# The Mediation Effect of Instrumentality in the Relationship between Expectancy and E-Agriculture Usability in Uganda

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## Abstract

*This study set out to investigate the mediation effect of Instrumentality in the relationship between Expectancy and E-Agriculture Usability Uganda. The study adopted a cross-sectional research design deploying quantitative research methods. The survey covered farmers in Uganda whose population was not known since farmers are not registered. A sample of 384 farmers was taken from Uganda using the population proportion sampling method. Data were collected using self-administered questionnaire and analyzed using SPSS analysis tool. Factor analysis, Correlation and regression were used in the study whereas MedGraph software tool by Jose (2013) was used to test for mediation. Results revealed that Instrumentality significantly mediates the relationship between Expectancy and e-Agriculture usability in Uganda. The type of mediation is partial since both the direct and indirect paths are significant. E-Agriculture usability can be improved through increasing farmers' expectancy and instrumentality. This study applies the Expectance theory also known as the Expectation-Value theory which is supported by the idea that individuals are driven by the need for self-satisfaction and gratification.*

**Keywords:** Expectancy, Instrumentality, e-Agriculture, e-Agriculture usability

## Introduction

Over the past century, agriculture has been the main driver of growth and sustainability for developing nations. Families relied on farm produce for the much needed food and household income. Nevertheless, this trend is on the decrease as farm produce keeps declining. Uganda is largely an agricultural country and also widely referred to as the food basket of the East African region (Engotoit *et al.,* 2016). For that, one would expect its citizens in every corner of the country to access food at low prices, in substantial amounts and in constant supply. However, a considerable number of people go hungry. In a report of Food Agricultural Organization (FAO) put the number of Ugandans going hungry at 23 million, implying that 67% of the population is food insecure (FAO, 2015). These findings show that Uganda, together with other sub-Saharan countries, has a high mountain to climb in a bid to ensure a sustainable food security net for the citizenry. Many factors contribute to food scarcity and poor farm produce. These include climate and political instability, rural-urban migration, pests, soil fertility issues, lack of insight and planning, shortage of knowledge on best farming practices. There are some practices, such as food wastage that seem trivial, but hamper food availability, especially in market places; poor storage practices and dumping sites and they seem to be ignored.

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Literature shows that the most accepted elucidation of motivation was provided by Vroom (1964) in the Expectance theory also known as the Expectation-Value theory (Simone, 2015). This theory was developed from earlier motivation theories including the equity theory and behavioural theories. Anderson and Gaile-Sarkane (2010) argue that in the Expectancy theory, individuals are motivated to behave in such a way that will lead to production of expected results. The expectance theory rides on the understanding that perception is important in influencing ones' decisions in anticipation of positive change and likely consequences of behaviour. Anderson and Gaile-Sarkane (2010) further posit that expectancy theory is supported by the idea that individuals are driven by the need for self-satisfaction and gratification. It can be used to forecast behavioural outcomes of a person's choices (Kreitner & Kimicki, 1998). The theory presents three constructs. These include expectancy, instrumentality and Valance. Vroom (1964) argues that individuals are motivated in three aspects; if they believe that their efforts will result into acceptable performance (expectancy), and also if they believe that the resultant performance will be rewarded (instrumentality). According to Vroom, higher levels of individual motivation will be realized where there is higher expectancy and instrumentality causing a multiplier effect (Lunenburg, 2011).

## Literature Review

### *The mediation effect of Instrumentality in the relationship between Expectancy and E-Agriculture Usability*

According to Robbins (2008), expectancy shows how certain an individual is that his/her effort will lead to good performance and better outcome. Where expectancy is low, there will be low performance (Chaudhary, 2014). On the other hand, Instrumentality is the confidence that one's good performance will lead to rewards (Porter & Lawler, 1969). It shows the probabilistic estimation of the outcome due to good performance. Just like Expectancy, the probability for instrumentality ranges from 0 to 1, where an instrumentality leaning towards 0 indicates negative or no outcomes (Chaudhary, 2014). For example, good performance may lead to better farm yields and / or household income (Simone, 2015; Vroom, 1964). The term e-agriculture is used to refer to the use of information and communication technologies in agricultural activities such as seed enhancement and value addition, marketing of agricultural produce, and agricultural information sharing (Namisiko & Aballo, 2013). It involved the design and development of ICT based applications for usage in fostering agriculture. According to Adhau (2010), e-agriculture has led to the development of agricultural databases and data warehouses that provide immense knowledge for farmers and buyers of agricultural products globally.

Farmers in Uganda maybe influenced to use e-Agriculture if they have the confidence that once they use e-Agriculture, their expected outcomes in terms of yields, market prices, knowledge sharing and better farm practices will be improved. However, there is a very low confidence in farmers' anticipation of rewards owing to their good performance. Perhaps, the only assurance that most farmers have as a reward for good performance is food security – even when it is disappointing at times. Some farmers end up abandoning farming for alternative hard labour jobs commonly known as "jua kali" or "under the sun", loosely meaning working under the hot sun. This shows that Ugandan farmers have a low confidence in the rewards offered to them from their agricultural efforts. Hence the study hypothesis below:

*$H_{1:}$ Instrumentality partially mediates the relationship between Expectancy and e-Agriculture usability by farmers in Uganda.*

## Research Design and Methods

This was a cross-sectional research design deploying quantitative research methods to investigate the mediation effect of instrumentality on expectancy and e-Agriculture usability. The covered farmers in Uganda whose population was not known since farmers are not registered. Given that the population of farmers in Uganda was unknown (Engotoit *et al.*, 2016), the researcher used rules of thumb by Roscoe (1975) that a sample between 30 and 500 was sufficient for quantitative research. The study sample was also within the estimations of Krejcie and Morgan (1970) table of sampling. More so, this study used the population proportion sampling method with the assumptions that a population proportion was 50% (0.5), a margin of error of 5%, and confidence level of 95% was used in line with (Hyde, 2017). Thus;

$$n = p(1-p)\left(\frac{z}{E}\right)^2$$

Where;

*n= sample size* *z= standard deviation*

*p = population proportion* *E=Margin of Error*

As already indicated above, the population proportion was estimated at the highest 50% while the standard deviation was estimated at 95% confidence level. Further, the margin of error was estimated at 5%.

$$n = 0.5(1-0.5)\left(\frac{1.96}{0.05}\right)^2$$
$$n = 0.5 * 0.5(39.2)^2$$
$$n = 0.5 * 0.5(1536.64)$$
$$n = 0.25 * 1536.64$$
$$\boldsymbol{n = 384}$$

This study adopted a multistage sampling approach. First cluster sampling was used to divide the population of farmers into four clusters, representing the four regions of Uganda (Northern Region, Eastern Region, Western Region and Central region), and the main reason was cost efficiency (economy and feasibility). Thereafter simple random sampling method was used in every cluster (region) to ensure that all farmers had an equal chance of representation. It is important to note that different regions grow different types of crops and rear different types of animals. For example, in the eastern Uganda, they grow maize, beans, coffee; in northern Uganda, the grow millet, sorghum and cassava, whereas in central, the main agricultural products are bananas, sweet potatoes, cassava, coffee and fruits. On the other hand, western Uganda is predominantly involved in rearing cattle and recently, growing bananas. Figure 3 is a map of Uganda showing study regions.

Given the above clusters, the national sample of 384 was divided by 4 to get the sample for each of the four regions. This gave a sample of 96 farmers for each region. Simple random sampling technique was then employed to select 96 farmers from each region to participate in the study. Table 1 shows the survey sample.

**Table 1:** Survey sample for farmers

| No. | Region | Sampling method | Sample size |
|---|---|---|---|
| 1 | Eastern Uganda | Simple random | 96 |
| 2 | Northern Uganda | Simple random | 96 |
| 3 | Western Uganda | Simple random | 96 |
| 4 | Central Uganda | Simple random | 96 |
| | **Total** | | **384** |

The data was collected using a self-administered questionnaire that was tested for reliability and validity to ensure the instrument was valid and reliable inline with Cronbach (1951) and (Nunnally, 1978; Peter, 1979; Sekaran, 2000). Reliability and validity results seen in Table 2 indicated values above 0.70 for all the three variables in the study. Therefore, the research instrument was valid and reliable.

**Table 2:** Reliability and Validity results

| Variable | No of items | Cronbach Alpha Reliability | Content Validity Index |
|---|---|---|---|
| Expectancy | 10 | .726 | 0.782 |
| Instrumentality | 10 | .791 | 0.723 |
| **E-Agriculture usability** | | | |
| Platform usability | 4 | .789 | 0.847 |
| Control and flexibility | 11 | .933 | 0.832 |
| Consistency and Standardization | 4 | .944 | 0.754 |
| Documentation and User Support | 6 | .860 | 0.94 |

Reliability and validity results in table 2 revealed that the research instrument was reliable since all variables and constructs had Cronbach Alpha Reliability (CAR) above 0.7. The average CAR was also above 0.7. Similarly, the instrument was valid since all variables had CVI greater than 0.7 and average CVI was above.

*Test for linearity*

In order to test whether the independent variables are linearly related with the dependent variable, which would imply that there existed proportionate covariance between the independent and dependent variable, we employed a bivariate correlation analysis where particular attention was focused on whether there was significant correlation between the independent and the dependent variable. Table 3 shows bivariate correlation analysis results.

**Table 3:** Bivariate Correlation analysis

| | 1 | 2 | 3 |
|---|---|---|---|
| Expectancy (1) | 1 | | |
| Instrumentality (2) | .701** | 1 | |
| E-Agriculture Usability (3) | .538** | .533** | 1 |

The results in table 3 show that there is a significant positive correlation between the dependent variable, that is; E-Agriculture usability and the 2 independent variables, which are; Expectancy ($r = .538$, $p<.01$), and Instrumentality ($r = .701$, $p<.01$). This implies that there is a possibility that the two independent variables are linearly related to the dependent variable. A further analysis of the scatter plots of the pairs of variables showed that for the plots between all of the two independent variables that had a significant relationship with E-Agriculture Usability, i.e. Expectancy and Instrumentality, the plots depict a straight line pattern with an upward movement from left to right. This is indicative of the existence of a linear relationship between the variables. Hence the linearity assumption held true for the relationship between the two independent variables and the dependent variable.

*Test for Multicollinearity*

The assumption that there is no multicollinearity between the independent variables was assessed to ensure that the independent variables are not highly correlated such that reliable statistics could be generated from the regression of the dependent variable on all of the independent variables. Besides the Bi-variate correlations between the independent variables, the Variance Inflation factor (VIF) of the regression model of E-Agriculture Usability were assessed as summarized in Table 4 below.

**Table 4:** Estimates of the Variance Inflation Factor (VIF)

| **Coefficients** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Model** | **Unstandardized Coefficients** | | **Standardized Coefficients** | **t** | **Sig.** | **Collinearity Statistics** | |
| | **B** | **Std. Error** | **Beta** | | | **Tolerance** | **VIF** |
| (Constant) | .678 | .194 | | 3.490 | .001 | | |
| Expectancy | .153 | .053 | .168 | 2.907 | .004 | .474 | 2.110 |
| Instrumentality | .001 | .063 | .001 | .014 | .989 | .405 | 2.472 |

Results in table 4 above show that the Variance Inflation factor (VIF) for all of the independent variables was between the ranges of 1 to 10 units, an indication that there is no multicollinearity among the independent variables. This means that individual influence of each independent variable on E-Agriculture Usability cannot be fused with the influence of any other independent variables in a particular regression model.

**Findings**

*Exploratory Factor Analysis Results for Instrumentality*

Instrumentality was measured using 10 items on a 5-point scale, and results in Table 5 below show that all the original 10 items, were found to measure Instrumentality (Eigen value=3.179, accounting for 63% of the variance. The obtained Kaiser-Meyer-Olkin (KMO) for sample adequacy was .828, which is above 0.5. Hence the sample was appropriate for factor analysis (Field, 2009). Bartlett s test of sphericity of approximately chi-square =1950.472, df = 45, and p=.000 indicate that the retained factors have significant relationships and can help measure Instrumentality. The Determinant = .005, is evidence of non-multicollinearity or singularity between variables since it is significantly greater than 0.00001.

**Table 5**: Instrumentality Component Matrix

| | **Factor loading** |
|---|---|
| I am confident that my effort to use e-Agriculture will enable me have access to extension workers | .929 |
| I am confident that my effort to use e-Agriculture will provide access to better pesticides | .845 |
| I am confident that my effort to use e-Agriculture will make me more knowledgeable about good farming practices | .799 |
| I am confident that my effort to use e-Agriculture will provide access to better farm breads | .785 |
| I am confident that my effort to use e-Agriculture will lead to better yields | .780 |
| I am confident that my effort to use e-Agriculture will enable me improve the quality of my far produce | .779 |
| I am confident that my effort to use e-Agriculture will enable me access to latest weather updates for planning purposes | .680 |
| I am confident that my effort to use e-Agriculture will provide access to expert agricultural information | .674 |
| I am confident that my effort to use e-Agriculture will attract good prices for my agricultural products | .670 |
| I am confident that my effort to use e-Agriculture will enable me have enough food for my family | .567 |
| ***Eigen value*** | ***3.179*** |
| ***Variance (%)*** | ***63.059*** |
| ***Cumulative Variance (%)*** | ***63.059*** |

**Determinant = .005; KMO= .828; Bartlett s test, chi-square =1950.472, df=45, p=.000** *Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 3 iterations.*

*Exploratory Factor Analysis Results for E-Agriculture Usability*

The table below 6 consisted of twenty five (25) items measured using a 5-point anchor. The Kaiser-Meyer-Olkin (KMO) was used to verify the sampling adequacy for factor analysis. Results for E-Agriculture Usability indicate KMO = 0.868, which is above 0.70 according to Field (2009) indicating that the sample was adequate for factor analysis. Bartlett's test of sphericity of Approx. Chi-Square= 7510.956, DF=300, p=.000 is significant, which indicates that correlations between items were sufficiently large for factor analysis. In addition, the determinant of 0.000 is greater than 0.00001 which reveals that there is no multicollinearity or singularity between variables.

Principle component analysis (PCA) extracted four factors of E-Agriculture Usability with Eigen values of greater than 1. The items that loaded on the same component were interpreted as representing Platform Usability, Control and Flexibility, Consistency and Standardization, Documentation and User Support. These four factors had eigenvalues of 5.797; 4.474; 3.208; and 2.907 respectively. The percentage variance explained by the four factors was 23.19; 17.897; 12.832; and 11.627 respectively and altogether explained 65.546 Percent of the variance in E-Agriculture.

**Table 6:** E-Agriculture Usability Rotated Component Matrix

| | **Control & Flexibility** | **Consistency & Standardization** | **Documentation & User Support** | **Platform Usability** |
|---|---|---|---|---|
| The available e-Agriculture platforms allow me to redo previous actions that I want to save | .817 | | | |
| The available e-Agriculture platforms allow me to undo previous actions I do not want to save | .775 | | | |
| The available e-Agriculture platforms allow me to change my login details | .727 | | | |
| The available e-Agriculture platforms allow me to customize information held on them | .712 | | | |
| The available e-Agriculture platforms ask me to confirm my actions before saving them | .693 | | | |
| The available e-Agriculture platforms provide me with shortcuts tools for accomplishing tasks | .676 | | | |
| The available e-Agriculture platforms allow me to exit when there is an error | .628 | | | |
| The available e-Agriculture platforms allow me to print information held on them | .609 | | | |
| The available e-Agriculture platforms allow me to access information in different formats | .595 | | | |
| The available e-Agriculture platforms allow me to save information in different formats | .502 | | | |
| The available e-Agriculture platforms have consistent colours | | .922 | | |
| The available e-Agriculture platforms have uniform user menus | | .899 | | |
| The available e-Agriculture platforms have a consistent interface | | .868 | | |
| The available e-Agriculture platforms have consistent text fonts and types | | .837 | | |
| The available e-Agriculture platforms have offline user manuals | | | .740 | |
| The available e-Agriculture platforms have online help tools | | | .707 | |
| The available e-Agriculture platforms have training materials | | | .619 | |
| The user manuals for e-Agriculture platforms are written in my local language | | | .557 | |
| The information provided by available e-Agriculture platforms is easy to read | | | | .875 |
| The information I get from available e-Agriculture platforms is easy to understand | | | | .851 |
| The information provided by the e-Agriculture platform is logically organized | | | | .729 |
| The information provided by available e-Agriculture platforms is clear | | | | .643 |
| *Eigen value* | *5.797* | 4.474 | 3.208 | 2.907 |

| | | | | |
|---|---|---|---|---|
| *Variance (%)* | *23.19* | 17.897 | 12.832 | 11.627 |
| *Cumulative Variance (%)* | *23.19* | 41.087 | 53.919 | 65.546 |
| **Determinant = .0013; KMO= .868; Bartlett s test, chi-square =7510.956, df=300, p=.000** | | | | |
| *Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 7 iterations* | | | | |

*Testing for mediation*

Baron and Kenny (1986) procedure was used to test for mediation illustrated as follows:

**Table 7:** Bivariate Correlation analysis for all variables

| | 1 | 2 | 3 |
|---|---|---|---|
| Expectancy (1) | 1 | | |
| Instrumentality (2) | .701** | 1 | |
| E-Agriculture Usability (3) | .538** | .533** | 1 |

Results in table 7 above show that instrumentality has a positive significant relationship with Expectancy (r=.701**) and e-Agriculture Usability (r= .533**). Further, Expectancy has a positive significant relationship with e-Agriculture Usability (r= .538**). Therefore, it was allowed to proceed to the regression analysis since all variables were significantly related.

**Table 8:** Instrumentality regressed on Expectancy

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .953 | .165 | | 5.764 | .000 |
| | Instrumentality | .775 | .041 | .701 | 19.038 | .000 |
| a. Dependent Variable: Expectancy | | | | | | |

**Table 9:** E-Agriculture Usability regressed on expectancy and instrumentality

| **Coefficients**[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. | Correlations | | |
| | | B | Std. Error | Beta | | | Zero-order | Partial | Part |
| 1 | (Constant) | 1.798 | .158 | | 11.358 | .000 | | | |
| | Expectancy | .259 | .047 | .323 | 5.480 | .000 | .538 | .272 | .230 |
| | Instrumentality | .273 | .052 | .307 | 5.209 | .000 | .533 | .260 | .219 |
| a. Dependent Variable: Usability | | | | | | | | | |

**Table 10:** Model summary

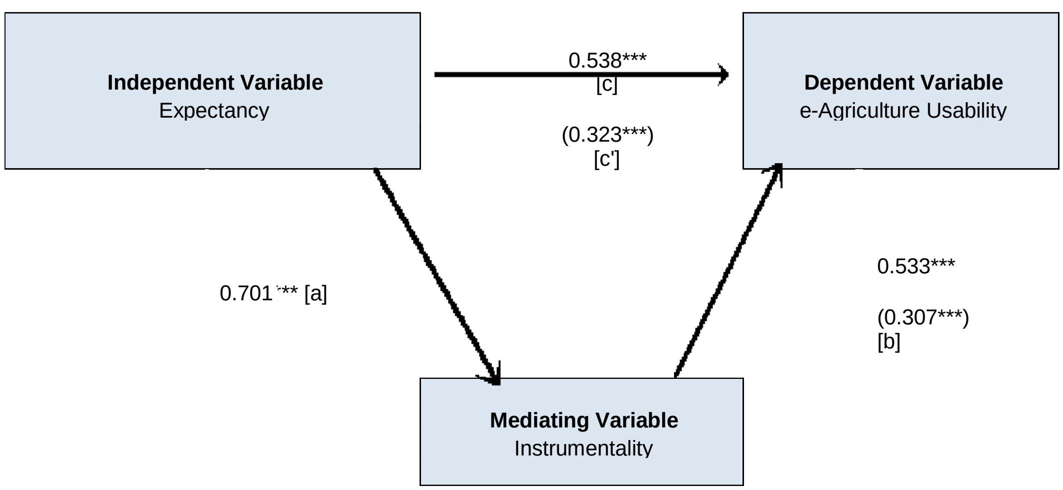
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .581[a] | .337 | .334 | .36004 |
| a. Predictors: (Constant), Instrumentality, Expectancy | | | | |

Regression results in tables 8 revealed that Instrumentality significantly predicted Expectancy (Beta=.701, Sig .000). Results in table 9 show that Expectancy and Instrumentality significantly predicted e-Agriculture usability (Beta=.323 and .307, Sig .000 with part coefficients of .230 and .219) respectively. Results in Table 10 further reveal that Expectancy and Instrumentality predicted 33.7% e-Agriculture usability ($R^2$=.337).

The above results were entered into a MedGraph software tool by Jose (2013) to generate a Medgraph showing the mediation effect of Instrumentality Expectancy and e-Agriculture usability. Figure 1 shows the MedGraph.

**Figure 1:** MedGraph showing mediation effects

| | | | |
|---|---|---|---|
| **Type of mediation** | | Significant | |
| **Sobel z-value** | | 5.058516 | *p* = <0.000001 |
| **95% Symmetrical Confidence interval** | | | |
| | Lower | **0.1296** | |
| | Higher | **0.29355** | |
| **Unstandardized indirect effect** | | | |
| | a*b | **0.21158** | |
| | se | **0.04183** | |
| **Effective Size measures** | | | |
| Standardised Coefficients | | | |
| Total: | | **0.538** | |
| Direct: | | **0.323** | |
| Indirect: | | **0.215** | |
| Indirect to Total ratio | | **0.4** | |




Results in the MedGraph above show that Instrumentality significantly mediates the relationship between Expectancy and e-Agriculture usability in Uganda (Sobel z-value=5.058516, $p$<0.000001). The type of mediation is partial since both the direct and indirect paths are significant. The indirect path contributes 21.5% while the direct path explains 32.3% of variance in the e-Agriculture usability. Both paths explain 53.8% of variance in e-Agriculture usability.

## Discussion of Findings

Results revealed that there is a positive significant relationship between expectancy and instrumentality of farmers using e-Agriculture platforms in Uganda. This finding is in agreement with literature that argued that high expectations increased farmers' instrumentality (Robbins, 2008; Porter & Lawler, 1969). The farmers' expectancy is manifested in terms of better farm yields, good prices for their agricultural products, better farm breads, access better pesticides, food security. On the other hand, instrumentality entails the farmers' confidence that using e-Agriculture will help satisfy their needs (Vroom, 1964). According to Anderson and Gaile-Sarkane (2010), the underlying motivating factors for individuals to do certain things he needs to satisfy their needs. Once given actions are expected to bring gratification to the individual, then such a person will carry out the actions, otherwise they will be reluctant to execute. In this case, high expectations also increase the confidence of satisfying need through taking actions (Kreitner & Kimicki, 1998).

Therefore, with high expectancy, farmers' confidence in use of e-Agriculture will increase with the hope that there will be benefits in yields, quality of breeds, better seeds, good prices, among others. However, where the expectancy is low i.e. the anticipated benefits of using e-Agriculture is low; the farmers will lose confidence in satisfying their needs through taking action by way of using e-Agriculture. Hence e-Agriculture usage will be low where expectancy is low and high where expectancy is high. Results further revealed that there is no significant relationship between Instrumentality and usability of e-Agriculture. This finding is in disagreement with the literature which reasons that, Instrumentality is the confidence that one's good performance will lead to rewards (Porter & Lawler, 1969). Instrumentality shows the probabilistic estimation of the outcome due to good performance, and it ranges from 0 to 1, where an instrumentality leaning towards 0 indicates negative outcome and when it is leaning to 1 it indicates a positive outcome (Chaudhary, 2014). The results show that Ugandan farmers are not inclined to use e-Agriculture because they have no confidence that once they use e-Agriculture, their outcomes in terms of yields, market prices, knowledge sharing, better farm practices, access to extension workers etc. will be improved.

Lastly, the results revealed that both the direct and indirect mediation effects of the relationship between expectancy and e-Agriculture usability and the relationship between expectancy and e-Agriculture usability via instrumentality were significant. This meant that Instrumentality partially mediated the relationship between Expectancy and e-Agriculture usability by farmers in Uganda. The finding agreed with literature that argued that instrumentality and intrinsic motivation enhanced performance (Vroom, 1964; Lunenburg, 2011). Hence, with increased instrumentality and expectancy, e-Agriculture usability is bound to increase.

**Conclusion and Recommendations**

It was confirmed that Expectancy had a positive effect on instrumentality of farmers' usage of e-Agriculture. The findings also revealed that the relationship between Instrumentality and usability of e-Agriculture was insignificant. Sobel results also indicated that Instrumentality partially mediated the relationship between Expectancy and e-Agriculture usability in Uganda. Therefore this hypothesis was dropped from the model. Hence, we can conclude that instrumentality had no causal effect on the usability of e-Agriculture by Ugandan farmers.

The study set out to examine the mediation effect of Instrumentality in the relationship between Expectancy and e-Agriculture usability by farmers in Uganda. This was completed through $H_1$ that Instrumentality positively mediates the relationship between Expectancy and e-Agriculture usability by farmers in Uganda. The findings revealed that Instrumentality partially mediated the relationship between Expectancy and e-Agriculture usability. Therefore we conclude that instrumentality played an important mediation role in causing the two relationships explaining e-Agriculture usability by farmers in Uganda. For improved usability of e-Agriculture platforms in Uganda, it is important to improve on Expectancy as well as Instrumentality of farmers.

**References**

Anderson I. and Gaile-Sarkane E. (2010) Consumer expectancy theory for Business, *a paper presented in the 6th International Scientific Conference May 13–14, 2010, Vilnius, Lithuania Business and Management 2010, Selected papers. Vilnius, 2010, pp. 001–002*

Adhau, B. (2010). Contributions of E-agriculture in the development of India. A generalized study. *International Referred Research Journal, 1(17), 10-11.*

Cronbach, L., J. (1951). "Coefficient alpha and the internal structure of tests”. *Psychometrika* 16 (3):297–334.

FAO (2015) e-Agriculture 10 year Review Report, Implementation of the World Summit on

the Information Society (WSIS) Action Line C7.ICT Applications: e-Agriculture, *Food and Agriculture Organization*

Lunenburg, F. C. (2011). Expectancy Theory of Motivation: Motivating by Altering Expectations. *International Journal of Management, Business and Administration*, 15(1), 1-6.

Engotoit, B., Kituyi, G. M., & Moya, M. B. (2016). Influence of performance expectancy on commercial farmers’ intention to use mobile-based communication technologies for agricultural market information dissemination in Uganda. *Journal of Systems and Information Technology*, *18*(4), 346-363.

Engotoit, B., Moya, M. B., Mayoka, K. G., & Bonface, A. (2016). A Mobile-Based Communication Adoption Model for agricultural market information dissemination in Uganda. *Global Journal of Computers & Technology*, *5*(1).

Nunnaly, J. (1978), Psychometric Theory, *McGraw-Hill, New York, NY.*

Namisiko, P., & Aballo, M. (2013). Current status of e-agriculture and global trends: a survey conducted in TransNzoia County, Kenya. *International journal of science and research, 2(7), 2319-7064.*

Porter L. W. & Lawler III E. E. (1968). Managerial Attitudes and Performance. New York: *McGraw-Hill.*

Simone S. (2015) Expectancy Value Theory: Motivating Healthcare Workers, *American International Journal of Contemporary Research*, Vol. 5, No. 2.

Robbins, Stephen P., & Judge, Timothy A. (2008). Organizational Behaviour, 13th ed., *Prentice-Hall.*

Roscoe, J.T. (1975), Fundamental Research Statistics for the Behavioral Sciences, Holt, Rinehart and Winston, *New York, NY.*

Vroom, V. H (1964). Work and motivation. New York: *Wiley*, 1964.

Kreitner, R.; Kimicki, A. 1998. Organizational Behaviour. *McGraw-Hill/Irwin.* 670 p. ISBN 0-256-22512-5.

Krejcie, V, R; Morgan, W,D. (1970), Determining sample size for research activities, *Educational And Psychological Measurement* 1970, 30, 607-610.