nigeria. A major point of departure of this study from previous studies is its examination of the implications of the usage of social media in agricultural marketing on marketing efficiency and sales turnover. It has thus made a concerted effort in reinforcing the interest of farmers in the use of social media in the marketing of agricultural products in south-south Nigeria.

The study is not without limitations which indicate the need for further studies to minimize the constraints associated with this study. Out of six South-South states in Nigeria, only three were studied. It is uncertain if the three states will adequately represent the six states in the region. The likelihood that the three states will inadequately represent the six South-South states is a limitation to the results of this study. Furthermore, the use of only members of the farmers' cooperative society constitutes a limitation to the results of the study. Farmers who do not belong to the cooperative society may have some dissenting perceptions from those of the members of a cooperative society.

### Implication of findings/recommendation

The significance of the use of social media in the marketing of agricultural products to marketing efficiency and sales turnover implies that policy makers in government and strategic managers of agro-allied firms can embrace the use of social media in the marketing of agricultural products to minimize the cost of marketing and enhance turnover from the sales of agricultural products. Growth in the agricultural sector has implications on a nation's gross domestic product and by implication, on national development. Given the problem definition and research findings, the following recommendations are suggested. Policymakers in government should be concerned about increasing agricultural production as well as the marketing of agricultural products to enhance earnings from agricultural production. This will attract many unemployed youths to the agricultural sector and thus help to guarantee food security as well as drastically reduce the level of unemployment in the country. Consequently, policymakers in government and other stakeholders like managers of cooperative societies and other farmers' associations should promote the adoption of social media in agricultural marketing through sensitization of the farmers as well as the outright provision of modern communication gadgets to farmers at subsidized prices.

Future studies should attempt to minimize the limitations associated with cultural bias by including more south-south states in the sample as well as try to include non-members of the farmers' cooperative society in the sample.

## Data availability

### Underlying data

Dryad: Use of social media in the marketing of agricultural products and farmers' turnover in South-South Nigeria. https://doi.org/10.5061/dryad.jwstqjq76 (Inegbedion *et al.*, 2020).

File 'Data-Use_of_Social_media_in_Agric_Markt-22' contains basic demographic information, questionnaire responses and social media use data from each participant.

## Extended data

Dryad: Use of social media in the marketing of agricultural products and farmers' turnover in South-South Nigeria. https://doi.org/10.5061/dryad.jwstqjq76 (Inegbedion *et al*., 2020).

File 'Questionnaire-Use_of_Social_Media_in_Agric_Marketing.docx' contains a blank copy of the questionnaire used in this study.



## Acknowledgement

We are grateful to the management of Landmark University for providing the necessary funding for this study.

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# Open Peer Review

## Current Peer Review Status: ? ✓

**Version 2**

Reviewer Report 19 March 2021

https://doi.org/10.5256/f1000research.54968.r81369



✓ **Phillip Alege**
Department of Economics and Development Studies, Covenant University, Ota, Nigeria

1. Under Literature Review, 2.2.3 'Theoretical Framework' should move to the beginning of Section 3 as a preamble.

2. 3.1 should be Study Population and not the paragraph.

3. The Sub-sections under Section 4 should be numbered properly.

4. Number "Discussion" as 5 and "Conclusion" as 6.

5. Everything about "Data Availability" should go back to Sub-section 3.2 Data Sources.

With this, the paper is good to go.

***Competing Interests:*** No competing interests were disclosed.

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

**Version 1**

Reviewer Report 23 February 2021

https://doi.org/10.5256/f1000research.29091.r73490

**Phillip Alege**
Department of Economics and Development Studies, Covenant University, Ota, Nigeria

**Abstract:**
The Abstract is too long. It should be brief and sharp. The content should include the following: background/motivation; objective of the paper, methodology, data, results and interpretation. It must also include contribution to knowledge. This component of the study should not be more than 250 words.

**Introduction:**
This is well written. However, the authors should take another look at line three and check the sentence for consistency. It should be "there are evidences…." You cannot use only one observation to conclude on an issue. Also, there is no need to create a sub-section for "Objective of the Study"

**MAJOR COMMENTS**
This is mainly on the Structure of the paper. I will suggest the Sections should be numbered for ease of referencing between the different parts of the report. This is also important for the readers.
An insight into this is given in what follows:

1. Literature Review
    1. Channels of advertisement
    2. Theoretical Review
        1. Technology acceptance model (TAM)
        2. Theory of agricultural marketing cooperatives
    3. Empirical review
        1. Use of social media in marketing agricultural products and cost of marketing
        2. Use of social media in agricultural marketing and sales turnover

1. Methods
    1. Study Population: Issues of request for consent, validity and Reliability must be discussed here.
    2. Model Specification
    3. Estimation Technique instead of Statistical Analysis
    4. Data Sources instead of Materials and Ethical Matters should be here
2. Estimation Results and Discussion
    1. Results
    2. Discussion
3. Conclusion

**MINOR**
There are a few typographical errors to be attended to. The authors should check the soft copy.

**GENERAL COMMENTS**
The paper addresses a very pertinent question in this era of New Normal on the need for the

adoption of social media in the marketing of agricultural products. The recommendations are the ways to go. However, if the idea captured in **"Figure 1: A model of social media marketing of agricultural products and sales turnover"** is a result emanating from this study, then it should be discussed earlier under Section 4.2.

Besides, the paper is well written and had made a tangible contribution to knowledge.

**Is the work clearly and accurately presented and does it cite the current literature?**
Yes

**Is the study design appropriate and is the work technically sound?**
Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**
Yes

**Are all the source data underlying the results available to ensure full reproducibility?**
Yes

**Are the conclusions drawn adequately supported by the results?**
Yes

***Competing Interests:*** No competing interests were disclosed.

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.**

Author Response 24 Feb 2021

**Henry INEGBEDION**, Landmark University, Omu Aran, Nigeria

**Comment:** The Abstract is too long. It should be brief and sharp. The content should include the following: background/motivation; objective of the paper, methodology, data, results and interpretation. It must also include contribution to knowledge. This component of the study should not be more than 250 words.
**Response**: F1000Research provided the template for the structure of abstract. In any case, the abstract has been reduced to below 250 words as suggested
**Comment**: This is well written. However, the authors should take another look at line three and check the sentence for consistency. It should be "there are evidences...." You cannot use only one observation to conclude on an issue. Also, there is no need to create a sub-section for "Objective of the Study"
**Response**: The sentence has been revised for consistency and the section on "objective of the study" has been removed as suggested

**Comment**: This is mainly on the Structure of the paper. I will suggest the Sections should be numbered for ease of referencing between the different parts of the report. This is also important for the readers. An insight into this is given in what follows**:**
**Response**: The paper has been restructured and the sections of the paper have been numbered as suggested by the reviewer
**Comment**: **There are a few typographical errors to be attended to. The authors should check the soft copy.**
**Response**: These have been worked on
**Comment**: **A model of social media marketing of agricultural products and sales turnover" is a result emanating from this study, then it should be discussed earlier under Section 4.2.**
Response: This section has been merged with section 4.2 as suggested

***Competing Interests:*** The Authors have no competing interest

Reviewer Report 16 February 2021

https://doi.org/10.5256/f1000research.29091.r76594



?

**Lauri M Baker**
Agricultural Communication, University of Florida, Gainesville, Florida, 32611, USA

This study is extremely interesting with regard to understanding social media use in agriculture in Nigeria and contributes to the body of knowledge more largely in the area of marketing agricultural products online.

Since this is the first time I am reviewing for this journal, I wasn't sure what to expect, but there is a fair amount of copyediting that needs to be done in this manuscript. I have made note of some major issues here in my review, but there are others. Also, perhaps it is acceptable in this journal, but I was trained that in research writing each paragraph needs a minimum of three sentences, and some sentences in this article are shorter than that. Additionally, some of the language used within the article isn't inclusive. I know many journals now have a stance on this, I am not sure if this journal does or not. The present article uses "he" or he/she instead of they or other neutral pronouns in some places.

I have the following specific feedback:

- The end of the second sentence of the manuscript isn't finished. It ends with "as well as".
- The first paragraph and first sentence of the literature review has a grammatical error in this section "ensure that is the products are available". It is unclear exactly what the authors mean because of the sentence structure.

- The first sentence under theoretical framework – theory should be theories.
- Internet is chaptalized throughout, but it is no longer considered a proper noun in most style formats.
- The first sentence of the theoretical framework is difficult to understand. I see the authors are trying to convey how they applied this framework, but how that was done is unclear as written.
- The majority of the empirical review section lacks flow and is choppy. It seems the authors have made more of an annotated bibliography instead of synthesizing and apply how each of these studies relates to their present work.
- Participants were described in present tense instead of past tense. This section was also missing commas in the numbers.
- Sampling procedure was explained well and was adequate, but again the writing in this section should be improved.
- I appreciate that the reliability is presented so clearly for each construct, but Tables 1 and 2 are overly complicated. I don't think you need the 3$^{rd}$ column if you adjust the headings accordingly.
- "analysed" is misspelled. It should be analyzed.
- There are places in the results where a capital P is used for significance level. In my training typically a lowercase p is used as in $p < .05$ and the authors do use this in some cases. I would advocate for the lowercase, but above all consistency.
- Rounding in the results section is not consistent.
- The use of the Oxford comma in this manuscript is not consistent.
- The conclusions and discussions and implications make sense from the results presented, and I believe the findings provide value in this context. However, the writing in these final sections is difficult to follow and has similar grammatical and flow areas, like the rest of the manuscript.

I would like to see the authors do some serious work in the writing of this manuscript. I hate to reject any article that clearly represents a solid study that can add to the literature in this area, but MAJOR improvements are needed in writing quality, editing, and flow.

**Is the work clearly and accurately presented and does it cite the current literature?**
Partly

**Is the study design appropriate and is the work technically sound?**

Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**
Yes

**Are all the source data underlying the results available to ensure full reproducibility?**
Yes

**Are the conclusions drawn adequately supported by the results?**
Yes

***Competing Interests:*** No competing interests were disclosed.

***Reviewer Expertise:*** Agricultural communication, social media strategy, marketing

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.**

Author Response 24 Feb 2021

**Henry INEGBEDION**, Landmark University, Omu Aran, Nigeria

**Comment**: but there is a fair amount of copyediting that needs to be done in this manuscript.
**Response**: Significant copyediting has been done
**Comment**: Also, perhaps it is acceptable in this journal, but I was trained that in research writing each paragraph needs a minimum of three sentences, and some sentences in this article are shorter than that.
**Response**: The paragraphs have been adjusted accordingly
**Comment**: Additionally, some of the language used within the article isn't inclusive. I know many journals now have a stance on this, I am not sure if this journal does or not. The present article uses "he" or he/she instead of they or other neutral pronouns in some places.
**Response**: Efforts have been made to enhance the inclusiveness of the language used
**Comment**: I have the following specific feedback:
The end of the second sentence of the manuscript isn't finished. It ends with "as well as".
**Response**: This has been corrected
**Comment**: The first paragraph and first sentence of the literature review has a grammatical error in this section "ensure that is the products are available". It is unclear exactly what the authors mean because of the sentence structure
**Response**: This has been corrected - "ensure that is the products are available"
**Comment**: The first sentence under theoretical framework – theory should be theories.
**Response**: This has been corrected
**Comment**: Internet is chaptalized throughout, but it is no longer considered a proper

noun
in most style formats.
**Response**: This has now been corrected
**Comment**: The first sentence of the theoretical framework is difficult to understand. I see the authors are trying to convey how they applied this framework, but how that was done is unclear as written.
Response: It is actually an attempt to justify the use of the two theories as framework, clarification has been provided. The how has been explained in the theoretical review.
**Comment**: The majority of the empirical review section lacks flow and is choppy. It seems the authors have made more of an annotated bibliography instead of synthesizing and apply how each of these studies relates to their present work
**Response**: Some level of synthesis has been provided to link the empirical literature to the study
Comment: Participants were described in present tense instead of past tense. This section was also missing commas in the numbers.

**Response**: The tenses and the missing comas have been corrected
**Comment**: Sampling procedure was explained well and was adequate, but again the writing in this section should be improved.
**Response**: The section has been improved upon
**Comment**: I appreciate that the reliability is presented so clearly for each construct, but Tables 1 and 2 are overly complicated. I don't think you need the 3rd column if you adjust the headings accordingly.
Response: The headings have been adjusted and the third column has been removed
**Comment**: "analysed" is misspelled. It should be analyzed
**Response**: This has been corrected
**Comment**: There are places in the results where a capital P is used for significance level. In my training typically a lowercase p is used as in $p < .05$ and the authors do use this in some cases. I would advocate for the lowercase, but above all consistency.
**Response**: This has been corrected
**Comment**: Rounding in the results section is not consistent
**Response**: Done
**Comment**: The use of the Oxford comma in this manuscript is not consistent.

**Response**: This has been addressed
**Comment**: The conclusions and discussions and implications make sense from the results presented, and I believe the findings provide value in this context. However, the writing in these final sections is difficult to follow and has similar grammatical and flow areas, like the rest of the manuscript.

**Response**: The grammatical flaws have been significantly addressed
**Comment**: MAJOR improvements are needed in writing quality, editing, and flow
**Response**: The quality of the paper has been enhanced

***Competing Interests:*** The authors have no competing interest