

# Motivational pathways for farmer learning behaviour in the student-to-farmer university outreach

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## Funding information

Regional Universities Forum for Capacity Building in Agriculture

## Abstract

In recent times, calls for practical training of agricultural extension workers, who exhibit the right mix of competences for responsiveness to farmer learning needs, have intensified. This comes at the time when there is an increasingly growing desire for more community-engaged African universities, and as such, making the integration of agricultural students into community outreach services a necessity. However, empirical evidence on whether student-led outreach and training models adequately respond to the psychological learning needs of host farmers and subsequent motivation of these farmers for learning is lacking. This study uses a structural equation modelling technique on a sample of 283 farmers who had previously participated in the student-to-farmer outreach of Gulu University. Results reveal that satisfying farmer learning needs influences intrinsic motivation, formation of learning intentions and farmer learning behaviour. Intrinsic motivation mediates the relationship between satisfying farmer learning needs and the outcome learning behaviour. We conclude that satisfying farmer learning needs is a strong initiator of motivational pathways for farmer

learning behaviour in the student-to-farmer university outreach. We call for more public financing of university outreach programmes so as to enable not only training for churning out graduates with the right competences of responsiveness to community needs but also fostering creative innovations involving both universities and communities.

## INTRODUCTION

Globally, a dominant discourse on policy reforms for higher education, including the training of agricultural extension workers, calls for intensification of university-community linkages in pursuit of the agenda on socioeconomic transformation (Jacob et al., 2015; WorldBank, 2009). In agricultural universities contexts, it has been argued that linkages between universities and communities are important for fostering symbiotic learning relationships between host farmers, students and faculty staff, and can potentially usher in co-creation of innovations (Blackie, 2016; Nakayiwa et al., 2016). For instance, faculty staff and students can: (1) learn about indigenous knowledge and experiences from host farmers; and (2) learn community development challenges for research attention. On the side of host communities, farmers can tap into intellectual resources generated within universities (Mugabi, 2015). However, existing literature shows that community linkages are not well developed in African universities (Blackie, 2016). Even where community outreach is practiced, agricultural universities barely prioritize processes of satisfying farmer needs and interests, as a strategy of harnessing farmer motivation for sustainable learning relationships and co-creation of innovation (Juma, 2016).

That aside, some scholars have argued that African universities are underfunded and that amidst the resource constraints, it is always the outreach activities which are sacrificed (Blackie, 2016; Larsen, 2016; Sherrard, 2016). This has necessitated universities to search for more cost-effective alternatives for organizing outreach services. One such option is the engagement of university students in community outreach through service-learning programmes. These service-learning programmes (in this study, referred to as the student-to-farmer university outreach or the student-centred outreach), that are common in non-African universities such as the EARTH University in Costa Rica, are not well practiced in Africa. Among some African universities that practice student-based outreach programmes are mostly South African universities (Preece, 2013). Others include: Egerton university in Kenya as well as Makerere university and Gulu University in Uganda (Kalule & Ongeng, 2016; Mungai & Njuguna, 2016; Opolot et al., 2016). However, the design and delivery of these student outreach programmes vary considerably across universities.

Regardless of the design of the student outreach programmes, careful response to the motivational needs of the host communities, for example the farmers, is crucial for building lasting training and learning partnerships (Jacob et al., 2015). What cannot be ignored is keeping an eye on the psychological relatedness learning needs (in this study, also referred to as satisfying farmer learning needs) and overall motivation of the farmers. Short of this, it means that limited learning may be realized and consequently, a likelihood of less than vibrant

university-community linkages. This study presupposes that satisfying learning needs and interests of host farmers, who live in social judgmental groups (Sewell et al. (2014), may enact motivation for joint learning, which in effect, can result into creative innovations in student outreach formats. In the context of this study, creative innovation is customized to refer to learning relationships that bring into use new forms of products, services and social organization. An example of a previous community-student learning relationship that resulted into creative innovation is disseminated in the work of Alowo et al. (2018). Notably, the study of Alowo et al. shows that during community placement, a student learnt about a widespread problem of malnutrition among infants, which in part was attributable to inability of mothers to purchase therapeutic food supplements. Upon return to the university, the student worked with senior researchers at the faculty to develop a nutritious food for infants from locally available food materials namely soy bean, millet and sesame. The outcome product has since been named “*Miseso*” and is increasingly becoming a lucrative business among refugee communities in Northern Uganda. However, this study only concentrates on analyzing the role of satisfying farmer learning needs in fostering motivation for community member learning with university students. Overall, there is a reported mismatch between what university outreach programmes offer to host communities on one part, and on the other part, the learning interests as well as the psychological and motivational needs of the host farmers (Mirembe et al., 2016; Roberts & Edwards, 2017).

Research on motivation and human behaviour has flourished in the disciplines of marketing (Muk & Chung, 2015) and sports and physical education (Brunet & Sabiston, 2009; Standage et al., 2007). Others include student study teams and educational psychology (Haichun & Chen, 2010; Spittle et al., 2009) and ICT acceptance behaviour (Hung et al., 2011; Lee et al., 2015). However, similar research approaches (that use social psychology) in agriculture, and particularly on farmer learning, are still limited. The few exceptions (Charatsari et al., 2016; Triste at al., 2018) have applied the Self-determination theory framework to assess motivational processes for farmer participation in development projects but barely demonstrate how such motivation can be stimulated at farm-level. Other studies on motivation have largely looked at how the economic gains, the desire to learn, usefulness of the content and technology applicability affect farmer motivation to participate in educational programmes (Moumouni & Streiffeler, 2010). In all, there is still limited research on motivation in the context of university community linkages. This creates a knowledge void on what role motivational forces play in fostering learning relationships between university students and host communities.

## THE STUDENT-CENTRED OUTREACH (SCO)

The implementation of the SCO in the Faculty of Agriculture and Environment at Gulu University started in the year 2005, and targeted the training and development of ‘hands-on’ human resource for serving the agricultural sector (Odongo et al., 2017). Characteristically, the SCO can be viewed as a tripartite-symbiotic learning relationship, offering a knowledge sharing platform that mutually benefits host farmers, students and faculty staff. Ostensibly, host-farmers bring to the sharing platform tacit knowledge, in form of accumulated experiences and practices rooted in socio-cultural contexts as well as the land resources for joint experimentation, demonstration and learning. The faculty staff share intellectual and research knowledge for blending with existing farmer indigenous knowledge and practices. Lastly, the

students who largely engage in farm attachment activities in their final year of bachelor's degrees or master's degree level, serve as a conduit of knowledge transmission from faculty staff to host farmers (Kalule et al., 2016). In the original design of the SCO, undergraduate students in their final year of study are meant to commute at least once in every 2 weeks to and from the host farmers premises, located within 5 km radius from the university campus (Kalule et al., 2016). For master's degree students, the attachment is undertaken at organizations serving the farming community and usually lasts for period of 2–3 months.

Kalule and Ongeng (2016)'s study shows that the SCO targets: (1) students learning gardening and indigenous knowledge from host farmers; and (2) students, as future extension workers, experiencing the environment they are likely to serve in upon completion of studies. In addition, Odongo et al. (2017) illustrate the relevance of the SCO to host farmers, as involving: (i) student farm visits; (ii) developing joint work plans for student and farmer learning; (iii) students facilitating farmer learning with technical backstopping from faculty staff; (iv) student participation in farm activities; and (v) students transmitting farm problems to faculty staff for research attention. Indeed, previous research has shown that faculty supervision support to students while on farm placements is a key determinant of farmer learning behaviour (Kalule et al., 2019). Overall, maintaining the tripartite-symbiotic learning structure requires buy-in and motivation of all the actors for learning. Whether the SCO pays attention to satisfying learning needs and subsequently stimulate farmer motivation to participate and learn from university outreach programmes, are questions that previous research has not adequately addressed. This study therefore seeks to fill the knowledge gap on how farmer motivation might be enacted to influence the learning behaviour.

## THEORETICAL FOUNDATIONS AND HYPOTHESES

Farmer motivation to jointly learn with students on university outreach is likely to depend on whether the delivery of the SCO is sensitive to satisfying farmer learning needs which are psychological in nature. If well motivated, farmers can from time-to-time demand for hosting students onto their farms. This line of thinking seems to suggest that the SCO might need to exploit self-motivated farmer behaviour as articulated in the self-determination theory (SDT) of learning. Thus, this study applied the SDT advanced by Deci and Ryan (1985). In the SDT, Deci and Ryan (2006) articulate that the concern of this theory is peoples' desire of freedom rather than being controlled in eliciting the behaviour. These scholars further expounded on the SDT and explained that when self-determined, people experience a sense of freedom to do what is interesting, personally important, and vitalizing. Therefore, SDT offers an insight into the underlying motivational pathways for the farmer learning process in the SCO (Guay et al., 2008). The theory also focuses on the importance of the inner human resources for the development and regulation of behaviours (Brunet & Sabiston, 2009; Jungert et al., 2022). It has been argued that the internal locus of causality such as needs or motives are very important for human behaviour and that they provide multiple pathways to adaptive outcomes (Haichun & Chen, 2010).

The SDT has several sub-theories that have received wide application in motivation studies. These among others include: motivational theory and the basic needs theory (Brunet & Sabiston, 2009). The basic needs theory is popular in studies on human behaviour. Triste et al. (2018) emphasizes that the basic needs theory assumes that individuals have three basic psychological needs which ought to be satisfied for successful learning, that is, competence,

autonomy and relatedness. Competence relates to the need to interact effectively with one's environment and feel effective in producing the desired outcomes. Autonomy is related to the need of experiencing volition and ability to make own decisions without feeling controlled. Finally, relatedness entails the need for learners to feel connected to others that are innate, universal, and fundamental for their well-being. These basic psychological needs influence how individuals are motivated to enact a particular behaviour. In this study, relatedness as a psychological learning need that has a direct bearing on connection of the university and its students to farmers for learning has been preferred ahead of competence and autonomy. This is because the said connectedness is critical for developing long-term partnerships for farmer learning.

Psychological satisfaction of relatedness learning needs (also referred to as satisfying farmer learning needs) in this study was operationalized as farmers: (1) feeling of closeness to university students; (2) feeling of a sense of contact with people (students) who care for their concerns; and (3) feeling of closeness of the student farming knowledge to farmer learning interests. Satisfying farmer learning needs is hypothesized to influence farmer learning behaviour through motivation and other mediating variables. These hypotheses are as summarized in Figure 1.

Further, the following hypothesis was derived to examine the relationship between satisfaction of relatedness learning needs and farmer learning behaviour (Figure 1):

**H<sub>1</sub>:** *Psychological satisfaction of relatedness learning needs positively influences farmer learning behaviour.*

Motivation relates to the internal urge that drives the human's organism to set goals for activation or invocation of activities, and the organization of the organism for coordination of

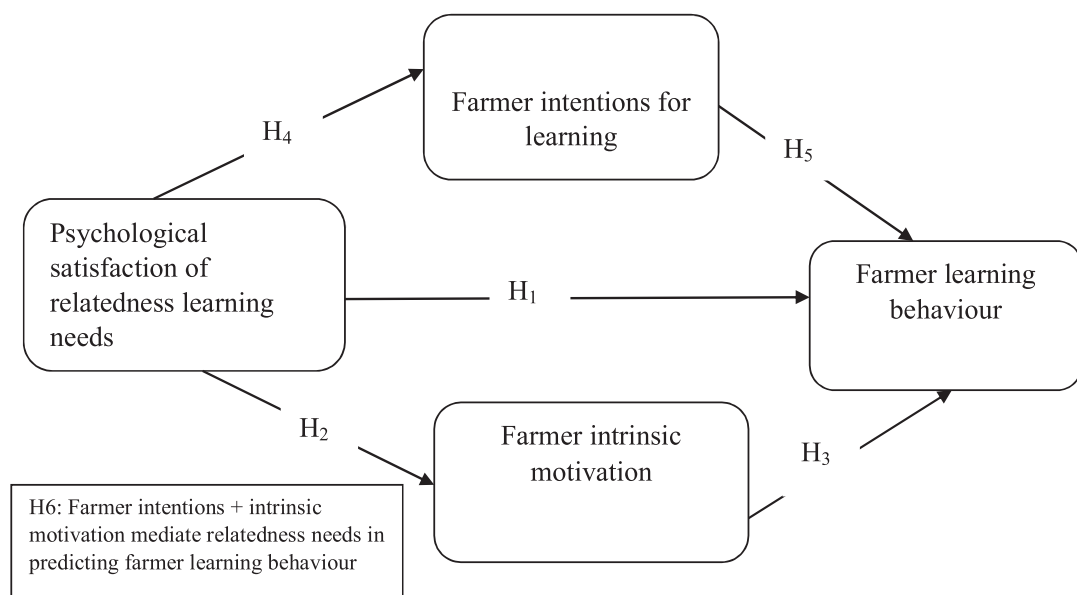


FIGURE 1 Hypothesized relationships in motivational factors for farmer learning behaviour.

the developed activities in a certain direction (Herath, 2010). Particularly, the motivation theory articulates two categories of motivation namely: intrinsic motivation (internally generated within the individual), and extrinsic motivation that originates from outside the individual (Herath, 2010). Intrinsic motivation refers to the drive that deals with experiencing pleasure and satisfaction from the performed behaviour (Gagne & Deci, 2005). It relates to willingness to spend more time on the task and involves creating an affective mood that results into learning (Hung et al., 2011). An intrinsically motivated person is believed to experience interest and enjoyment in the interaction with the activity rather than from external pressures or reward (Haichun & Chen, 2010). For instance, intrinsically motivated farmers in SFUO are likely to be interested in learning from the student outreach programme and thus, might demand for service provision and student placements onto their farmsteads.

Research has shown that intrinsically motivated learners demonstrate better performances, better engagement and higher quality learning behaviour (Ryan & Deci, 2000). On the other hand, extrinsic motivation involves performing the behaviour to achieve some separable goals, such as rewards or avoiding punishment rather than the behaviour itself (Gagne & Deci, 2005). The assumption inherent in the extrinsic motivation makes its application unsuitable to contexts that involve no positive (for instance, giving money or farm inputs to host farmers) or negative rewards (e.g., sanctions for underperformance). Thus, intrinsic motivation was preferred in this study, since the context of student-to-farmer university outreach being studied, is devoid of any rewards besides facilitating learning. Intrinsic motivation in this study refers to: (1) farmer enjoyment derived from associating with the university; (2) farmer pleasure in learning from students; and (3) farmer satisfaction in applying student knowledge onto their farms. Previous research on human behaviour has demonstrated that social support from facilitators can promote more optimal motivation for farmer learning behaviour (Deci & Ryan, 2008). Based on literature of basic learning needs and motivation for learning behaviour, the following hypotheses were derived for testing within the context of the SFUO programme:

**H<sub>2</sub>:** *Psychological satisfaction of relatedness learning needs positively influences farmer intrinsic motivation.*

**H<sub>3</sub>:** *Farmer intrinsic motivation positively influences farmer learning behaviour.*

Scholars have also shown that the satisfaction of psychological needs and motivation are linked to behavioural intentions and ultimately the actual outcome behaviour (Herath, 2010). Behavioural intentions refer to a condition of conscious goal pursuit which is necessary but not sufficient at predicting behaviour (Ajzen et al., 2012). These intentions indicate how much effort an individual will exert to perform a behaviour (Herath, 2010). In this study, farmer formation of intentions is operationalized as formulating plans and intending to try out farming competences gained from students through the experiential learning cycle of concrete experience, reflecting, analyzing, conceptualizing and testing. Theories on behavioural intentions predict that the stronger an individual's intent to perform a behaviour, the more likely the individual will engage in that behaviour (Ajzen et al., 2009). Lastly, farmer learning behaviour refers to learning activities namely: (1) seeking information that is, searching for information (Wilson, 2000) from university students; (2) knowledge sharing that is, exchange of information, skills, or expertise (Hasmath & Hsu, 2016); (3) seeking feedback from university students on the way they effect learning; and (4) giving feedback to university students on what they (students) discuss with farmers. In the application of the assumptions of the above

theories and reported relationships from previous studies, the following hypotheses were derived:

**H<sub>4</sub>:** *Psychological satisfaction of relatedness learning needs positively influences farmer formation of intentions for learning from the students on farm placement.*

**H<sub>5</sub>:** *Formation of intentions for learning positively influences farmer learning behaviour.*

**H<sub>6</sub>:** *Intrinsic motivation combines with the formation of intentions for learning to mediate psychological satisfaction of relatedness learning needs in predicting farmer learning behaviour.*

## METHODOLOGY

### Participants

A cross-sectional survey was conducted on a sample of 283 farmers who had previously hosted agricultural students of Gulu university in the SCO programme during the period of 2007 to 2016. Participant farmers were drawn from purposively selected sub counties of Paicho and Bungatira (Gulu District); and Koro and Bobi (Omoro District). To ensure representativeness, proportional sampling was used to distribute the sample between the selected districts. Records available at the Faculty of Agriculture and Environment indicate that up to 65% of programme participants come from Gulu District probably because of the closeness of this district to Gulu University. As such, 181 participants representing 64% (Paicho = 94 and Bungatira = 87) were sampled from Gulu District. That meant that 102 representing 36% (Koro = 61 and Bobi = 41) were sampled from Omoro District. Socioeconomic characteristics of the sample expressed in terms of means (*M*) and standard deviations (*SD*) were as follows: experience of household head in hosting university students in years (*M* = 2.18; *SD* = 1.99), and distance of the household from the university in km (*M* = 12.60; *SD* = 8.86), farming experience of household head in years (*M* = 23.20; *SD* = 15.15), and age of household head in years (*M* = 43.41; *SD* = 13.82). Still in the sample, the education levels of household heads were distributed as follows: no formal education (9.5%), primary education (56.5%) and postprimary education (33.9%). In terms of sex of household head, females constituted (35.3%) of the sample and the rest were male.

### Measures

Four constructs were measured using the rating scale and these included: farmer learning behaviour, farmers' formation of intentions, intrinsic motivations and psychological satisfaction of relatedness needs (Table 1). Farmer learning behaviour was measured using seven items capturing the elements of information seeking, knowledge sharing, feedback seeking and giving feedback (Edmondson, 1999). A sample item from the domain of information seeking reads as follows: 'I seek information on farming practices from university students'. All items

**TABLE 1** Operationalization of motivational factors and farmer learning behaviour.

Construct	Indicators	Scale definition
Satisfying farmer learning needs [Adapted from Cordeiro et al., 2016]	(1) Student support to host farmers; (2) Student care for farmer concerns; and (3) matching student knowledge with farmer learning interests	1–5 point scale; where 1 = not at all and 5 = always
Intrinsic motivation [Adapted from Moreno et al., 2007]	(1) Enjoyment of learning from students; (2) pleasure from associating with the university; and (3) satisfaction at applying student knowledge	1–5 point scale; where 1 = Does not correspond and 5 = Corresponds exactly
Farmer learning intentions [Adapted from Ajzen et al., 2009]	(1) Formulating learning plans; and (2) trying out knowledge gained on record keeping	1–5 point scale; where 1 = unlikely and 5 = most likely
Farmer learning behaviour [Adapted from Edmondson, 1999]	Seeking information, knowledge sharing, seeking feedback and giving feedback to students	1–5 point scale; where 1 = not at all and 5 = always

were rated on a 5-point scale (1–5, where 1 = not at all and 5 = always). The construct of farmer intentions was measured on a scale of four items adapted and modified from Ajzen (2002) and Ajzen et al. (2009). The items were modified following the experiential learning cycle capturing the domains of concrete experience, analyzing, conceptualizing and testing. A sample item of the construct is: ‘I plan to analyze records at my farm to identify any sources of success’. The items were rated on a 5-point scale (i.e., 1–5, where 1 = unlikely and 5 = most likely).

For intrinsic motivation, the items were adapted and modified from the behavioural regulation exercise questionnaire 2 (Moreno et al., 2007). Intrinsic motivation was measured using three items. A sample item from the construct is: ‘I enjoy associating with the University for learning’. The items were rated on a 5-point scale as follows: does not correspond at all = 1; corresponds a little = 2; corresponds moderately = 3; corresponds a lot = 4; and corresponds exactly = 5. Lastly, psychological satisfaction of relatedness needs had three items adapted and modified from Cordeiro et al. (2016). A sample item reads as follows: ‘I feel a sense of contact with people who care for me and whom I care for, during my interaction with the students’. The items were rated on a 5-point scale (i.e., 1 = not at all and 5 = always).

## Data analysis

Data were cleaned and transferred to the SPSS–AMOS version 23 for structural equation modelling (SEM). The analysis process followed a three-step procedure that is, data reduction, evaluation of the measurement model, and confirmatory factor analysis (CFA) to test for the hypotheses. Data reduction was done using exploratory factor analysis (EFA) that reduced the number of items for each construct to only those that exhibited best fit. Evaluation of the measurement model was done by examining the contribution of each item to the construct (latent variables) variance using factor loadings and average variance extracted (AVE). For CFA, the structural model was tested to determine the strength of the hypothesized



relationships between the latent variables. In the SEM, it is important to assess model fit before hypothesis testing. Thus, this study used common indices of assessing model fit as suggested in Bhatti et al. (2014) and Margaryan et al. (2022). The indices applied in this study included: ratio of  $\chi^2$  to degrees of freedom ( $\chi^2/df$ ), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Tucker-Lewis Index (TLI), Comparative-Fit-Index (CFI) and Root Mean Square of Error Approximation (RMSEA).

## RESULTS AND DISCUSSION

### Testing motivation model constructs for SEM analysis

Diagnostic test results are indicated in Table 2. Descriptive results show that farmers rated the construct of intrinsic motivation highest ( $M = 4.775$ ;  $SD = 0.431$ ) while farmer learning behaviour ( $M = 3.992$ ;  $SD = 0.860$ ) was the least rated. In between the two constructs, farmers rated satisfying farmer learning needs second highest ( $M = 4.491$ ;  $SD = 0.610$ ) while farmers' formation of intentions for learning was rated second lowest ( $M = 4.225$ ;  $SD = 0.837$ ). The results also show that correlations amongst the constructs ranged from weak to only moderate.

The highest correlation was between satisfying farmer learning needs and farmer intrinsic motivation ( $r = 0.339$ ;  $p < 0.01$ ) while the weakest was between farmer intrinsic motivation and formation of intentions for learning ( $r = 0.076$ ;  $p > 0.05$ ). Since the magnitudes of correlates between the constructs were all less than 0.6, then the assumption of no multicollinearity was confirmed (Hamilton, 2006). Measurement reliability, assessed using construct reliability ( $\rho$ ), showed that satisfying farmer learning needs ( $\rho = 0.996$ ) exhibited the highest value while farmer learning behaviour ( $\rho = 0.934$ ) was the lowest. Since the  $\rho$  indices were all above the recommended minimum threshold of 0.7, then the assumption of adequacy of measurement reliability was confirmed.

For convergent validity, both the standardized estimates of factor loadings (Table 3) and AVE had values exceeding the minimum threshold of 0.5 and thus, the precondition for convergent validity was supported. Lastly, discriminant validity test, evaluated by comparing correlates of constructs and the square roots of their AVE values revealed that all correlates were smaller than the square roots of AVE values. Accordingly, intraconstruct variance exceeded inter-construct variance, meaning existence of construct distinctness from each other and thus, the assumption of adequacy of discriminant validity was supported.

TABLE 2 Descriptive statistics and correlations of motivational factors of learning behaviour.

Variables	Mean	SD	CR ( $\rho$ )	AVE	Correlations			
					1	2	3	4
1. Satisfying farmer learning needs	4.491	0.610	0.994	0.749	0.865 <sup>a</sup>			
2. Farmer intrinsic motivation	4.775	0.431	0.991	0.630	0.339	0.794 <sup>a</sup>		
3. Farmer formation of intentions	4.225	0.837	0.979	0.650	0.166	0.076	0.807 <sup>a</sup>	
4. Farmer learning behaviour	3.992	0.860	0.934	0.529	0.158	0.078	0.161	0.727 <sup>a</sup>

Abbreviations: AVE, average variance extracted; CR = construct reliability; SD = standard deviation.

<sup>a</sup>means the value is square root of AVE.

TABLE 3 Estimates of factor loadings of motivational factors of learning behaviour.

Item	Standardized factor loadings			
	FLB	FFI	SAT	MOT
I seek information on farming practices from university students (IS_5)	0.667			
I seek information on produce marketing from university students (IS_13)	0.684			
I share knowledge of new ideas of farming practices with university students (KS_5)	0.733			
I share knowledge of postharvest handling with university students (KS_9)	0.712			
I seek feedback on produce postharvest handling from university students (FS_9)	0.792			
I give feedback on farming business plans to university students (PF_1)	0.758			
I give feedback on new ideas of farming practices to university students (PF_5)	0.738			
I plan to take records of farming activities on my farm (IE_2)	0.697			
I plan to analyze records at my farm to identify any sources of success (IA_2)	0.838			
I plan to think through records at my farm on what has gone well in the previous year (IC_3)	0.877			
I will try to use records on my farm for making future decisions (IT_3)	0.803			
I feel close to the students facilitating the learning processes (SR_1)	0.902			
I feel a sense of contact with people who care for me and whom I care for, during my interaction with students (SR_2)	0.866			
I feel that the farming knowledge from students is close to my learning interests (SR_3)	0.826			
I enjoy associating with the university for learning (MI_1)		0.851		
I find using learnt knowledge from students pleasurable (MI_2)		0.879		
I feel satisfied when applying modern farming techniques from students (MI_3)		0.627		

Abbreviations: FFI, formation of farmer intentions; FLB, farmer learning behaviour; MOT, intrinsic motivation; SAT, satisfying farmer learning needs.

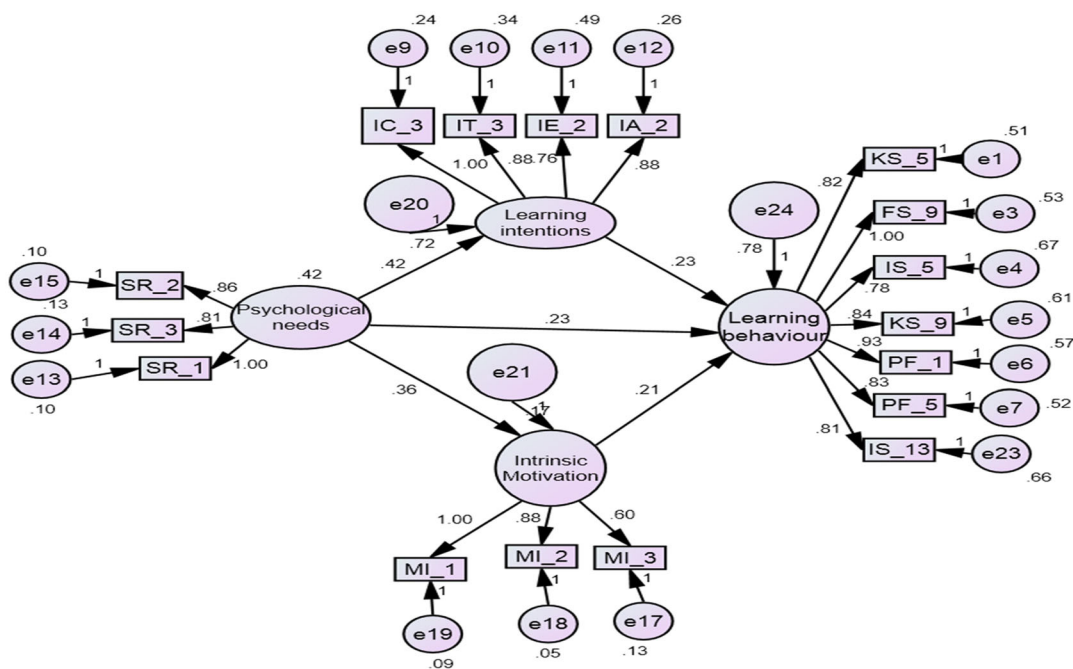
## Confirmatory factor analysis and testing of hypotheses

Results of confirmatory factor analysis presented in Figure 2 show that the specified structural model yielded SEM results that depicted an almost perfect model fit.

The comparison of goodness-of-fit indices (Figure 2) with baseline values (specifications) as articulated in Bhatti et al. (2014) and Mittal & Dhar (2015) revealed that the ratio of  $\chi^2/df = 1.62$  (spec.  $\leq 3$ ), GFI = 0.93 (spec.  $\geq 0.90$ ), and AGFI = 0.91 (spec.  $\geq 0.90$ ) met precondition specifications. Similarly, the preconditions of goodness-of-fit were met for the following indices: TLI = 0.97 (spec.  $\geq 0.95$ ), CFI = 0.97 (spec.  $\geq 0.95$ ) and RMSEA = 0.05 (spec.  $\leq 0.08$ ).

SEM results of hypothesis testing (Table 4) revealed that the antecedent of satisfying farmer learning needs was a significant predictor of farmer learning behaviour ( $\beta = 0.227$ ;  $t = 1.978$ ;  $p < 0.05$ ), supporting hypothesis H<sub>1</sub>. The same antecedent significantly predicted farmer intrinsic motivation ( $\beta = 0.358$ ;  $t = 7.422$ ;  $p < 0.01$ ) and farmer formation of intentions ( $\beta = 0.419$ ;  $t = 4.682$ ;  $p < 0.01$ ) thus, supporting hypotheses H<sub>2</sub> and H<sub>4</sub>. Lastly, farmer formation of intentions was a significant predictor of farmer learning behaviour ( $\beta = 0.233$ ;  $t = 3.193$ ;  $p < 0.01$ ), and thus, supporting hypothesis H<sub>5</sub>. However, farmers' intrinsic motivation did not significantly predict farmer learning behaviour ( $\beta = 0.207$ ;  $t = 1.366$ ;  $p > 0.05$ ), meaning that hypothesis H<sub>4</sub> was not supported.

The results in this study did not vary from what has been reported in extant research literature on motivation. First, the finding on positive influence of satisfying farmer learning needs on intrinsic motivation matched theoretical prediction (Brunet & Sabiston, 2009; Deci &



Goodness of fit indices: Chi-sq = 185.0; df = 114; Chi\_sq/df = 1.62; GFI = 0.93; AGFI = 0.91; TLI = 0.97; CFI = 0.97; RMSEA = 0.05

FIGURE 2 Path diagram of motivational factors of farmer learning behaviour. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

**TABLE 4** Testing of hypotheses of motivational factors of farmer learning behaviour.

Path	Path Est., $\beta$ (S.E)	<i>t</i> Value	Hypothesis testing decision
H <sub>1</sub> Satisfying farmer earning needs → Farmer learning behaviour	0.227(0.115)	1.978*	Supported
H <sub>2</sub> Satisfying farmer learning needs → Farmer intrinsic motivation	0.358(0.048)	7.422**	Supported
H <sub>3</sub> Farmer intrinsic motivation → Farmer learning behaviour	0.207(0.151)	1.366	Not supported
H <sub>4</sub> Satisfying farmer learning needs → Farmers' form of Intentions	0.419(0.089)	4.682**	Supported
H <sub>5</sub> Farmers' form of intentions → Farmer learning behaviour	0.233(0.073)	3.193**	Supported

Note: \* and \*\* represent significant at 5% and 1%, respectively.

Abbreviation: form., formation.

Ryan, 2006). The finding did not only conform to theoretical prediction but also it was in support of the results on motivation of behaviour reported in earlier studies (Halvari et al., 2010; Triste et al., 2018). Similarly, the result of positive influence of satisfying farmer learning needs on formation of learning intentions supported earlier research which revealed that psychological needs predict peoples' intentions and consequently, their learning behaviour (Ajzen et al., 2009).

Based on the results reported in the current study, it can be argued that satisfying farmer learning needs is an important initiator of the motivational pathway and farmer intentions, which stimulate farmer learning behaviour in the student-to-farmer university outreach. This is well aligned with the line of thinking of many scholars on self-determined motivation. For instance, the study of Van den Broeck et al. (2016) suggest that people are always self-motivated, and that, depending on the status of social connectedness to them, this motivation can either be thwarted or nurtured for better behaviour. Similarly, Ng et al. (2012) and Ryan et al. (2008) shed light on enhancing peoples' motivation. These two studies articulated that support and subsequent satisfaction of the basic needs provides a higher quality of psychological energy which motivates the initiation and long-term maintenance of behaviours. Thus, it can further be argued that developing close relationships between the university staff and their students on one part, and the farmers on the other, during university outreach builds intrinsic motivation. The same psychological needs are important stimulants of farmer formation of intentions for learning. In turn, intrinsic motivation and farmer formation of intentions invoke farmer learning behaviours in the student-to-farmer university outreach. This means that addressing psychological needs of closeness of staff and students to community members stimulates enthusiasm of farmers to interact with the students. Consequently, it creates farmers' interest in the learning process and the enjoyment that comes with the learning situation.

Results of bootstrapping are presented in Table 5. These results indicate that the combined indirect effects of intrinsic motivation and farmers' formation of intentions in the relationship between Satisfying farmer learning needs and farmer learning behaviour were significant ( $\beta = 0.118$ ; 95% CI = 0.014 ~0.257). Thus, the mediation hypothesis (H<sub>6</sub>) was supported. This

**TABLE 5** Bootstrapping results for motivational factors of learning behaviour.

Path	Standardized effects			Bias-corrected (95% CI)	
	Direct	Indi.	Total	Lower	Upper
H <sub>1</sub> : Satisfying farmer learning needs → Farmer learning behaviour	0.157	0.118	0.275	0.158	0.400
H <sub>2</sub> Satisfying farmer learning needs → Farmers' intrinsic motivation	0.486	-	0.486	0.339	0.604
H <sub>3</sub> Farmer intrinsic motivation → Farmer learning behaviour	0.105	-	0.105	-0.082	0.332
H <sub>4</sub> Satisfying farmer learning needs → Farmers' form of intentions	0.306	-	0.306	0.166	0.431
H <sub>5</sub> Farmers' form of intentions → Farmer learning behaviour	0.220	-	0.220	0.078	0.379
H <sub>6</sub> Satisfy learn needs → motivation + Far. intentions → Farmer learn. beh.	-	0.118	-	0.014	0.257

Abbreviations: beh., behaviour; Form., formation; Satisfy learn needs, satisfying farmer learning needs.

finding is in conformity with research which revealed that intrinsic motivation along with other motivation factors mediate the variable of satisfying farmer learning needs in predicting learning behaviour (Van den Broeck et al., 2016). Further, effect sizes were examined to determine whether the findings reported in this study met the criterion of practical relevance ( $\beta = 0.2$ ) as articulated in Medina (2017). The biggest total effect size was found in the relationship between satisfying farmer learning needs and farmers' intrinsic motivation ( $\beta = 0.486$ ; 95% CI = 0.339 ~0.604), hypothesis H<sub>2</sub>.

Statistically, it was also significantly different from zero. This means that satisfying relatedness learning needs explained up to 49% of the variance in farmer intrinsic motivation. This finding reinforces the argument in literature that basic psychological needs are crucial antecedents in arousing motivation of learners (Guay et al., 2008).

The next biggest effect size was observed for the relationship between psychological satisfaction of relatedness learning needs and farmer formation of intentions ( $\beta = 0.306$ ; 95% CI = 0.166 ~0.431), hypothesis H<sub>4</sub>, which was also significant. This means that satisfying relatedness learning needs explain about 31% of variance in farmer formation of intentions. Other relationships that meet the criterion of practical relevance are: psychological satisfaction of relatedness learning needs effects on farmer learning behaviour ( $\beta = 0.275$ ; 95% CI = 0.158 ~0.400). In this case, the predictor accounts for 28% of the variance in the outcome variable. Lastly, farmer learning intentions ( $\beta = 0.220$ ; 95% CI = 0.078 ~0.379) accounts for about 22% of the variance of in farmer learning behaviour. In either case of the former two findings (for hypotheses, H<sub>1</sub> and H<sub>5</sub>), statistical significance was confirmed. For the relationship between farmer intrinsic motivation and farmer learning behaviour ( $\beta = 0.105$ ; 95% CI = -0.082 ~0.332), despite being significant, the criterion of practical relevance was not met. The findings in this study imply that much as intrinsic motivation is a significant predictor of farmer learning behaviour, it is satisfying relatedness learning needs that remains the most important factor for achieving objectives in the SCO programme.

In this study, it is evident that satisfying farmer learning interests is a key stimulant for farmer motivation to learn from student outreach programmes. It is clear that if the SCO pays attention to ensuring that: (1) students are responsive to farmer concerns; (2) students are socially caring for example, assisting farmers during farm work; and (3) student knowledge matches farmer learning interests, then host farmers would be motivated towards learning from students. This motivation is likely to be manifested in form of host farmer enjoyment of associating with the university; (2) feeling pleasure at learning from students and (3) satisfaction with applying student knowledge onto the farm. Such motivation is likely to generate favourable learning behaviour among host farmers, notably, sharing indigenous knowledge with students, seeking information from students and giving to and receiving from outreach students learning feedback. This in the long run might result into lasting learning relationships between the university and the host communities. It is thus arguable that achieving desirable farmer learning behaviour in the student-to-farmer outreach is dependent on satisfying farmer learning needs and interests which university outreach programmes might consider prioritizing.

## Conclusion and recommendations

This study has yielded results suggesting that satisfying farmer learning needs is a strong initiator of the motivational pathways for farmer learning behaviour in the student-to-farmer

university outreach. This study reveals that satisfying farmer learning needs is a positive and significant predictor of the mediating variables namely: (1) intrinsic motivation, and (2) farmer formation of intentions for learning. In turn, the two mediating variables predict farmer learning behaviour in the student-to-farmer university outreach. We conclude that satisfying farmer learning needs determines farmer motivation that drives farmer formation of learning intentions, and subsequently, enact farmer learning behaviour. Literarily, this means that satisfying farmer learning needs generates farmer interest in student outreach; enjoyment of associating with the university; and farmers feeling pleasure at applying knowledge learnt from students. The results point to the possibility of developing lasting relationships in the student outreach programmes, if such programmes ensure that students on farm placements are sensitive to the learning interests and needs of the farmers. This could be through students demonstrating care for problems experienced at the farmsteads.

The contribution of this study is three-fold: (1) theoretical development; (2) practical application; and (3) reinforcing the on-going discourse on policy reforms in higher education for enhanced university-community linkages. This study deepens self-determination theory by enriching the literature on basic psychological needs and motivation subtheories with empirical data and concepts derived from the context of university student outreach. Pertinent concepts of university student outreach integrated in the self-determination theory include formation of intentions for learning from university students on farm placements. Further, this literature has been enriched with concepts of farmer learning behaviour in a university outreach context, in form of information seeking, knowledge sharing, receiving and giving feedback to outreach students. From a practical standpoint, the results are applicable to management of student-centred outreach. This study emphasizes the importance of satisfying learning needs and interests of farmers in eliciting favourable farmer learning behaviour in the student-to-farmer university outreach. This could be harnessed through appropriate orientation of students before farm placements so as to instill a sense of care for farmer concerns and responsiveness to farmer learning interests. It is also important that student-centred outreach programmes regularly identify farmer learning needs so as to tailor student knowledge to such farmer learning needs. For the on-going discourse on policy reforms in higher education and training of agricultural extension workers, the results are informative to the debate on harnessing university-community linkages to churn out a labour force equipped with the right competences of being responsive to farmer learning needs and interests. This study also highlights that a well-motivated farmer, who also lives in a social judgmental group, can be useful in advancing social approvals for university student outreach within his or her social setting. This might also be vital in generating social support for joint learning between host farmers, students and faculty staff; a key precondition for triggering creative innovation in the student-to-farmer university outreach.

On limitations, this study relied on primary data collected using one survey instrument to analyze whether university students on community outreach motivate host farmers for learning. Yet again, the study uses self-reported responses from host farmers, untriangulated with other data sources and collection methods. As such, this might have biased the findings reported in this study. In addition, some study variables, for instance intrinsic motivation, had as few as three measurement items. However, the results of this study are still upheld because the three measurement items are adequate for data analysis using SEM. Further, potential biases were minimized by the large sample used in this study.

## ACKNOWLEDGEMENTS

This article resulted from the PhD research supported by the Regional Universities Forum for Capacity Building in Agriculture-RUFORUM (Grant Number: RU 2014 NG 15). We also acknowledge additional funding from RUFORUM under the Wajao post-doc fellowship (Grant number: RU/2018/Post Doc RTP/01).

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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**How to cite this article:** Kalule, S. W., Sseguya, H., Karubanga, G., & Ongeng, D. (2023). Motivational pathways for farmer learning behaviour in the student-to-farmer university outreach. *International Journal of Training and Development*, 27, 263–280. <https://doi.org/10.1111/ijtd.12298>