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Influence of knowledge utilization mechanisms on innovativeness of smallholder farmer groups

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ABSTRACT

Despite the great potential and need for agricultural innovations, the uptake by rural farmers of those developed and disseminated seems to be slow. Thus this study sought to ascertain the determinants of innovation adoption intentions among smallholder farmer groups in Uganda. The farmers had been trained and given innovative knowledge which was meant to change the way they reared poultry. Even after accessing the poultry knowledge, many still faced production challenges. To understand what factors were involved in adopting innovative poultry technologies, the social cognitive theory (SCT) which accounts for changes in human behavior was used. A survey methodology was used to obtain data from 231 farmers from selected sub-counties of Wakiso district in central Uganda. Hierarchical linear regression revealed that innovation adoption intentions were a function of farmer output expectation and technology enjoyment factors. Factors like self-efficacy and trust were not significant in farmer innovativeness adoption intentions. Therefore, to enhance innovativeness and farmer group success, output expectations from use of innovative knowledge and its enjoyment need to be emphasized.

Key words: Agricultural innovations, innovative knowledge, innovativeness, poultry, farming, Uganda, Wakiso district

RÉSUMÉ

Malgré le grand potentiel et le besoin d'innovations agricoles, l'adoption par les agriculteurs ruraux de ceux qui sont développés et disséminés semble lente. Cette étude visait donc à identifier les déterminants des intentions d'adoption de l'innovation parmi des groupes de petits agriculteurs en Ouganda. Les agriculteurs avaient reçu une formation et des connaissances novatrices qui devaient changer la façon dont ils élevaient la volaille. Même après avoir eu accès aux connaissances sur la volaille, bon nombre d'entre eux ont encore des problèmes de production. Pour comprendre les facteurs impliqués dans l'adoption de technologies avicoles innovantes, la théorie cognitive sociale qui tient compte des changements de comportement humain a été utilisée. Une méthodologie d'enquête a été utilisée pour obtenir des données de 231 agriculteurs de certains sous-comtés du district de Wakiso dans le centre de l'Ouganda. La régression linéaire hiérarchique a révélé que les intentions d'adoption de l'innovation étaient fonction des attentes de production des agriculteurs et des facteurs de jouissance de la technologie. Des facteurs comme l'auto-efficacité et la confiance n'étaient pas importants dans les intentions d'adoption novatrices des agriculteurs. Par conséquent, pour améliorer l'esprit d'innovation et le succès des groupes d'agriculteurs, il faut mettre l'accent sur les attentes en matière de production

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découlant de l'utilisation des connaissances novatrices et de leur jouissance.

Mots clés : Innovation agricole, connaissance novatrice, esprit d'innovation, volaille, Ouganda, District de Wakiso

INTRODUCTION

Per capita food output has declined in sub-Saharan Africa of recent, yet the region has the highest proportion of undernourished people in the world, estimated to be 30% of the total population or 239 million people in 2010 (FAO, 2010; Meijer *et al.,* 2015). A number of innovations that have been introduced to address production constraints and challenges have had little success. Research continues to show that risk and uncertainty have played an important role in the adoption of new agricultural innovative technologies (Meijer *et al.,* 2015). This has been shown to be true for marginal farmers in Africa, who have to manage risk on an everyday basis to secure their livelihoods despite the innovations.

An innovation is an idea, concept, technical information or an actual practice perceived as new by an individual; and according to Meijer *et al.* (2015), the decision to adopt an innovation is a mental process involving inter alia a knowledge phase. The potential to innovate, i.e., the innovativeness of an individual determines when the individual adopts the innovation either at an early or late stage. Most innovations involve availing new agricultural knowledge to farmers and require change in farmer behavior. There is thus need to understand factors determining farmer knowledge use, especially their innovativeness adoption intentions, aimed at collective achievement of food security and commercial farming.

Knowledge refers to the factual information and understanding of how the new technologies work and what can be achieved from using them, though this rarely aligns with the reality (Meijer *et al.,* 2015). It is classified into declarative or procedural knowledge, where the former refers to knowledge about facts the latter is knowledge of a method or skill (Anderson, 1980). It is the knowledge of a method or skill that many sub-Sahara countries have availed and disseminated to their farmers in the agricultural sector. Governments have invested in farmer group (FG) training with the expectation that this will eventually change their mindset and enable farmers like those dealing in poultry, to perform better and more efficiently to improve agricultural productivity. Using well this knowledge in enterprises like poultry rearing would assist farmers overcome poverty and improve their livelihoods. Pretty *et al.* (2011) analyzed 40 projects in 20 African countries and found that by early 2010, they had provided benefits for 10.39 million farmers and their families on roughly 12.75 million hectares of land.

Despite the great potential of agricultural innovations, their uptake by smallholder farmers in Africa appears to be slow (Meijer *et al.,* 2015). Additionally, literature on results regarding impact of knowledge acquired from agricultural training sessions using introduced innovations, and their influence on farmer innovativeness in agriculture, and farmer group performance is equivocal (Meijer *et al.,* 2015). As a result, the past several years have witnessed increasing interest in interventions regarding knowledge access, sharing, use/applicability by smallholder farmer groups and effect on their various enterprises.

In Uganda, despite the great potential of knowledge, the literature about the relationship between knowledge access, acquisition and use in agricultural innovation is ambiguous and scanty.

There is empirical evidence that approximately 40% of those trained fail to transfer knowledge and skills into use immediately after training, and that 70% fail to apply it one year after training (Saks, 2002). Although several studies have looked into the challenges facing innovation adoption, the reasons for the relatively low adoption rates are still not fully understood. The influence and/or effect of knowledge accessed by smallholder farmers on their work performance (agricultural production) have not been fully ascertained. Consequently, information on the true relationships among knowledge access, use and innovativeness is limited. Research is therefore necessary to gain a better understanding of factors involved and the roles of collective knowledge accessibility and applicability on farmer intentions to adopt new ideas in agriculture.

The ambiguity in the literature results from lack of comprehensive analysis of the underlying mechanisms linking collective knowledge access, use and innovativeness. Past studies have concentrated on exploring farmer group performance and inputs availability. Others have concentrated on productivity and marketing (Kilelu, 2013; Turyahikayo and Kamagara, 2016). The influence of collective knowledge access, and use in innovativeness has largely been given little attention in research. This limitation constitutes an important gap in the farmer group development literature especially on innovative knowledge adoption. To address this gap, this study therefore explores the influence of knowledge on farmer innovativeness. There is need to understand the underlying factor mechanisms for the relationships. The study concept model is underpinned by the socio-cognitive theory. The study proposes that farmer self-efficacy, outcome expectations, trust and enjoyment influence knowledge use in farmer innovativeness.

Theoretical background

As one of the most powerful theories of human behavior (Bandura, 1986), the Social cognitive theory (SCT) serves as the theory for this study. The SCT is chosen because of its adaptive nature ,i.e., its suitability and employability in various disciplines as it considers human behavior to be dynamic (Kock, 2004). The fundamental argument of the SCT is that an individual's behavioral intention to do something is a function of not only behavior, but also of cognitive personal and environmental factors (Boateng *et al.,* 2016).

Boateng *et al.* (2016) and Cooper and Lu (2016) argue that the basic precept of the SCT is that behavior is regulated by an individual through the cognitive processes and by the environment through external social situations. Since an individual's perception, beliefs and expectations shapes his/her behavior (Bandura, 1986), the theory also implies that an individuals' self-efficacy, i.e., abilities, knowledge, and skills influence him or her to engage in certain actions and activities (Prussia and Kinick, 1996). The factors external to an individual (i.e., environment) predicts the person's behavior. Such environment that surrounds an individual includes things like the physical and social environment. The former involves natural and man-made objects; and the latter involves not only the physical surroundings, but the social relationships, social norms, peer influence, values and cultural aspects. Behaviour is the other component of the SCT and is the way people act or respond to a particular situation or object (Bandura, 1991; Boateng *et al.,* 2016). In this case behavior is the way people respond to technology or technological innovations (Ratten and Ratten, 2007). Thus the cognitive personal and environmental factors coupled with the behavioural component, are believed to interact with each other to predict an individual's action. Bandura (1989; 1991) and Boateng *et al.* (2016) observe that the three components have different predictive capacities about a person's intentions, and that their influences on each other do not occur simultaneously.

The Social cognitive theory (SCT) has been widely used in organizational management (Boateng *et al.,* 2016); tourism sustainability (Font *et al.,* 2016) and in technological innovation adoption (Ratten and Ratten, 2016). However, it has rarely been used to study knowledge influence on farmer innovativeness in poultry rearing in the Uganda context. Since the theory is anchored on the foundations of individual and group psychological behavior (Pincus, 2004), the SCT is used in this study as also Bandura (1986) noted, as a basis to examine the reasons why individuals especially those in a farmer group adopt certain behaviours. The SCT is used in this study to predict poultry farmers' intentions to use innovative knowledge to innovate. This is because the SCT explains how individuals' actions are predicted by the interaction of personal factors, environment and behavior. Of particular interest and relevance to the study is the theory's development of an individual's social environment and cognition, beliefs about capabilities, and personal factors.

Research model

Based on the SCT, use of innovative knowledge and associated technologies will be influenced by the development of an individual's social environment and cognition, beliefs about what the knowledge and technologies will offer personal factors and motivation. Therefore, we specifically argue that knowledge adoption will be influenced by the social characteristics within and without of the FG, individual self-efficacy and expected outcomes from the agricultural industry.

Figure 1 presents the research model that conceptualizes and explains the hypothesized relationships between underlying knowledge variables that are assumed to predict innovativeness among poultry farmers. Knowledge as a factor is defined in this model through variable constructs that include: self-efficacy, expected outcome, trust and enjoyment. It is on these constructs that the several hypotheses were developed as explained below.

Hypothesis development

Self-efficacy. Self-efficacy refers to the beliefs and confidence that one can perform certain tasks or behaviors (Vantieghem *et al.,* 2014). The SCT reveals that human achievement is

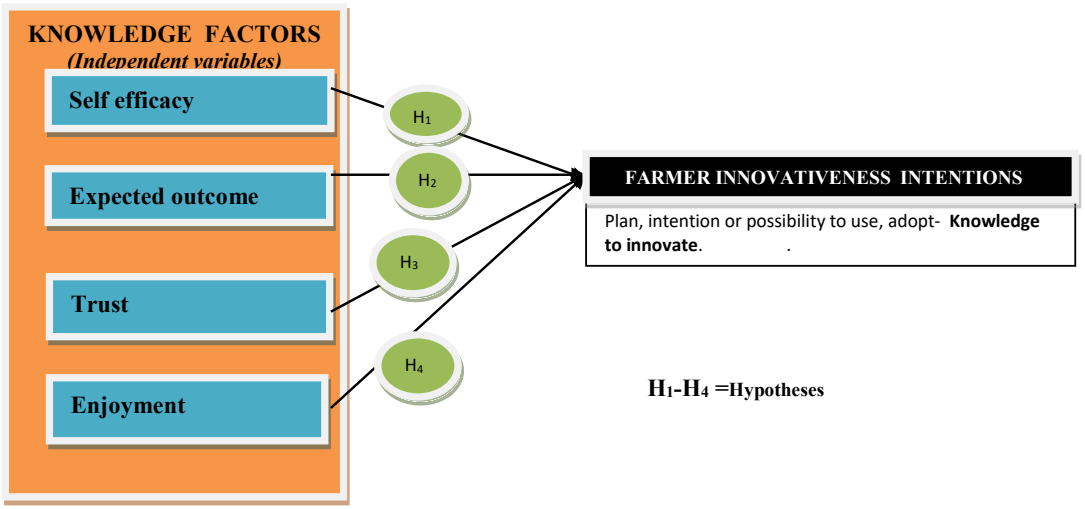

Figure 1.0. Theoretical model

dependent on one's behaviours, internal personal factors (e.g. cognitive, affective and biological events) and environmental conditions (Bandura, 1997). According to Vantieghem *et al.* (2014), the SCT identifies a large array of motivators and regulators of social, behavioural and cognitive capabilities, and self-efficacy is a crucial factor in the SCT because it acts upon several of these determinants. This makes self-efficacy to be considered as one of the most important contributors to innovation achievement since it enables individuals to effectively use their perceived knowledge and skills according to observed demands of the situation (Bandura, 1997; Yusuf, 2011). Self-efficacy beliefs are thus reported to function as a self-fulfilling prophecy, by affecting how consistently and effectively people apply what they know (Vantieghem *et al.,* 2014). Since this makes the factor a better predictor of performance we argue in this study that self-efficacy is associated with farmer group members' intentions to adopt innovative tendencies in agricultural enterprises like poultry rearing. Therefore, we hypothesize that:

H1. Self-efficacy is associated with poultry farmers' intention to adopt innovative tendencies in poultry rearing.

Outcome expectations

Outcome expectations according to the SCT are personal beliefs anchored on individual use of a technology, service, or any other resource in his/her works, from which that person expects whatever is accessed to be useful or add value to the outcome. The measure was framed in terms of the general form that "doing x….will be/allow me to…" followed by a set outcome statement (Blanco, 2011). For instance among the items used in the study includes this one which states: "Knowing how to apply innovative knowledge and skills will be useful in my work". Thus we argue that using collectively acquired innovative knowledge is associated with the individual's intention to adopt innovative tendencies in enterprises like poultry rearing. Thus we hypothesize that:

H2 Outcome expectations affect poultry farmers' intention to adopt innovative tendencies in poultry rearing.

Trust. In most social environment that has people and technologies interacting, a lot of trust is needed. Trust is said to help regulate social relationships between people and minimizes uncertainty of human behavior in certain instances (Boateng *et al.*, 2016). Trust may as well be defined as the confidence an individual may have in the honesty and goodness of a person, organization, service or resource. In the context of group poultry farming, it could be defined as the assured confidence a farmer has in the poultry knowledge provided by agricultural service providers. For instance (in terms of training) whether the knowledge can lead to innovations that brings success in the poultry enterprise. Boateng *et al.* (2016) provide evidence that supports the fact that trust influences individual intentions towards adopting certain behaviours. Using these observations, we argue that poultry farmer group trust in the knowledge as a secure way to conduct good poultry rearing will affect farmer intentions to adopt innovative tendencies. Thus:

H3 Trust is associated with farmers' intentions to adopt innovativeness in poultry rearing.

Enjoyment. Enjoyment is part of the hedonic factors that are believed to influence actor behaviours regarding innovations especially new technologies. Chow (2016) argued that the more actors enjoy use of an innovation like a technology or a system the more likely they will develop positive intentions to use it. In this study enjoyment (E) is the degree to which a farmer feels pleasure (Chow, 2016) in using the innovative knowledge that has been accessed and applied. The more the farmer enjoys using the acquired information or ideas while rearing for instance poultry the more

likely that the farmer will adopt innovativeness adoption intentions. Based on this reasoning, the following hypothesis is posited:
H4: Enjoyment will have a significant influence on farmer innovativeness adoption intentions.

Dependent variable
Innovativeness according to (Mengue and Auh, 2006; Boateng *et al.,* 2016; Meijer *et al.,* 2016) is described as 'a method used to create something new'. In the study context, innovativeness was based on the potential farmers developed leading to innovation (changes in farmer's way of rearing poultry) measured through captured farmer items on knowledge acquisition. It was through these variable items that farmers showed their opinions as to how they *inter alia* would use, plan, predict or intend to use the knowledge they acquired to

- access quality services, chicken breeds, feeds, drugs;
- make own feeds, vaccinated, practiced hygiene, sorted, graded, bulked products;
- keep records, access markets, monitor and evaluate services provided;

Intention to adopt innovativeness would improve poultry production processes, and products and farmers becoming commercial. Use of the knowledge acquired depends much on the self-efficacy, outcome expectation, trust and enjoyment poultry farmers expect. Any positive tendencies regarding these, would trigger a response on farmers intentions to innovate.

METHODOLOGY

Study area, scope and population. The study was undertaken in Wakiso district in central Uganda, purposively selected because it had many smallholder farmers dealing in poultry farming. The enterprise was supported tremendously by the National Agricultural Advisory Services (NAADS), a government programme. Study respondents were poultry farmers selected from sub-counties of Kasanje, Kakiri, Nangabo, Makindye-Ssabagabo, and town councils of Kira, Nabweru and Kasangati. Sampling frames bearing names of beneficiary poultry farmers and their groups were secured from district headquarters. These were used to undertake random sampling to select respondents.

Sample and Data Collection. The study was quantitative. Survey questionnaires were administered to a total of randomly selected 231poultry farmers. These helped the study to generate data on their views regarding their intention to use acquired knowledge to change the way they carry out poultry rearing. Data collection was through a self-administered questionnaire which was designed in English though a standard translated version of the same was put in the local language. The interviewers read this to the respondents to enable them provide a score to each of the statement based on their opinion and experience. A score value 1(one) on the scale meant low regard for the item and a score of 10 (ten) high regard for the statement. The questionnaire encompassed three sections and 21 items; this could be completed within one hour.

The first section of the questionnaire covered the respondent's demographics, i.e., gender, age and education level attained. The second section asked respondents for their assessments of various aspects connected with acquired poultry knowledge and their intention to use it to innovate in their poultry enterprises. Items used within the knowledge constructs were derived from the social cognitive theoretical (SCT) modal as used by Blanco (2011), Vantieghem (2014) and Boateng *et al.* (2016). The constructs in the second section comprised the independent variables and these were operationalized by their items to estimate innovation adoption intentions among poultry farmers.

The third section asked farmer respondents for

their innovation adoption intention, using a scale adapted from Chow (2016) and Okumus *et al.* (2018). Intention to adopt innovation in poultry rearing was the dependent variable of this study, and was measured using 4 items. All items of the independent and dependent variables were scored using a 10-point rating scale. Item scales in the tool were adapted from prior research. Although the independent and dependent variable items were adapted from work done in other studies, they were modified to suit our study context as Tables 1-5 below show.

Independent variable constructs. Independent variable constructs involved: 1. Self-efficacy, 2. Output expectation, 3. Trust and 4. Enjoyment. Two of the independent constructs (i.e., 1 and 2) were measured each using 8 and 6 items each respectively; whereas Trust and enjoyment was measured using 4 items each. The dependent variable (adoption of innovativeness) was measured using 4 items and the tables below show the items and measuring statements of the independent and dependent factors.

Table 1. Items measuring construct outcome expectation (Adapted from Blanco, 2011)

Items	Statement
SCT-OE1	Knowing how to apply poultry knowledge will allow me select better birds relevant to my rearing practices.
SCT-OE2	Knowing how to apply poultry knowledge will contribute to improving my work as a poultry farmer.
SCT-OE3	Knowing how to apply poultry knowledge will allow me gain greater familiarity with vaccination.
SCT-OE4	Knowing how to apply poultry knowledge and skills will not be useful in improving my poultry rearing practices
SCT-OE5	Knowing how to apply poultry knowledge will help me to feel competent at debeaking and rearing chicken
SCT-OE6	Knowing how to apply poultry knowledge will contribute positively to the image others have for me as a poultry farmer

Table 2. Items measuring construct Trust (Adapted from Boateng *et al.,* 2016)

Items	Statement
SCT-Trust1	I would trust the knowledge gained to improve my poultry rearing techniques.
SCT-Trust2	Using knowledge gained would improve my poultry production.
SCT-Trust3	I would find poultry knowledge relevant in conducting my poultry transactions.
SCT-Trust4	Using new knowledge would be important in marketing quality poultry products.

Table 3. Items measuring Self-efficacy construct (Adapted from Blanco, 2011; Vantieghem *et al.,* 2014)

Items	Statement
SCT-SE1	I will be able to achieve most of the poultry rearing goals that I have set for myself
SCT-SE2	When facing difficult tasks in my poultry rearing, I am certain that I will accomplish them.
SCT-SE3	In general, I think that I can obtain poultry outcomes that are important to me
SCT-SE4	I believe I can succeed at almost any poultry rearing endevours to which I set my mind.
SCT-SE5	I will be able to successfully overcome poultry challenges at my farm.
SCT-SE6	I am confident that with the knowledge I acquired in a FG, I can perform effectively various poultry activities
SCT-SE7	Compared to other group members, I can do most tasks in poultry rearing very well
SCT-SE8	Even when poultry is tough, I can perform quite well

Table 4. Items measuring construct Enjoy (Adapted from Blanco, 2011)

Items	Statement
SCT-Enjoy 1	I enjoy applying the new poultry knowledge gained in rearing chicken.
SCT-Enjoy2	Identifying chicken that lay eggs using the new knowledge will be exciting.
SCT-Enjoy3	I will enjoy use of the new knowledge to de-beak chicken as it is interesting.
SCT-Enjoy4	I will enjoy use of new technology to access better markets for eggs and other chicken products

Dependent variable construct

Table 5. Items measuring intention to adopt innovativeness (Adapted from Okumus *et al.,* 2018 and Boateng *et al.,* 2016)

Items	Statement
DepSCT1	I predict that I would use the acquired knowledge
DepSCT2	I intend to use poultry knowledge to identify quality chicken.
DepSCT3	I plan to use knowledge acquired to continuously make my chicken feed.
DepSCT4	It is very possible to use good feeds for my birds.

In the study questionnaire tool, a rating of 1 to 3 ranged from strongly disagree to disagree; while response ratings 4 to 6 were ranked as neither disagree nor agree while response rating 7 to 10 were responses on agree to strongly agree. The flexibility of the rating scale gave respondents a wider option in selecting their responses. Minor revisions on measurement items and wording were clarified by the researcher prior to the actual data collection; and in the field the purpose of the research was clarified to the respondents. Prior to administration of the questionnaires informed consent and confidentiality for the respondents were respectively sought and assured. To ensure validity the questionnaire was first piloted on six poultry farmers from three parishes in Kasangati Town Council and individual items adopted based on the farmer responses. A Cronbach's alpha validity test was also used to test item validity.

Data analysis. Using SPSS, rating scale type questions measuring each of the dimensions of the three SCT constructs were reduced into a parsimonious data structure using the Principle Component Analysis (PCA) computer programme. They were computed into composite scales (means) which were then used in further analysis (Boone and Boone, 2012; Sseguya *et al.,* 2018). The Cronbach's Alpha coefficient was used to assess the internal consistency and reliability of the questionnaire and the individual items used to create the rating scales. A coefficient of at least 0.70 is recommended (Straub *et al.,* 2004; Sseguya *et al.,* 2018), and values in the range of 0.60 to 0.69 are acceptable especially if there are only a handful of items in the questionnaire or scale (Leech *et al.,* 2005). The dependent variable was computed from four rating scale items as Table 5 indicates. Regarding the independent variables the alpha value for the four items for construct Trust was 0.673, which indicated that the items formed a scale that had reasonable internal consistency and reliability. Similarly, the Alpha for outcome expectation was 0.703

which indicated good internal consistency. The Alpha for the scale on self-efficacy was 0.646 and Enjoy was 0.610.

In subsequent analysis, a Pearson correlation was performed to ascertain the nature and strength of relationship within the independent variables, and between independent and dependent variables. A regression analysis was conducted to determine the most influential factor after establishing existence of a relationship among the independent and dependent variables.

Findings

Sample characteristics. Table 6 lists the participant farmer characteristics. The result of the sample characteristics analysis indicate that the age of most small holder poultry farmers participating in the study, was at least 30 years old. Majority of the farmers (83.1%) were above 30 years of age. The results of the sample characteristics analysis indicated a respondent bias towards females (66.2%) than males (33.8%).

Majority of the poultry farmers (65.80%) had attained secondary education and above. Those with primary education and below were only 34.20%.

Correlations among variables. The nature of relationships existing between the variables measuring farmer knowledge acquisitions and intention to adopt innovativeness is presented in Table 7. Additionally, other descriptive statistics of the variables (i.e., the means and standard deviations) are also indicated. Results (Table 7) show that independent variable constructs: Trust, Self-efficacy, Outcome expectation and Enjoy correlated significantly with farmer intention to adopt innovativeness. The direct positive correlations among these variables and the dependent variable imply that all factors play a role in predicting the intention of farmers to undertake innovation using knowledge acquired from the farmer group trainings.

From Table 7, it can be seen that correlation was high between construct outcome expectation and the dependent variable, intention to adopt innovations (r=0.721, p=0.01). Similarly, correlation results between constructs self-efficacy and trust showed also a relatively high value (r=0.593, p=0.01). The variable construct enjoy, correlated positively and significantly with most variable constructs (self-efficacy (r=0.314, p=0.01), and with trust r=0.272, p=0.01); though its correlation with outcome expectation (r=0.534, p=0.01) was relatively high. Other independent variable constructs

Table 6. Summary of survey demographics

Demographic attributes	Frequency	Percentage
Gender:		
Male	78	33.77
Female	153	66.23
Total	231	100
Age:		
≤ 30	39	16.90
> 30	192	83.10
Total	231	100
Education level:		
Primary and no school at all	79	34.20
Secondary level and above	152	65.80
Total	231	100

Source: Primary data Wakiso disrict

which correlated positively and significantly correlations with the dependent variables included: trust (r=0.395, p=0.01); self-efficacy (r=0.323, p=0.01) and enjoy (r=0.555, p=0.01). Overall, results from correlation analysis of constructs indicate that knowledge constructs have a relationship with the dependent variable regarding farmer innovativeness adoption intentions.

Hierarchical regression analysis. After establishing the relationships existing between variables, a multiple hierarchical regression analysis was done. This was to determine the extent to which variable constructs, anchored on the SCT theoretical frameworks, predicted innovativeness adoption intentions of poultry farmers. The first model of the regression analysis constituted one variable construct trust. Model 1 (Table 8) shows that Trust predicted significantly (β=0.395, p<0.01) farmer intention to adopt innovativeness in their enterprise. The second model constituted variable construct trust, self-efficacy and outcome expectation. Resultant regression analysis of model 2 (Table 8) shows that two out of the three variables i.e., trust (β=0.049, p>0.05), and self-efficacy (β=0.087, p>0.05) were not significant. Only variable construct outcome expectation was significantly influential (β=0.673, p<0.01) in predicting intentions to adopt innovativeness of poultry farmers (F=86.227, p<0.01).

The third model results (Table 8) indicate

Table 7. Correlation between independent variables and dependent variables

	Variable	Mean	SD	1	2	3	4	5
1	Trust	27.55	8.43					
2	Self-efficacy	7.02	0.7	.593**				
3	Outcome expectation	38.05	10.7	0.437**	0.307**			
4	Enjoy	24.17	9.20	0.272**	0.314**	0.534**		
5	*Dependent Variable	15.58	9.52	0.395**	0.323**	0.721**	0.555**	

*Dependent Variable= innovativeness intentions

** - Indicates significant correlation at α=0.01 level (2-tailed)

Table 8. Hierarchical regression analysis for predictor variable and intention to adopt innovativeness

Variable	Model 1 (β)	Model 2 (β)	Model 3 (β)	Tolerance for model 3	VIF for model 3
Trust	0.395**	0.049	0.064	0.575	1.739
Self-efficacy		0.087	0.042	.623	.605
Output expectation	-	0.673**	0.560**	0.622	1.606
Enjoyment	-	-	0.226**	0.688	1.453
R^2	0.156	0.533	0.626**		
Adj. R^2	0.152	0.526	0.618		
F	42.258**	86.227**	74.16**		

a. Dependent Variable: Dependent variable: 'Farmer Acceptance of innovation'.

b. Predictors: Performance expectancy, Effort expectancy, Social influence, Satisfaction, Enjoyment.

that values for variables trust (β=0.064, p>0.05), and self-efficacy (β=0.042, p>0.05), showed no significant influence on the dependent variable construct. However, values for variables constructs output expectation (0.560, p<0.01) and enjoyment (β=0.226, p<0.01), were significant. These constructs significantly predicted farmer intentions to adopt innovativeness (F=74.16, p<0.01). The adjusted R^2 value for the final model indicated that 62.6% of variance in farmer intention to adopt innovativeness was explained by the factors in the model. Additionally, in models 2 and 3, relative to other independent variables, the variable output expectation posted higher beta-values and significant levels thus predicting highly farmer intentions to adopt innovativeness. Trust only posted slightly higher beta values and was significant in regression model 1. Based on model 3 results (Table 8) above, hypotheses one (H1) and three (H3) were rejected (Table 9); whereas hypotheses two (H2), four (H4) and five (H5) were accepted.

DISCUSSION

Adoption of innovative knowledge is important if rural smallholder farmers are to become commercial and overcome poverty. The reasons why many farmers access agricultural innovative knowledge but are reluctant to utilize it need to be understood. The factors underlying knowledge and its adoption in innovation was thus at the centre of the study analytical framework (Figure 1). In trying to determine factors affecting knowledge adoption and usage, the study tested hypotheses on the influence of knowledge disseminated to farmers on their intentions to undertake innovativeness in a chosen enterprise that was poultry. Knowledge was measured through self-efficacy, trust, outcome expectations and enjoyment constructs and how these predicted farmer innovation intentions.

One of the most noteworthy findings in the present study was the empirical support for the importance of knowledge-related outcome expectations in explaining goals or farmers' intentions of engaging in innovation-related activities in their poultry management. From the study results it became clear that outcome expectation explained more significantly the variation in innovativeness adoption intentions of farmers. Similar results were observed by Lent and Brown (2006) and Blanco (2011). Outcome expectations based on the Socio-cognitive theory (Bandura, 1997), are personal beliefs based on individual use of a technology, service, or any other resource in his/her works, from which that person expects whatever is accessed to be useful or add value to the outcome. Findings indicate that farmers' beliefs in the usefulness of the knowledge they were given made them develop intentions

Table 9. Research model developed hypothesis

H1	Self-efficacy is associated with poultry farmer intention to adopt innovativeness in poultry rearing.	Rejected
H2	Outcome expectation is associated with poultry farmer intention to adopt innovativeness in poultry rearing.	Accepted
H3	Trust is associated with farmers' intentions to adopt innovativeness in poultry rearing.	Rejected
H4	Enjoyment has a significant influence on farmer intention to adopt innovativeness in poultry rearing.	Accepted

to adopt innovativeness intentions that were to improve their poultry rearing and production methods.

Similar to what Blanco (2011) noted, the study results indicate that interests directly affect choice intentions, with outcome expectations producing an even greater positive influence on intentions. Farmers believed for instance that knowing how to select better breeds of egg-laying birds will be/allow them improve production and income. Similarly, having knowledge on how to vaccinate and debeak birds will allow them minimize mortality of their birds and increase income. It is the beliefs in the knowledge and skills regarding poultry that was perceived useful in their work and developing highly their outcome expectations.

Further analysis of data also revealed that enjoyment was significantly associated with innovativeness adoption intentions (β=0.226, $p<0.01$). It implies that enjoyment plays a key role in innovativeness adoption. Enjoyment is one crucial element in a social environment. It appears to raise morale among individuals in a social setting. In a situation when most of the inputs, ideas or skills are usually from the top-down to farmers who rarely participate in their development, farmers become more innovative when they take knowledge to be enjoyable while applying it. For instance, when they are motivated by the use of knowledge to separate chicken that is productive from unproductive ones or in sharing market information it increases farmers' chances in adopting innovativeness. It shows the knowledge could be applicable in their situation, easy to understand and share and could lead to enhancing the development of their enterprise. In many studies, hedonic motivation or enjoyment is an important determinant of the use of different consumer technologies (Childers *et al.,* 2001; Brown and Venkatesh, 2005; Chun *et al.,* 2012). Hedonic motivation has been incorporated into various theories as a new consumer belief. It reveals the fact that when an innovation is easily appreciated and understood, intentions to adopt and use it increases.

However, despite the fact that knowledge is believed to be influenced by a number of various intrinsic and extrinsic factors, self-efficacy and trust which are intrinsic factors failed in this study to influence innovativeness adoption intentions. This is contrary to findings by previous research (Bandura, 1997; Blanco, 2011; Vantieghem, 2014; Boateng *et al.,* 2016) that these factors/ constructs influence innovation adoption. Self-efficacy being the belief and confidence that one can perform certain tasks or behaviors (Vantieghem *et al.,* 2014) was overshadowed by outcome expectations and innovation enjoyment as depicted by farmers.

Whereas self-efficacy is a crucial factor in the SCT it thus failed in this study to have an influence regarding farmer innovativeness intentions. The findings were thus contrary to observations that considered self-efficacy to be one of the most important contributors to innovation achievement, i.e., enabling individuals to effectively use their perceived knowledge and skills according to observed demands of the situation (Salmon, 1984; Bandura, 1997; Yusuf, 2011). Other factors appeared to have played a more influential role than self-efficacy.

CONCLUSION AND RECOMMENDATION

The study provided an analytical framework for examining knowledge and the innovativeness adoption intention process that takes into account intrinsic factors of farmers. While it appears knowledge in relation to the benefits and challenges of the technology play a key role in the decision to adopt, we do not claim that knowledge factors like self-efficacy and trust are not important. Rather, in this instance the adoption process was more influenced by knowledge factors: outcome expectation and

enjoyment. Our framework emphasizes that these two factors were identified to influence the way innovativeness adoption intentions are developed in the context of smallholder poultry farmers. When we comprehend farmer responses in relation to agricultural innovations and how these are brought about, we can then design policies or projects of local relevance. To ensure high farmer participation in innovation development and use, we recommend that policy design programmes that satisfy farmer needs. These then can enable farmers enjoy the changes they intend to make in their enterprises including full participation in implementation of these programmes. More importantly, policy should note that whether individuals are in groups they still have their personal and/or individual beliefs that influence innovation adoption.

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STATEMENT OF NO CONFLICT OF INTEREST

We the authors of this paper hereby declare that there are no competing interests in this publication.

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