

FARMER LEARNING BEHAVIOUR: A CASE OF THE STUDENT-TO-FARMER UNIVERSITY OUTREACH OF GULU UNIVERSITY IN UGANDA

By

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DECLARATION

I, **Kalule Wamala Stephen** hereby declare that this research dissertation is a result of my own efforts. However, the ideas that are not my own have been accredited. I further affirm that this dissertation has never been presented to any university or any other tertiary institution for the award of certificate, diploma or degree.

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APPROVAL

This dissertation has been submitted for the award of a Degree of Doctor of Philosophy in Agricultural and Rural Innovation of Makerere University with the approval of the following academic supervisors.

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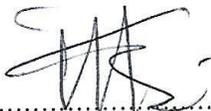
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DEDICATION

This dissertation is dedicated to members of my family, Annet and Roselyn. Also, to my parents, the late Henry Wamala Kalule and my ever-loving and encouraging mother, Ms. Justine Nalugya.

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LIST OF ACRONYMS

AGFI:	Adjusted Goodness-of-Fit Index
AMOS:	Analysis of Moment Structures
AVE:	Average Variance Extracted
BNT	Basic Needs Theory
CE	Community Engagement
CFI:	Comparative-Fit-Index
CI	Confidence Interval
CMB:	Common Method Bias
CR:	Composite Reliability
DC:	Doctoral Committee
EFA:	Exploratory Factor Analysis
FAE:	Faculty of Agriculture and Environment
FAP:	Farmer Attachment Program
FC:	Facilitating Conditions
FI:	Farmer Intentions
FLB:	Farmer Learning Behaviour
FSS:	Faculty Supervision Support
BREQ-2:	Behavioural Regulation Exercise Questionnaire - Two
FSS:	Faculty Supervision Support
GFI:	Goodness-of-Fit Index
GU:	Gulu University
HEIs:	Higher Education Institutions
NGO:	Non-governmental Organization
PAS:	Perceived Attitudes of Students
PVLC:	Perceived Value of Learning Content
RMSEA:	Root Mean Square of Error Approximation
RUFORUM	Regional Universities Forum for Capacity Building in Agriculture

SA	South Africa
SAE	Supervised Agricultural Enterprise
SCO:	Student Centered Outreach
SCT:	Social Cognitive Theory
SDT:	Self-determination Theory
SEM:	Structural Equation Modeling
SFA	Student Farmer Attachment
SPSS	Statistical Package for Social Sciences
SSA:	Sub Saharan Africa
TLI:	Tucker-Lewis Index

ABSTRACT

Globally, a dominant discourse on policy reforms for the higher education sector has called for universities to prioritize community outreach services. However, concerns exist in student outreach formats that they might not be yielding the desired community-level learning. A cross-sectional study on 283 host farmers of the student-to-farmer outreach of Gulu University was used to examine the influence of psychosocial factors on farmer learning behaviour. Specifically, the study: 1) analyzed contextual factors that determine differences in the elements of farmer learning behavior; 2) assessed the influence of facilitating conditions on farmer learning behavior; 3) assessed the influence of motivational factors on farmer learning behaviour; and 4) assessed the social cognitive drivers of farmer learning behaviour. The study used Kruskal-Wallis test to analyze contextual determinants of differences in the elements of farmer learning behavior while structural equation modelling was used to analyze psychosocial factors influencing farmer learning behavior in the student-to-farmer University outreach. Results show significant differences in the elements of learning behaviour of knowledge sharing [$\chi^2 (2) = 8.5$; $P < 0.05$] and giving feedback [$\chi^2 (2) = 7.6$; $P < 0.05$] for farmstead distance from the university and experience in student outreach amongst host farmers. Further, Friedman test results reveal preferential perceptions for the student outreach program compared to public extension and non-public extension. Results further show that the most important and positive facilitating condition for farmer learning behaviour was faculty supervision support to students ($\beta = .182$; $P < 0.05$). For motivational factors, satisfaction of relatedness learning needs ($\beta = .228$; $P < 0.05$) and the formation of learning intentions ($\beta = .233$; $P < 0.01$) were the positive and significant predictors of farmer learning behaviour. Lastly, social cognitive factors that positively and significantly influenced farmer learning behaviour were perceived social outcome expectations ($\beta = .372$; $P < 0.01$) and social influence ($\beta = .227$; $P < 0.05$). The study concludes that farmstead distance to the university together with farmer experience in student outreach determine differences in farmer learning behaviour. Furthermore, faculty supervision support to students, satisfying relatedness learning needs, favourable social outcome expectations and social influence positively impact farmer learning behaviour. The study recommends more logistical support to faculty staff for effective supervision of student outreach activities for enhanced learning at grassroots. This study contributes to existing knowledge by providing a deeper understanding of farmer learning behaviour using data and concepts drawn from student outreach formats.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background

Worldwide, as new knowledge and advanced skills drive economic development, universities and other Higher Education Institutions (HEIs) are increasingly urged to play a critical role in facilitating learning and innovations in communities (Cloete & Maassen, 2015; Jowi, 2012). For instance, in many countries, it is widely reported and believed that such aspirations can easily be realized if universities efficiently implement the presumed triple roles of higher education mandate namely training and learning, research and community outreach (Nhamo, 2012; Kraemer-Mbula, 2014). Through training and learning function, HEIs produce a skilled labour force that drives economic development (Cloete & Maassen, 2015). For research, the belief is that HEIs can generate new knowledge and technologies required to foster innovations for socio-economic transformation (Pillay, 2010). From the perspective of community outreach, as part of the wider framework of university-community linkages, these HEIs are expected to disseminate researched knowledge for end-use application (Grimshaw & Kala, 2011).

On the contrary, HEIs, most particularly in developing countries, have been the subject of criticisms for operating as “ivory-tower universities”. In this regard, the notion “ivory-tower universities” has been used to refer to those universities whose operations largely concentrate on only the two primary functions of training and research (Muriisa, 2015). In such “ivory-tower universities”, little or no attention is paid to community linkages, meaning that they barely engage local communities and external stakeholders for mutually beneficial learning (Kibwika, 2006). Even in the few universities that have entrenched community outreach in their systems, very often, the notion of “two-way symbiotic learning relationships”, in which both the university and host communities learn, is not well practiced (Blackie, 2016). Instead, existing reports show that the structure and operations of community outreach appear to be focused on simply dissemination of knowledge and technologies generated in universities (Fergie, 2014; Teferra, 2013). For community-engaged universities, the expectation is that host communities easily tap into intellectual and researched knowledge resources that, if well exploited, improve the quality of life especially in rural areas (Juma, 2016). On the other hand, universities equally stand to benefit from such a symbiotic relationship with host communities. For instance,

academic staff and students can easily learn indigenous knowledge and practices from host communities which contributes to academic growth if such indigenous knowledge is blended with technical knowledge.

However, community outreach functions are not well developed in most universities, especially in African. Indeed, some scholars have pointed out that of the three functions of university mandate, community outreach is the least prioritized and very often, it is referred to as the “third function of universities” (Juma, 2016; Jacob, Sutin, Weidman & Yeager, 2015). As a result of the low prioritization, these outreach functions tend to receive little funding from both the university administration and national budget (Teferra, 2013; Ofoyuru, Bisaso & Muwanga, 2018). Yet again, in many universities, especially in African countries, faculty staff are few and aging (Blackie, 2016). Besides, the staff do not only appear to be inadequately incentivized but also lack skills and knowledge required for effective facilitation and supervision of community outreach activities, most especially, those implemented as student service learning programs (Larsen, 2016). As such, a lot of researched knowledge, technologies and innovations have remained shelved within universities, barely reaching the intended end-users (Mirembe, Obaa, & Ebanyat, 2016).

In recent times, there have been renewed calls for universities to be proactive in bridging and harnessing community linkages as a means of pursuing knowledge-based development (Cozza & Blessingger, 2015). In this debate, there are a number of presumable interests linked to differing needs of various stakeholders. Firstly, the policy makers consider university-community linkages as critical in exploiting the knowledge economy for socio-economic transformation (East African Community, 2016; African Union Commission, 2015). This line of argument follows good lessons gained from the famous “*Asian Tigers*” namely China and India, which reportedly exploited their knowledge economies for initiatives that triggered tremendous industrial development (Cloete, Bailey, Pillay, Bunting & Maassen, 2011). In this case, the term knowledge economy relates to the use of knowledge to generate tangible and intangible values including goods, services, learning and innovations (Simandan, 2010). Secondly, the educationists and researchers believe that university-community linkages can have influences on the evolution of, and redesigning curricula that produce graduates who are competitive on the labour market, but also that these linkages yield community learning and innovation (Fergie, 2014). However, this

line of thinking lacks empirically supported knowledge on the role that psychosocial factors play in influencing farmer learning behaviour. Yet psychosocial factors may depict mechanisms that lead people to be supportive of interventions and hence, relevant for analyzing learning behaviour in host communities of university outreach (Yazdanpanah, Hayati, Hochrainer-Stigler & Zamani, 2014). For instance, farmer perceptions about the learning environment including program design (facilitation) that stimulates host farmer motivation to learn as well as social cognition beliefs might be important for whether host farmers are supportive of student outreach programs or not. In the end, this could be the precursor for long-term and mutually beneficial learning relationships in the student outreach programs. Thirdly, local communities view their linkages with universities as useful for harnessing learning and addressing their development needs especially if such researched knowledge, innovations and solutions are responsive to community-based challenges (Preece, 2013a; Glewwe, Maiga & Zheng, 2014).

Conversely, the practice of community outreach differs across universities and from region to region. From the perspective of developed countries, community outreach involves forging functional partnerships between universities on one part and either well-established civil society, firms or industries on the other part (Kruss, Visser, Aphane & Haupt, 2011a). In such partnerships, the well-endowed organizations fund universities, whereas the universities disseminate researched knowledge for practical application by end-users (Preece, 2013b). However, in developing countries, there is still limited capacity of such organizations (specifically the private sector) funding universities for purposes of tapping into researched knowledge for innovation and development (Preece, 2013b; Cloete et al., 2011). Instead, some scholars have argued that in developing countries, universities would be most useful if they intervened by influencing learning behavior in less-advantaged communities, and so contributing by solving local development problems (Grobbelaar, Tijssen & Dijksterhuis, 2017). In this way, universities would assume the roles of facilitators of the localized innovation systems (Lundvall, Vang, Joseph, & Chaminade, 2009), believed to be influential in farmer learning behaviour and grassroots innovation.

In the face of diminished university staff visibility and in search of more societal relevance, alternative approaches of community outreach have evolved. Among the recent approaches of community outreach, most particularly in African universities, are the student-centered outreach

programs [also known as student outreach models or approaches], which many stakeholders currently believe can be useful for localized innovation processes (Lundvall et al., 2009; Sherrard, 2016). In these outreach programs (which in the context of this study are also referred to as the student-to-farmer university outreach), students are seen as a conduit for knowledge transfer between universities and the wider communities (Sherrard & Alvarado, 2017). At the same time, through these outreach programs, students work with faculty staff to learn about community challenges and indigenous knowledge in the host communities. It has been reported that student-centered outreach programs are useful for student experiential learning and improvement of the quality of life amongst host communities (Ssebuwufu, Ludwick & Béland, 2013; Fergie, 2014). However, other studies report that some host communities consider student outreach programs as highly demanding in terms of time and efforts to attend to students and such communities may be less enthusiastic to receive students (Ferman & Hill, 2004; Petersen & Henning, 2010). Nonetheless, student-centered outreach programs are widely cherished because they are presumed to offer a relatively cost-effective means of providing learning in host communities, thus, the possibility of facilitating localized innovation systems with economical resources (Muhamad, Yahya, Shahimi, & Mahzan, 2009). However, previous research has not satisfactorily addressed the question of how psychosocial factors affect farmer learning behaviour in these outreach programs for a localized innovation system.

Student oriented university outreach has largely been practiced in non-African Universities. Examples of student outreach include: the service learning program at EARTH University in Costa Rica (Sherrard & Alvaro, 2017) as well as the Supervised Agricultural Enterprise (SAE) and the land-grant universities model in the United States of America [US] (Liu, 2014; Mack & Stolarick., 2014; Mukembo, 2017). In Africa, student service learning programs are majorly being documented in a few Southern and Central African universities (Preece, 2013a). In the East African region, student-centered university outreach models are progressively taking root, most particularly in the agricultural training universities. For instance, Gulu University in Uganda runs the student-to-farmer University outreach program in which both graduate and undergraduate students are positioned to work with smallholder farmers (Odongo et al., 2017). At Makerere University, still in Uganda, agricultural students participate in a community outreach program in which such students train farmers in a range of agricultural skills (Opolot, Obaa, Isubikalu, Ebanyat, & Okello, 2016). Similarly, Egerton University in Kenya engages

students in the farm attachment program (FAP) for experiential learning while providing advisory services to farmers (Mungai & Njuguna, 2016). These different forms of university-community linkages are clearly described in the subsequent sub-section to express their uniqueness in fostering student training and engagement with communities. Given the fact that student centered outreach programs are a recent phenomenon in many African universities, and with limited information on their effectiveness to date, there are still questions over their capacity to facilitate grassroots learning and innovation. This study therefore uses the student-to-farmer university outreach (SFUO) program of Gulu University to elucidate on psychosocial factors that influence farmer learning behaviour towards student outreach.

1.2 Forms of university-community linkages

Different scholars use the notion university-community linkage interchangeably with other terms. For example; community engagement, collaborative learning, and community outreach or community partnerships are used interchangeably depending on the perspective of the scholar conceptualizing it (Keith, 2015). Basically, these community linkages are referred to as community outreach if the focus of knowledge flow is from the knowledge institution to the community with the intention of facilitating learning for behavioral change (Arko-Cobbah, 2004). However, if the university-community interactions involve two-way knowledge flows, for instance, knowledge flowing from the university to the community, and the university also learning from the community, then these linkages can be referred to as community engagement [CE] (Erickson, 2010). As cited in the study by RUFORUM (2017, pp22), the Carnegie Foundation for the Advancement of Teaching describes CE as collaboration between institutions of higher education and their larger communities for mutual and beneficial exchange of knowledge and resources. In practice, however, information linkages between universities and the larger communities may not be efficient (Kruss, Adeoti, & Nabudere, 2012), more especially in situations where psychosocial factors may be influencing farmer learning behaviour (Roberts & Edwards, 2017). For instance, previous research attributes such flaws in information linkages on inappropriate channels of communication and intricate language used in dissemination of knowledge for behavioural change (Mirembe et al., 2016). In a nutshell, the problems associated with information linkages such as those stipulated above are more likely to happen in the SFUO programs which are intended to facilitate farmer learning behaviour amidst influencing psychosocial factors. Relevant psychosocial factors for farmer learning during university

outreach may include facilitating conditions, motivation and social cognitions, which previous research has not given adequate attention. Therefore, student outreach programs might need research results on how facilitating conditions, motivational factors and social cognition beliefs can be exploited for lasting learning relationships at grass roots.

Extant literature has demonstrated that existing designs and execution of student outreach programs are multifaceted (RUFORUM, 2017), but with the same goal of responding to community learning needs and development. First, student outreach may be undertaken as capstone courses involving field-based practical training, a practice commonly referred to as experiential learning (RUFORUM, 2017; Sebuwufu et al. 2012). In such a scenario, students engage in community-based work for practical training, allowing them an opportunity of experiencing the environment they are likely to serve in after completion of their studies. Still, the RUFORUM (2017) study identifies a second form of student outreach known as the research, innovation and scholarship. A key objective of this type of student outreach, also known as action-research is co-creation of knowledge involving university staff, students and community members (Grobbelaar et al., 2017). Lastly, a third form of student outreach is community attachment (also known as field attachment and service internships). This entails work-based placement of students [also referred to as the student service learning program] to host communities (Cooper, Orrell, & Bowden, 2010; Emslie, 2010).

As a service learning program, the SFUO positions students at the forefront of working with host communities while the faculty staff play the supervision and mentorship roles (Giddings, Vodde, & Cleveland, 2003). In such SFUO, field-based faculty supervision (in this study referred to as faculty supervision support to students) is critical for realizing learning in host communities. For instance, the faculty supervision support to students may entail: 1) faculty staff mediating host farmer - student meetings prior to farm placements; 2) faculty staff providing supplementary knowledge during student-farmer engagement at farmsteads, and 3) regular follow ups to students at the farmsteads. The SFUO programs tend to have an on-going faculty-guided reflection purposely to challenge the students to analyze their newly acquired experiences using discipline-based theories (Erickson, 2010). The centerpiece of these SFUO programs is reciprocity in which emphasis is placed on exchange of knowledge and experiences in a manner that is mutually beneficial to the students and the host communities (Kruss & Gastrow, 2015;

Ram, 2008). This narrative is not any different from the design of the SFUO program at Gulu University (Kalule, Okello, & Ongeng, 2016a). Therefore, the challenges faced in service learning programs in many other universities are related to those experienced in the SFUO program. Such challenges include: 1) lack of guiding policies and operational frameworks to regulate student field-based activities; 2) understaffing and limited field supervision of students; and 3) inadequate engagement of host communities for desirable learning behaviour (Ofoyuru et al., 2018; Kraemer-Mbula, 2014). It is therefore imperative to search for lasting solutions that respond to the challenges experienced in the SFUO programs. Accordingly, the current study addresses the question of student field supervision and engagement of host communities to arouse farmer interest for learning from the SFUO program.

1.3 The design of Student-Centered Outreach at Gulu University

Gulu University (GU), located in Northern Uganda, was established in 2003 at the time of an armed conflict. Many households had been displaced, and neither benefited from economic growth experienced in other parts of the country nor had the capacity to engage in active production. This background informed the eventual rationale of establishing GU whose mandate, in part, was to rehabilitate livelihoods of the once displaced households. Right from its inception, the University's mission emphasized integrating community engagement in its core functions of teaching and training, research and knowledge dissemination as well as consultancy (Odongo et al., 2017).

In a similar line of thinking, in 2005 when the Faculty of Agriculture and Environment (FAE) at GU was established, it sought to further operationalize the community connectedness agenda of the university in its training programs. For instance, in the curriculum of its flagship degree program of Bachelor of Agriculture, the FAE entrenched community outreach as the student-farmer attachment [SFA] (Kalule, Okello, & Ongeng, 2016a). This SFA later transformed into the student-centered outreach [SCO] program (in this study referred to as the student-to-farmer University outreach [SFUO]). In the original design of the SCO, undergraduate students were meant to operate within a short distance of 10 km radius from the University campus (Kalule & Ongeng, 2016). The short distance nature was meant to ensure that students regularly commute to and from the field by riding bicycles and/or walking for a period of not less than one year. However, following the introduction of graduate training programs in 2014, the outreach

catchment frontiers were extended beyond the 10 km radius from the university to cover many districts in Northern Uganda including Gulu, Omoro, Lira, Oyam, and Amuru among others. For the graduate students, the SCO emphasizes attachment to farmer associations, farmer groups and other farmer organizations serving farming households (Kalule & Ongeng, 2016). Like undergraduate students, many graduate students attached to the farmer organizations end up working with individual farmers at farmsteads.

As stated by Kalule et al. (2016b) the features of the SCO program are as follows: 1) students interact with farmers to facilitate learning; 2) farmers participate in problem communication and knowledge sharing with students; 3) students transmit identified farming problems to the faculty; and 4) students returning researched solutions to the community. Generally, in this outreach program, empirical evidence on how psycho-social factors affect farmer learning behavior is still limited. The available farm-level studies (e.g. Roberts & Edwards, 2017; Mirembe *et al.*, 2016) reveal existence of information mismatch between the student outreach programs and the host farmers but barely pay attention to the psychosocial environment of the farmer that might influence the learning behaviour. For instance, positive perceptions about student outreach programs together with host farmer beliefs that learning from university students improves farm yields, products and incomes might stimulate farmer motivation for better relationship with, and learn from the SFUO. It is thus necessary to further examine farm-level factors in combination with the farmer psychosocial environment that might be affecting grassroots learning in the SFUO program.

1.4 Problem statement

Although student-centered outreach models are on the rise in Africa, especially in agricultural training universities, they are not free of challenges. Many scholars have argued that the student-to-farmer University outreach barely stimulates farmer learning behavior at the grass roots owing to poor information linkages between the faculty staff, students and farmers [the end-users of outreach services], (Mukembo, 2017; Globbelaar et al. 2017). Related concerns, most especially on student engagement of host farmers for appropriate learning behaviour, have also been reported in the student-to-farmer outreach of Gulu University (Roberts & Edwards, 2017). This suggests that students': 1) information might not match farmer learning needs; and 2) engagement of host farmers may not stimulate desirable learning behaviour. Reportedly, host

farmers barely engage students on farm placement in information seeking, knowledge sharing, seeking & giving feedback (Roberts & Edwards, 2017; Acheampong, Frimpong, Adu-Appiah, Asante, & Asante, 2017).

The design of the SFUO program at GU and the overall implementation of activities emphasize the notion of demand-driven service provision to farmers. As such, the success of the SFUO program is likely to depend on farmer volunteerism and whether facilitation of farmer learning arouses interest and subsequent motivation (Menozzi, Fioravanzi, & Donati, 2015; De Snoo, Lokhorst, van Dijk, Staats, & Musters, 2010). In this case, motivation for learning is likely to be an outcome of: 1) intervention factors (facilitating conditions), and 2) the psychosocial environment in which an individual host farmer lives. However, how these factors influence farmer learning behaviour in the context of student centered outreach is still less understood. It is thus necessary to examine the question of farmer learning behavior in the SFUO using psychosocial theories as articulated in literature (Sewell et al., 2017; De Snoo et al., 2012).

Psychosocial studies analyzing farmer learning behaviour using facilitating conditions, self-determination motivation and social cognitions are still few. Examples of such studies include farmer conservation practices (Menozzi et al., 2015; De Snoo et al., 2012) and learning behaviour in virtual training systems (Venkatesh, Thong, & Xu, 2012; Abu Bakar & Abdul Razak, 2014). Particularly, similar research in the context of the student-to-farmer university outreach is conspicuously lacking. This deprives the SFUO programs of results on how the psychosocial environment of host farmers might be harnessed to improve student-farmer learning relationships. A notable knowledge gap exists on what contextual factors determine differences in farmer learning behaviour. In addition, the influence of facilitating conditions, motivational and social cognitive factors in student outreach formats is still unclear. Thus, this study sought to examine whether psychosocial factors affect farmer learning behaviour for grassroots innovation in the context of the student-to-farmer university outreach.

1.5 Objectives and research questions

The overall objective of the study was to establish psychosocial factors driving learning behaviours at farm-level for grassroots innovation outcomes in the context of student-to-farmer University outreach basing on the case of Gulu University in Northern Uganda. Specifically, the study sought to achieve the following objectives:

- i. To analyze the contextual factors determining differences in farmer learning behaviour in the student-to-farmer university outreach
- ii. To assess the influence of facilitating conditions on farmer learning behaviour in the student-to-farmer university outreach
- iii. To assess the influence of motivational factors on farmer learning behaviour in the student-to-farmer university outreach
- iv. To assess the influence of social cognitive factors on farmer learning behaviour in the student-to-farmer university outreach

Accordingly, the following research questions were derived to guide the studies reported in chapters 2 – 5 of this dissertation:

- i. What contextual factors determine differences in farmer learning behaviour in the student-to-farmer university outreach?
- ii. What is the influence of facilitation conditions on farmer learning behavior in the student-to-farmer university outreach?
- iii. What is the influence of motivational factors on farmer learning behavior in the student-to-farmer university outreach?
- iv. What is the influence of social cognitive factors on farmer learning behavior in the student-to-farmer university outreach?

1.6 Conceptual framework

This study deals with host farmers of university student outreach, who are adults, to analyze their learning behaviour. For effective learning, the atmosphere needs to provide for interactions amongst the learners and the facilitator. Thus, this study analyzes the farmer learning behavior in the SFUO, a construct drawn from the social learning theory which emphasizes interactive learning among participants (Kilpatrick & Johns, 2003). The study is anchored on a variety of theories since the existing literature does not provide a single theory that can offer exhaustive explanations for farmer learning behaviour in the student-to-farmer university outreach (SFUO) as Figure 1.1. Instead, to cover all relevant features of information linkages in the SFUO model, a parsimonious approach of integrated theories was adopted to build the conceptual framework (Figure 1.1) used to analyze psychosocial factors influencing farmer learning behaviour. In this regard, integrated theories (Hagger & Chatzisarantis, 2009) allow for conceptual frameworks to:

1) get rid of concepts/variables that seem redundant in explaining the phenomenon being investigated; and 2) borrow concepts/variables from alternative theories to strengthen the conceptualization. Notably, redundancy of concepts in a given integrated theoretical model happens because of conceptual overlap which tends to reduce the quality of statistical results. For instance, it has been argued that if there is a high degree of conceptual overlap, as is the case between social support (e.g. peer support) and social influence used in this study, it limits the predictive ability of models in which the two variables are components (Plotnikoff, Lubans, Penfold, & Courneya, 2014). Besides addressing the redundancy issue, integrated theories reportedly produce more plausible explanation of findings (Lippke & Plotnikoff, 2009; Sniehotta, 2009).

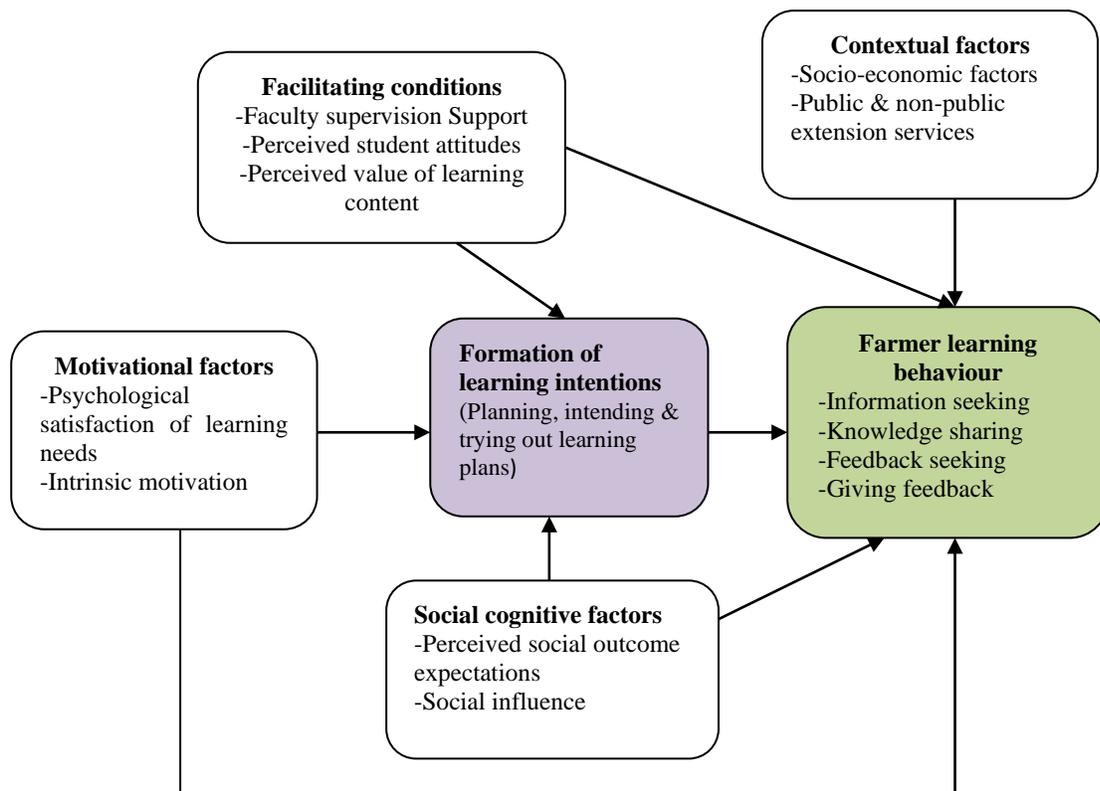


Figure 1.1: Conceptual framework of psychosocial factors predicting farmer learning behaviour in the SFUO

As any other theoretical framework, there are useful preconditions for applying parsimonious models. According to Hagger et al. (2012), the conditions for integration of theories include: 1) the theories being integrated must belong to the same family; and 2) none of the theories being integrated should on its own be able to independently explain the phenomenon under study. In

this study therefore, all constructs were selected from a related family of theories, namely behaviour and behavioural change theories (Morris, Marzano, Dandy, & O'Brien, 2012). These theories included: the facilitating conditions (FC), self-determination theory (SDT), and social cognitive theory (SCT). In addition, the contextual factors were incorporated in the conceptual framework to analyze whether these factors determine differences in farmer learning behaviour in the context of the student-to-farmer university outreach.

Figure 1.1 illustrates that facilitating conditions are hypothesized to positively affect both farmer intentions and their learning behaviour. From theory, facilitating conditions are enablers of intentions and behaviour (Teo, 2010), and might influence farmer learning behavior in the SFUO. For example, in the current study, the enablers that may explain farmer learning behaviour in the university student outreach, and as theorized in literature (Darishah, Daud, & Omar, 2017; Emslie, 2010) are: faculty supervision support to students, perceived attitudes of students and perceived value of learning content. Key indicators of faculty supervision support to students included: 1) faculty staff mediating meetings between students & host farmers; 2) staff follow-ups of students on farm placement; 3) faculty staff providing supplementary knowledge during student-farmer engagement at the farmsteads. Perceived student attitudes encompassed: 1) farmer perceptions about student performance of farm work; 2) farmer perceptions about student conduct; & 3) farmer perceptions about student affection towards farm work. Lastly, perceived value of learning contents encompassed perceived value of student knowledge on: 1) crop husbandry, 2) postharvest handling, & 3) marketing farm produce.

Based on the SDT theory (Deci & Ryan, 2008), motivational factors namely: intrinsic motivation and extrinsic motivation as well as psychological satisfaction of relatedness learning needs may be important in explaining farmer learning behaviour in the SFUO. In this study, however, following the parsimonious approach adopted, it is only intrinsic motivation and psychological relatedness needs that were included. Essentially, extrinsic motivation was dropped because of the likelihood of conceptual overlap with social cognitions which would affect the quality of statistical results in this study. Hence, among the indicators of satisfaction of relatedness learning needs applied in the current study include farmers: 1) feeling psychological closeness to students during learning sessions; 2) feeling a sense of contact with people (students) who care for their concerns; and 3) feeling that the students' knowledge matches farmer learning needs. In

addition, intrinsic motivation of the SDT was also investigated in this study. Key indicators of intrinsic motivation in this study include farmers': 1) enjoyment of associating with the university; 2) pleasure in learning from students; and 3) satisfaction in applying students' knowledge onto their farms. Since, the theoretical prediction of SDT variables is that they tend to evoke voluntary behaviour (Gagne & Deci, 2005), both psychological satisfaction of relatedness learning needs (in this study, also referred to as satisfying farmer learning interests) and intrinsic motivation were hypothesized to positively affect farmer intentions and learning behaviour as indicated in Figure 1.1.

In analyzing the role of farmer social environment, captured as support from peer farmers to host-farmers of university student outreach, the study drew two constructs from the social cognitive theory [SCT] (Bandura, 1977). These constructs include perceived social outcome expectations and social influence. As indicated in Figure 1.1, perceived social outcome expectations represent beliefs among host farmers that their peers expect from the SFUO program improvement in farm yields, product quality and farm income. If the construct of social expectations is supportive of the SFUO activities, then a positive relationship between social outcome expectations and farmer intentions and learning behaviour is expected. For social influence, if the assumption that social encouragement and persuasion influences behavior among host-farmers holds true (De Snoo et al., 2012), likewise, this variable is theoretically predicted to post a positive relationship with farmer intentions and learning behaviour.

1.7 Operationalization of key terms

Psychosocial antecedents refer to the combined influence of psychological and surrounding social environment factors on the individual's ability and learning behaviour (Woodward, 2015). In this study, psychosocial antecedents relate to host farmer perceptions and beliefs about conditions within the facilitation and the learning environment at farmstead and community level in the student-to-farmer University outreach (SFUO) that influence the learning behaviour. These antecedents include facilitating conditions, motivational and social cognitive factors.

Farmer learning behaviour refers to farmer learning activities namely: 1) seeking information i.e. searching for information (Wilson, 2000) from university students and other service providers; 2) knowledge sharing i.e. exchange of information, skills, or expertise (Hasmath &

Hsu, 2016); 3) seeking feedback from university students and other service providers on the way host farmers effect learning; and 4) giving feedback on what these host farmers learn.

Student-to-farmer university outreach refers to extra-mural activities involving undergraduate students commuting to and from individual farming households while facilitating farm-level learning for a time period of at least one year. It also involves graduate student attachment for a period of 2-3 months to farmer groups, farmer associations and other organizations providing services to farmers.

Formation of intentions for learning is derived from the understanding gained from Ajzen, Albarracin, & Hornik (2012). In the context of the SFUO, intentions are defined as a condition of conscious goal pursuit which is necessary but may not be sufficient at predicting farmer learning behaviour towards student outreach activities. Accordingly, farmers' formation of intentions is operationalized as formulating plans for learning and trying out farming competences gained from students through the experiential learning cycle of: 1) concrete experience, 2) reflecting and analyzing, 3) conceptualizing, and 4) testing.

Facilitating conditions refer to enablers or barriers within the learning environment (including people who offer social support for learning) that influence farmer perception of ease or difficulty related to performing a task (Teo, 2010). In this study, facilitating conditions are operationalized based on key enablers of student field attachment and learning (Darishah, Daud, & Omar, 2017) and these include: faculty supervision support, perceived attitudes of student and farmer perception of the value of learning content.

Motivational factors relate to the internal urge that drives a human being to set goals for activation or invocation of activities, and the organization of the organism for coordination of the developed activities in a certain direction (Herath, 2010). Among the motivational factors in this study included intrinsic motivation concerned with farmers' internal drive for experiencing pleasure of participating in student outreach. In addition, the study examines psychological satisfaction of relatedness learning needs and refers to farmer learning interests and the need to be connected to other people (students as facilitators) in the SFUO for lasting learning relationships.

Social cognitive factors combine two sub-constructs: social outcome expectations and social influence. The construct of social outcome expectations is a key component of self-efficacy expectations. It is defined as the beliefs about expected social reactions and social approval from others if the individual farmer participated in the learning behaviour (Hall, Wójcicki, Phillips, & McAuley, 2012). For this study, the construct of social outcome expectations was operationalized as beliefs among host farmers that their peers expect improvement in farm yields, farm product quality and farm income following participation in the SFUO program. Social influence was operationalized as social persuasion and encouragement to the individual host-farmer by peers (and ‘the significant others’) that reinforces farmer learning behaviour.

Host farmers refers to smallholder farmers who receive agricultural students of Gulu University onto their farmsteads for purposes of exchanging knowledge, experiences, technologies and practices in the learning process.

1.8 Overview of the research methodology

1.8.1 Study population and research design

The study used a cross sectional research design to collect primary data from a purposive sample of 283 previous host-farmers of the SFUO of Gulu University (GU). Data were collected once during the period of September 2017 to February 2018 from farmers in Northern Uganda. GU as a case was selected because it runs a unique student centered outreach program, involving students regularly commuting to and from farming households for long periods of at least a year. GU has been implementing the student outreach program since the year 2006 to smallholder farming households with land holding averaging 2.5 (Löwe & Sanyu, 2017). In Northern Uganda, it has been reported that majority of the households missed out on participating in economic activities during the war (Lehrer, 2010), a situation that informs the post-war poverty conditions in the area. This kind of background did not only inform the design of the student-centered outreach whose main objective is to contribute to socio-economic transformation but also the influx of many public (for example, the Northern Uganda Social Action Fund) and other non-public interventions.

In this study, the pragmatist approach that transcends the positivist and constructivist (Creswell, 2014; Trochim, 2006) was preferred. Particularly, empirical chapter two applied both qualitative and quantitative research approaches. For empirical chapters, three to five, the study adopted a

positivist approach which involved theoretical testing using empirical data collected from host farmers of the SFUO program. Theoretical testing entails making deductions based on empirical evidence to either support or refute the research hypotheses derived from studying literature (Creswell, 2014).

1.8.2 Population and sampling

Respondents were purposively sampled from previous host farmers of the student-centered outreach of Gulu University. It should be noted that students are key actors in the outreach format being studied and triangulation of farmer data with opinions of students and staff would have probably enriched the current study. However, both the students and faculty staff data have not been included in this study because previous research on community engagement has given a lot attention to the role of students and faculty staff in university outreach (Opolot et al., 2018; Roberts and Edwards, 2017). Yet, affording a lot of space on the learning environment of the host farmers was necessary for a deeper understanding of how the psychosocial factors can be exploited for lasting learning relationships in the student-to-farmer university outreach.

The sample size was computed out of an estimated population of previous host farmers of 1,000 (based on the records with the FAE at Gulu University) using the method suggested by Krejcie and Morgan (1970) as shown below:

$$S = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)} \quad (1)$$

Where;

S = desired sample size

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841),

N = the population size of farming households that participate in the SFUO,

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size),

d = the degree of accuracy expressed as a proportion (0.05).

Substituting the values of parameters in equation (1), gave an estimated sample of 278 respondents. This sample size was adjusted to 285 host-farmers so as to cater for any possible

attrition of respondents. However, only 283 respondents' data that exhibited completeness and consistency was retained in the final sample for further processing and analysis. As per the records maintained in the Faculty of Agriculture and Environment at GU, up to 65% of host farmers in the outreach program come from Gulu District and the rest from Omoro District. Accordingly, 64% and 36% of the sample was obtained from Gulu and Omoro District, respectively. A multi-stage sampling approach was used to arrive at the final sample of respondents. In each of the two study districts, two sub counties which had the highest numbers of previous host farmers of student outreach program compared to other sub counties were selected. From each of the selected sub counties, host farmers of outreach students were identified to constitute the sampling frame from which the final sample was drawn.

1.8.3 Instrumentation and data collection

Primary data were collected using a semi-structured questionnaire which had questions for both quantitative and qualitative data. Quantitative data were obtained using standardized rating scales, multiple choice and "fill in" spaces, for questions that required numerical answers. For the Likert scales, the response formats differed between the criterion variable and the predictors as a procedural remedy for addressing any possible problem of common methods bias (CMB) as articulated in Podsakoff, MacKenzie & Podsakoff (2012). For the multiple-choice type questions, respondents were offered options from which they selected alternative(s) that best described their own situations. In the open-ended questions, the focus was on metric data which also had units of measurement stated for the respondents. Throughout all the sections of the questionnaire, structured questions for qualitative data were provided for. These structured questions allowed respondents freedom of expression in describing own situations. Resultant qualitative data, mostly on contextual factors of the SFUO program, were particularly important for triangulating statistical findings.

Initially, the questionnaire was pretested to assess its validity and reliability. Pretesting of the questionnaire was done in Lakwana Sub County (Omoro District), which neighbours the study area on a sample of 33 respondents. Results from the pretested questionnaire were then used to reword questions and/or items for improved consistency and clarity of questions to respondents. In this study, common methods of assessing reliability and validity of the study instrument were applied. Preconditions for validity of constructs include: Kaiser-Meyer-Olkin (KMO) measure of

sampling adequacy [value > 0.5]; Bartlett's test of sphericity [$p < 0.05$] and construct reliability [CR], an alternative to Chronbach alpha [value > 0.6] (Hair, Anderson, Tatham, & Black, 1988). In this study, diagnostic results show that the KMO = 0.813; Bartlett's test of sphericity ($p < 0.01$) and the CR indices ranged from 0.934 to 0.996. Therefore, the questionnaire met the minimum conditions of measurement validity and reliability.

The questionnaire comprised of six components (Appendix B). The first component captured information on the dependent variable of farmer learning behaviour as adapted and modified from Edmondson (1999). Section two of the questionnaire covered the mediating construct namely; farmers' formation of intentions for learning, adapted and modified following the scales in literature (Ajzen, 2002; Ajzen, Czasch, & Flood, 2009). Section three captured information on the construct of social cognitive factors categorized into two that is, perceived social outcome expectations and social influence. The scales for these constructs were developed with modifications from Wójcicki, White, & McAuley (2009) and Ajzen (2002) respectively. Section four captured the construct of facilitating conditions and was adapted with modifications from Fraide et al. (2013) while section five captured motivational factors of farmer learning behaviour (Moreno, Laje, Blanco, Jiang, Schmidt, & Olfson, 2007).

Lastly, section six covered contextual factors of the SFUO of GU and included the socio-economic characteristics of households, source of various extension services and social participation factors. Key variables included: sex of household head, age of household head in years and highest level of education of household head (highest class reached). Other variables included farmstead distance to the university in kilometer, participation in farm-labour sharing (if the farmer is a participant equal to one; otherwise equal to two) and length of experience of hosting university student outreach in years.

1.8.4 Data analysis

Prior to the actual analysis, data were cleaned, coded and entered into the computer spreadsheet known as: Statistical package for Social Sciences (SPSS) version 22. It was subsequently transferred to another statistical program known as Analysis of Moment Structure (AMOS) Version 23 for structural equation modeling. For the first objective on contextual determinants of learning behaviour differentials of host farmers, the statistical methods used were non-parametric

types because the dependent variable of farmer learning behaviour was captured on a 1-5 points rating scale that violates the normal distribution assumption, a precondition for parametric methods. Accordingly, non-parametric methods were applied following the argument of De Winter & Dodou (2010). Thus, the statistical methods preferred included: Kruskal-Wallis test which was used to examine the differences in farmer learning behaviour with respect to the variables of interest. These variables included; age, education, sex, participation in farm-labour sharing, distance to the university and experience of hosting students. In order to gain an understanding of how farmer perceptions towards university student outreach service compares with public and non-public agricultural extension, Friedman test was used to assess statistical differences followed by Wilcoxon signed rank test for post hoc analysis.

For objectives two to four, structural equation modeling (SEM) was applied for path analysis. The reason for the choice of SEM for data analysis is that it is a proven and robust statistical method for Likert scale data and it is very efficient for large samples, which are greater than 200 (Schumacker & Lomax, 2004). Unlike other forms of regression, for instance, Ordinary Least Squares and other econometric techniques, SEM has a unique property of simultaneous estimation of parameters for a system of inter-relationships between independent, mediating and dependent variables (Hair, Black, Babin, Anderson, & Tatham, 2006; MacCallum & Austin, 2000). It is thus, a useful tool for mediation analysis of intervening variables. Lastly, it is credited for using multiple indicators in assessing goodness of fit of the specified structural model (Hair et al., 2006).

1.8.5 Methodological limitations

There are a number of methodological limitations that ought to be pointed in this study. First, this study relied on a single instrument (the structured questionnaire) for data collection. This instrument was prepared in English and administered in the local language (Acholi) by trained research assistants. This questionnaire was administered on a sample of respondents who were semi-literate, and since it was never translated in the local language, it is possible that data quality could have been negatively impacted. However, this limitation was minimized by relying on well-trained research assistants who could fluently speak the local language. Second, responses relied upon for analyses were as self-reported by the host farmers. Yet, there was no triangulation of methods and with information from students who worked with farmers. This

might have posed a potential bias on the results reported in this study. Nevertheless, the results were upheld given their informativeness to the situation of SFUO. Third, the researcher for this study is a faculty member of Gulu University whose student outreach program was studied. A common problem of a researcher being part of the system being studied is that respondents might provide responses purposely to impress the researcher. In this study, it is recognized that the problem of exaggerated answers (responses) from host farmers might have happened and potentially, this could have impacted on the results reported in the study. In all, continuous consultations together with self-reflection were used as the strategy for minimizing the impact of this bias.

1.9 Ethical considerations

Preceding data collection, a research proposal was developed and presented to the Doctoral Committee (DC) for detailed discussion before approval for submission to the Directorate of Research and Graduate Training of Makerere University. A survey questionnaire was subsequently developed, with recommendations of the DC incorporated, and approved by the academic supervisors. The DC meeting did not only assess possible sources of bias but also evaluation of aspects that tend to violate research ethics. Prior to data collection, all enumerators were trained and were required to introduce themselves to the respondents before any further interactions for purposes of seeking consent. As a proof that respondents consented, they were requested to sign consent forms as a confirmation of willingness to participate in the study (Appendix A). A second ethical issue in the study was that the researcher works with Gulu University whose outreach program was selected for the study. A common criticism of the researcher being part of the study context under investigation is that it is difficult to separate the influence of such a researcher from the study. However, this form of bias was minimized by ensuring continuous consultations and self-reflection at all stages of the research process. Key stages of consultations included the development of research questionnaire, pilot-testing of the questionnaires, presentations of findings of pilot-testing to members of doctoral committee, training data enumerators, and then data collection.

1.10 Organization of the dissertation

This dissertation is chronologically structured into six chapters. Chapter one presents the contextual background of the study. The chapter explains the relevance of the university-community linkages as a topical issue and research problem. Chapters two to five are empirical

parts of the dissertation. Specifically, chapter two explains the contextual determinants of learning behaviour differentials amongst host-farmers of university student outreach. The chapter contains results on socio-demographic factors responsible for differences in farmer learning behaviour and comparative perceptions of the student-to-farmer university outreach with public and non-public agricultural extension services. Chapter three deals with facilitating conditions namely faculty supervision support, farmer perceptions of the value of learning content and perceived student attitudes that affect farmer learning behaviour during outreach. Chapter four focuses on the motivational pathways of farmer learning behaviour while chapter five deals with social cognitive drivers of farmer learning behaviour in the university outreach. Lastly, chapter six, summarizes and discusses the main findings drawn from the four empirical chapters. The dissertation ends with conclusions and recommendations of the study.

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CHAPTER TWO

CONTEXTUAL DETERMINANTS OF LEARNING BEHAVIOUR DIFFERENTIALS AMONG HOST-FARMERS OF UNIVERSITY STUDENT OUTREACH IN UGANDA¹

Abstract

In Sub-Saharan Africa, a knowledge void still exists on two contextual questions of university-community outreach: 1) what socio-economic factors determine differences in farmer learning behaviour towards student outreach, and 2) how student outreach models compare with public and non-public extension services. As such, a cross-section survey was conducted to obtain data from a sample of 283 respondents purposively selected from previous host farmers of student outreach of Gulu University in Uganda. Results of a Kruskal-Wallis test revealed that there were significant differences among host farmers with respect to farmstead distance to the university for knowledge sharing [$\chi^2(2) = 8.5$; $P < 0.05$] and giving feedback [$\chi^2(2) = 7.6$; $P < 0.05$]. With regard to farmer experience in student outreach, significant differences were found in terms of seeking information [$\chi^2(2) = 12.3$; $P < 0.01$]; knowledge sharing [$\chi^2(2) = 10.4$; $P < 0.01$]; seeking feedback [$\chi^2(2) = 16.4$; $P < 0.01$] and giving feedback [$\chi^2(2) = 8.1$; $P < 0.05$]. Friedman test results also showed preferential perception for the student outreach program compared to public and non-public extension services. A follow up on triggers of this preferential perception revealed that host farmers believed that the student outreach approach was more beneficial compared to public and non-public agricultural extension. This study concludes that university student outreach is a useful service to farmers. However, its success in facilitating farmer learning is dependent on farmstead distance to the university and farmer experience in the student outreach program. The study recommends more logistical support to university outreach programs so that outreach services can efficiently complement public and non-public interventions in delivering community-based training and learning approaches.

Key words: Higher education, community linkages, farmer learning

2.1 Introduction

In developing countries, university-community linkages are largely underdeveloped (Sherrard, 2016). It has been reported that the aims of many higher education institutions (HEIs), most

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especially in Sub-Saharan Africa, are quite disconnected from the local development needs (Blackie, 2016). As a result, the universities fail to advance the two core components of university outreach. First, these universities may not provide outreach services for facilitating learning that targets solving community-based challenges. Second, such universities may miss out on learning local knowledge, innovations and practices. The under-development of community outreach in universities has been attributed to diminishing public funding (Larsen, 2016). Yet, the fiscal allocation available to universities is meant to simultaneously cater for the core university functions including teaching and learning, training, research, and then community outreach. In the face of existing financial squeeze, community outreach is always the least prioritized activity by universities in terms of planning and budgeting. This is well-evidenced in a host of scholarly work that often refers to community outreach as a relegated third mission of the university (Teferra, 2013; Muriisa, 2015). Inevitably, as suggested in literature (Preece, 2013a), outreach activities have remained marginal, and barely contribute to community development. As a result, a lot of researched work in form of knowledge, technologies and innovations remain shelved within universities, and is hardly exploited to facilitate learning in communities.

While searching for lasting solutions to improve the vibrancy of university-community linkages, it is important to take into account the contextual environment of target communities of outreach service provision. Part of this contextual environment comprises of the socio-economic setting of host communities which extends to not only the social demographics of age, education and gender but also to social participation, distance to knowledge institution and overall experience (Acheampong et al., 2017). Yet again, in the same contextual environment, host communities encounter alternative providers of development-oriented services (Muriisa, 2015). In case of farming households, such alternative services may include the public extension and non-public extension systems. On the basis of organization of services and objectives, university outreach programs are not expected to operate like typical agricultural extension services. For instance, the focus of agricultural extension is transfer of knowledge to farmers while universities are meant to engage host farmers for joint learning (Cloete & Maassen, 2015). In either case however, an element of facilitating learning is evident and again, both development approaches target smallholder farming households for change. This makes it necessary to compare university

outreach programs with agricultural extension systems in terms of how they are perceived by service-recipient farmers. In effect, it gives a possibility of learning good practices which can be used for cross-fertilization between university outreach programs and agricultural extension.

In recent times, and following good lessons learnt on community outreach from other universities, for instance, EARTH University in Costa Rica, rolling out student-oriented outreach models in African universities has gained prominence (Sherrard, 2016). For example, many South African universities run service learning programs for enhanced community outreach (Preece, 2013b). Elsewhere in Africa, agricultural-leaning universities are also implementing student-focused outreach models. A case in point, Egerton University in Kenya runs a farm attachment program (as form of community outreach) for student experiential learning which supports farmer learning (Mungai & Njuguna, 2016). In Uganda, student outreach services are well known in two universities. For example, Makerere University runs a student attachment program, in which undergraduate students train smallholder farmers for purposes of developing their capacities in farming business (Opolot et al., 2018). At Gulu University (the focus of current study), in what is known as the Student-Centered Outreach (SCO), students are attached to farmsteads for both own experiential learning and provision of advisory services to host-farmers (Kalule et al., 2016a).

Research on university student outreach has concentrated on the influence of these outreach programs on entrepreneurial competences of host-communities (Opolot et al., 2018; Mukembo, 2017). Other studies have merely explored the role of resistance, stereotyping and gender-bias (Roberts & Edwards, 2017) and description of processes for student attachment (Sherrard & Alvarado, 2017) with limited focus on the underlying contextual determinants of learning behaviour differentials. In the SCO, there have been claims of social environment factors limiting ultimate student-farmer interaction for learning (Roberts & Edwards, 2017). Yet, there is still little attention paid to analyzing how the differences in farmer socio-economic factors are related to farm-level learning behaviour, an issue that calls for further investigation. In addition, a research gap still exists on how the student-to-farmer university outreach compares with alternative providers of farmer learning services namely public and non-public agricultural extension. This study therefore assesses how socio-economic factors differentiate learning behaviours among host-farmers of university-student outreach. It also compares farmer

perceptions of university student outreach to both public and non-public agricultural extension services using Gulu University (GU) in Uganda as a case. The results of the differences in farmer learning behaviour attributable to socio-economic characteristics are important for segmented targeting of outreach services to host-communities so as to enhance more even impact. In addition, comparative results on university outreach with public and non-public extension services can be insightful to policy brokers in lobbying for a more supportive policy environment for university outreach programs.

2.2 Design of Student-Centered Outreach at Gulu University

Gulu University (Gu) runs a Student-Centered Outreach (SCO) program, organized as a service learning program for practical training of students through experiential learning while at the same time, providing advisory services to the farming communities. Typically, service learning programs involve attachment of students to host communities (for example, farmsteads) so as learners experience an environment, they are likely to serve in upon completion of university studies (Preece, 2013b). The SCO varies from other models of student community engagement in that field attachment tends to occur over long periods, with the student participating in provision of services to host communities. On the contrary, the “field-capstone courses” model involves students visiting host communities for practical assignments, usually to expose the students to a learning aspect that may not be handled in class (RUFORUM, 2018). Another model of student community engagement is the research, innovation and scholarship. In the research, innovation and scholarship model, the focus is on action-research undertaken with host communities for purposes of solving community-based challenges, and usually results into knowledge co-creation (RUFORUM, 2018).

In the original design of the SCO, undergraduate students of agriculture were being attached to farmsteads situated within the 10km radius from the University campus (Odongo et al., 2017). However, the reorganization of this SCO following the introduction of graduate programs in the Faculty of Agriculture and Environment led to diversification of community attachment approaches. In the study of Kalule & Ongeng (2016), it was articulated that in addition to the SCO described above, graduate students, upon completion of the first year of their master’s study programs, are attached to farmer organizations including associations and producer groups for a period of 2 -3 months. The core features of the SCO of GU as explained by Kalule et al. (2016b)

include: 1) students interact with farmers to facilitate learning; 2) farmers participate in problem communication and knowledge sharing with students; 3) students transmit identified farming problems to the faculty; and 4) students transmit researched solutions to the community. In this outreach set up, it can be imagined that long term success and linkages in the SCO would most likely depend on adequate student-farmer engagement in information seeking, knowledge sharing, seeking and giving feedback on experiences, farming practices and technical knowledge.

2.3 Theoretical framing

University outreach is associated with enhanced farmer learning and behavioural change through fostering student-farmer interactions. Farmer learning models therefore provide a strong basis for application to the context of university outreach programs whose main purpose is to support learning in farming communities. This study therefore, adapted and modified the learning behaviour model (Edmondson, 1999). The model explains that learning behaviour comprises of four tenets: seeking information, knowledge sharing, seeking feedback and speaking about concerns (also known as giving feedback). However, how these occur in the context of university outreach remains unclear. It has been argued that in order to be able to learn and adapt (Karubanga, Kibwika, Okry, & Sseguya, 2016), farmers seek to acquire complete, high quality and timely information related to their crops and livestock throughout the year (Kumar et al., 2018). Learning in relation to university outreach refers to a dynamic behavioural process of interaction and exchange among people (Kozlowski & Bell, 2007). For instance, Karubanga, Kibwika, Okry, & Sseguya (2017) and Kilpatrick & Johns (2003) point out that farmer learning may involve interpersonal practices of seeking and sharing information either amongst the farmers or between the farmers and other stakeholders such as extension agents. These processes enable learners to compare new information with their experiences, creating new solutions for more efficiency and effectiveness (Carmeli, Brueller, & Dutton, 2009).

In particular, information seeking refers to an individual way and manner of gathering and sourcing for information for personal use, knowledge updating and development (Igwe, 2012). Seeking information through university outreach is useful for farmers to overcome their inadequacies in knowledge of certain basic practices that may include technical, managerial and marketing (Owolade & Kayode, 2012). University outreach is further known for enhancing knowledge and experience sharing among students and farmers which also involve donating and

collecting knowledge thereby facilitating farmer learning (Kamarudin, Aziz, Zaini, & Ariff, 2015). Lastly, the learning loop is only complete, if there is giving and receiving feedback from the source of knowledge (Hamilton, 2010). For instance, Milestad et al. (2010) pointed out the relevance of feedback for farmer learning where they reasoned that feedback enhances the adaptive capacity of the farmers in a given learning situation. They further explained that feedback construes new or revised interpretations of farmers' experiences and in effect changes these farmers' attitudes for decision making and behaviour for production.

Previous research has demonstrated that farmer acquisition of information and knowledge is connected to social demographic characteristics of the farmers (Acheampong et al., 2017). For instance, key among the social demographics that are likely to affect farmer learning behaviour are: sex, age and education status. Besides, there are also some factors which are peculiar to the context of student-to-farmer University outreach that are also worth testing. These include among others: participation in farm-labour sharing, experience of hosting students on the farm and farmstead distance to the university. Therefore, this study hypothesized as follows:

H₁: Socio-demographic characteristics significantly differentiate learning behavior of host-farmers of university student outreach.

H₂: Host-farmers of students of university outreach are significantly different in learning behaviour in terms of a) level of experience of hosting students on their farms; and b) farmstead distance to the university

Another key assumption in this study is that farmers are confronted with different sources of information but with varying levels of efficiency in service delivery. Extant literature has shown that farming households experience under-service from public agricultural extension (Acheampong et al., 2017). Therefore, it arguable that university outreach as an alternative development intervention, might help to reduce the service gap. It is presumed that comparative perceptions about facilitating farm-level learning amongst host farmers differs between university-student outreach and other development interventions of agricultural extension service and thus, this study further hypothesized as shown below:

H₃: Farmer perceptions of own learning behaviour in the student-to-farmer university outreach is significantly different from that of public and non-public agricultural extension services

2.4 Methodology

2.4.1 Research design

A cross-sectional survey was conducted on a sample purposively selected from previous host-farmers of the Student-Centered Outreach (SCO) program of Gulu University. In the SCO, students are meant to commute to and from the farmsteads, at least once in every two weeks for a period of not less than a year. Selected farmers had previously received students onto farms during the period of 2007 to 2016. Study participants were drawn from neighbouring districts of Gulu and Omoro in Northern Uganda. Besides, these two districts are in close proximity to Gulu University. The location of Gulu University is largely rural in nature and as such, there are many farming households in the neighbourhood of the University campus, a factor that has enabled ease of reach of farming households. In this study area, apart from university outreach, common development interventions for farmer agricultural extension service include: the public agricultural extension service, non-governmental organization (NGO) extension and the farmer-to-farmer extension.

A sample of 283 respondents was computed following the sample size estimation method suggested by Krejcie & Morgan (1970). Subsequently, a purposive and multi-stage sampling approach was used to arrive at the final study participants. The reason for purposive sampling was to target only the program participants of university-student outreach for making deductions. First, respondents were selected from the sub counties of Paicho and Bungatira (Gulu District) and Koro and Bobi (Omoro District). In each sub county, farmer groups that had received students were identified for sampling. Subsequently, a list of farmers from each group was used to systematically sample respondents. To ensure representativeness, proportional sampling was used to distribute the sample between the selected districts. Up to 65% of SCO program participants come from Gulu District, possibly, because of the closeness of this district to Gulu University. As such, 181 participants representing 64% (Paicho = 94 and Bungatira = 87) were respectively sampled from Gulu District. That meant that 102 representing 36% (Koro = 61 and Bobi = 41) were sampled from Omoro District.

2.4.2 Data and data sources

Data were collected using semi-structured questionnaire. The questionnaire captured both Likert scale data as well as qualitative information that allowed respondents freedom of expression. A

key section in the questionnaire captured responses on farmer learning behaviour. This construct comprised of four indicators and these were: seeking information, knowledge sharing, seeking feedback and giving feedback to the service provider. Each of these four indicators was measured using four items, adapted and modified from Edmondson (1999) to suit the context of the student-to-farmer university outreach. The same indicators and items were repeated for each of the three other sources of farmer agricultural extension service namely public extension service, NGO extension and farmer-to-farmer extension. In all, a total of 64 items were used to measure farmers' learning behaviour. A sample item from the domain of information seeking read as follows: "I seek information on farming practices from university students". All items were rated on a 5-point Likert scale (1-5, where 1 = not at all and 5 = always).

Social demographic factors used in this study include: sex of the household head (captured as female = 1 and male = 2) and education status of household head (no-formal education = 1; primary education = 2 and post-primary education = 3). Other variables include: age of household head in years, participation in rotational farm-labour sharing in the community (if participant = 1; otherwise = 2, experience of hosting students on the farm (number of times the farmer had received student since inception of university outreach). Lastly, farmstead distance to the University was captured in km.

2.4.3 Data analysis

Data were entered, processed and transformed in the computer statistical package of SPSS. Means and standard deviations were computed from Likert scale data on the indicators of farmer learning behaviour. Ordinarily, based on the large sample size used in this study, parametric statistical methods would be preferred for analysis. However, the nature of likert scale data in the outcome variable of farmer learning behaviour meant that the normal distribution assumption is violated as explained by De Winter & Dodou (2010). Therefore, this study followed the argument of De Winter & Dodou (2010) of using non-parametric methods for analyzing Likert scale data. As such, non-parametric methods namely Kruskal-Wallis, Friedman and Wilcoxon signed-rank tests were preferred for subsequent analysis. Effect sizes were also computed manually following the method suggested by Field (2009). Effect sizes were calculated as follows:

follows: $\frac{Z}{\sqrt{N}}$ where Z is the statistic that tests for significance of differences from Wilcoxon

signed-rank test and \sqrt{N} is the square root of sample size. The study also adapted (Cohen, 1988. 2nd ed.) criteria for evaluation of effect sizes (ρ). This criteria explains that the magnitudes of such effect sizes are considered small, if $\rho \leq 0.1$. These effect sizes are medium in size, if $\rho \leq 0.3$ and they are large, if $\rho \geq 0.5$.

2.5 Results and discussion

2.5.1 Socio-economic factors determining differences in farmer learning behaviour towards student outreach

Results of differences in farmer learning behavior towards student outreach attributable to socio-economic factors are presented in Table 2.1. The results show that respondents were significantly different in learning behaviour with respect to experience of hosting students.

Table 2. 1: Socio-economic factors determining differences for farmer learning behaviour

Variables	N	Kruskal-Wallis Test for Group Differences							
		Seeking Information		Knowledge Sharing		Seeking feedback		Giving feedback	
		MR	χ^2	MR	χ^2	MR	χ^2	MR	χ^2
Sex of household head									
<i>Male</i>	154	139.2		141.1		147.0		141.0	
<i>Female</i>	129	145.3	0.4	143.1	0.0	136.0	1.3	143.2	0.0
Farm-labour sharing									
<i>Participant farmer</i>	195	139.4		135.0		135.9		136.2	
<i>Non-participant farmer</i>	88	147.9	0.7	157.6	4.7*	155.5	3.5	155.0	3.3
Age of host farmer									
≤ 30 years	69	148.2		142.5		153.2		141.2	
$> 30 - 50$ years	123	139.5	0.5	142.2	0.1	136.1	2.0	144.7	0.3
> 50 years	91	140.7		141.3		141.6		139.0	
Education of host farmer									
<i>Pre-primary education</i>	27	129.5		133.6		124.1		116.8	
<i>Primary education</i>	160	146.1	3.8	143.2	1.8	146.2	0.3	148.4	1.2
<i>Post-primary education</i>	96	138.7		142.3		140.1		138.4	
Farmstead dist. to the University									
<i>Short distance (≤ 10 km)</i>	142	153.4		154.4		149.9		153.3	
<i>Medium dist. ($>10 - \leq 20$ km)</i>	81	130.8	5.6	137.6	8.5*	142.8	4.9	139.0	7.6*
<i>Long distance (> 20 km)</i>	60	130.2		118.7		122.3		119.2	
Experience of hosting students									
<i>Low (≤ 3 times)</i>	203	132.3		133.9		131.5		133.9	
<i>Medium (4 – 6 times)</i>	57	158.4	12.3**	152.3	10.4**	156.5	16.4**	157.0	8.1*
<i>High (> 6 times)</i>	23	187.2		188.2		198.5		176.3	

* and ** means significant at $P < 0.01$ & $P < 0.05$, respectively.

The differences were detected in the learning behaviour elements of seeking information [$\chi^2(2) = 12.3$; $P < 0.01$]; knowledge sharing [$\chi^2(2) = 10.4$; $P < 0.01$]; seeking feedback [$\chi^2(2) = 16.4$; $P < 0.01$] and giving feedback [$\chi^2(2) = 8.1$; $P < 0.05$]. These results supported the hypothesis (H_{2a}) that farmer learning behaviour was significantly different for the level of farmer experience of

hosting University outreach students. There were also significant differences in farmstead distance to the university for knowledge sharing [$\chi^2(2) = 8.5$; $P < 0.05$] and giving feedback [$\chi^2(2) = 7.6$; $P < 0.05$]. These findings supported the hypothesis (H_{2b}) on existence of significant differences in farmstead distance to the University for the behaviours of knowledge sharing and giving feedback.

However, hypothesis (H_{2b}) was not supported with respect to seeking information and seeking feedback, for which no significant differences were found. Participation in farm-labour sharing was only significantly different for knowledge sharing [$\chi^2(1) = 4.7$; $P < 0.05$] and was not statistically significant in any of seeking information, seeking feedback and giving feedback. However, for the variables of sex, age and education status of the household head, there was no significant differences across the four indicators of farmer learning behaviour, and thus, hypothesis (H_1) was not supported. This implies that the three variables were independent of farmer learning behaviour.

A comparison of short-distance and medium-distance farmers revealed that significant differences were only in giving feedback [$\chi^2(1) = 3.9$; $P < 0.05$]. For the other three indicators of farmer learning behaviour, no significant differences were found. Still, there were no significant differences across the four indicators of learning behaviour between medium and long-distance farmers. Thus, the effect size in the comparison of short and medium-distance as well as the medium to long-distance farmers, which ranged from 0.0 to 0.3, were all small as affirmed by Cohen (1988). The effect sizes between short-distance and long-distance were above small criterion; seeking information ($\rho = 0.2$), seeking feedback ($\rho = 0.3$). Large effect sizes were detected in giving feedback ($\rho = 0.5$) and knowledge sharing ($\rho = 0.6$). In the case of knowledge sharing, the result implied that the differences in short and long-distances from the university amongst farmers accounted for 60% variation in farmers' knowledge sharing with students.

Results of post hoc analysis for the variables, which had three comparison groups and exhibited significant differences in at least two indicators of learning behaviour are presented in Table 2.2. For example, farmstead distance to the university, the results show that farmers within short-distance radius from the university ($\leq 10\text{km}$) performed better in three indicators of learning behaviour compared to those located in long-distance to the university ($>20\text{km}$). Thus,

farmsteads within short distance to the University were significantly different from long-distance farmsteads in knowledge sharing [$\chi^2(1) = 8.3$; $P < 0.01$], feedback seeking [$\chi^2(1) = 4.5$; $P < 0.05$] and giving feedback [$\chi^2(1) = 7.4$; $P < 0.01$].

Regarding the experience of hosting university outreach students, significant differences were found across the four indicators of farmer learning behaviour between low and high number of times of hosting students. The results were as follows: seeking information [$\chi^2(1) = 5.5$; $P < 0.05$], knowledge sharing [$\chi^2(1) = 13.3$; $P < 0.01$], seeking feedback [$\chi^2(1) = 9.1$; $P < 0.01$] and giving feedback [$\chi^2(1) = 8.8$; $P < 0.01$]. There were also significant differences between low and medium experience of hosting students for knowledge sharing [$\chi^2(1) = 4.4$; $P < 0.05$] and giving feedback [$\chi^2(1) = 4.8$; $P < 0.01$]. In the comparison between medium and high level of experience, significant differences were only found in knowledge sharing [$\chi^2(1) = 6.0$; $P < 0.05$]. The effect sizes were biggest in the comparison between low experience and high experience. These effect sizes ranged from medium ($\rho = 0.4$ in information seeking) to large ($\rho = 0.6, 0.6$ and 0.9 in seeking feedback, giving feedback and knowledge sharing, respectively). For knowledge sharing, as a case, the results meant that the difference in low and high experience of hosting students amongst farmers accounts for 90% of the variation in the learning behaviour of knowledge sharing.

Elsewhere, studies have shown that farmers in close proximity to knowledge institutions, for instance, universities and research institutions, and knowledge sharing platforms have a relative advantage in accessing information and knowledge, and tend to exhibit better learning (Mashavave, Mapfumo, Mtambanengwe, Gwandu, & Siziba, 2013).

Table 2. 2: Post hoc tests for comparisons of socio-economic factors for learning behaviour

Pairwise Comparisons	Farmer learning Behaviour (N = 283)							
	Seeking Information		Knowledge Sharing		Seeking feedback		Giving feedback	
	χ^2	ρ	χ^2	P	χ^2	ρ	χ^2	ρ
Farmstead distance to the University								
Short (≤ 10 km) & Medium ($>10 - \leq 20$ km)	1.6	0.1	0.5	0.0	2.2	0.1	3.9*	0.3
Medium ($>10 - \leq 20$ km) & Long (> 20 km)	0.0	0.0	1.8	0.2	2.6	0.2	2.1	0.2
Short (≤ 10 km) & Long (> 20 km)	3.5	0.2	8.3**	0.6	4.5*	0.3	7.4**	0.5
Experience of hosting university students								
Low (≤ 3 times) & Medium (4 – 6 times)	3.6	0.2	4.4*	0.3	2.3	0.1	4.8**	0.3
Medium (4 – 6 times) & High (> 6 times)	1.0	0.1	6.0*	0.7	3.5	0.4	3.1	0.3
Low (≤ 2 times) & High (> 4 times)	5.5*	0.4	13.3**	0.9	9.1**	0.6	8.8**	0.6

* & ** means significant at $P < 0.01$ & $P < 0.05$ respectively

Results indicate that it is likely that farmsteads that are closer to the university are regularly reached by students because of ease of commuting to and from these farmsteads. It is also imaginable that long-experience farmers could have realized the value of participating in student outreach activities. In turn, these farmers could have been more encouraged to exhibit positive learning behaviour towards student outreach. These results support earlier findings that have suggested that host communities tend to have positive perceptions towards student outreach because these communities assume that students possess valuable knowledge (Shuda & Kearns-Sixsmith, 2009).

2.5.2 Comparison of student-to-farmer university outreach to other farmer extension services

Results in Table 2.3 reveal that the student-to-farmer university outreach was rated highest amongst the four domains of farmer learning behaviour. Results from Likert scale data indicate that with respect to university student outreach, farmers rated least information seeking (M = 3.91; SD = 0.99) while the highest rated indicator was giving feedback (M = 4.02; SD = 0.92). Farmers rated lowest the four domains of learning behaviour with respect to public extension service, ranging from giving feedback (M = 2.44; SD = 1.14) to knowledge sharing (M = 2.54; SD = 1.14).

Table 2. 3: Comparison of university student outreach to public and non-public extension services

Farmers' Sources	Information	Means (SD); n= 283			
		Information seeking	Knowledge Sharing	Feedback seeking	Giving feedback
Student Outreach		3.91 (0.99)	3.99 (0.92)	3.94 (1.01)	4.02 (0.92)
Public Ext. Service		2.49 (1.15)	2.54 (1.14)	2.46 (1.16)	2.44 (1.14)
NGO Ext. Service		3.30 (1.04)	3.36 (1.02)	3.31 (1.06)	3.39 (1.08)
F2F Ext. Service		3.11 (1.23)	3.21 (1.24)	3.12 (1.23)	3.15 (1.21)

NGO extension service was rated second highest from information seeking (M = 3.30; SD = 1.04) to giving feedback (M = 3.39; SD = 1.08). The second lowest rated service provider was farmer extension whose rating ranged from information seeking (M = 3.11; SD = 1.23) to giving feedback (M = 3.15; SD = 1.21).

The results of follow-up tests on differences in farmer learning behaviour between the student outreach and other service providers are presented in Table 2.4. Friedman test results showed that the learning behaviour elements of information seeking [$\chi^2(3) = 180.38$; $P < 0.01$]; knowledge sharing [$\chi^2(3) = 170.91$; $P < 0.01$], feedback seeking [$\chi^2(3) = 186.62$; $P < 0.01$] and

giving feedback [$\chi^2(3) = 190.68$; $P < 0.01$] were significantly different across the four sources of farmer information. Post hoc analysis, in which Wilcoxon signed-rank tests were conducted with a Bonferroni correction applied, resulted in a significance level with a p value = 0.0125. Accordingly, there was a statistically significant reduction in information seeking from student outreach to public extension service ($Z = -12.81$; $P < 0.0125$), NGO extension service ($Z = -7.12$; $P < 0.0125$) and farmer extension ($Z = -7.38$; $P < 0.0125$). As such, these results supported the hypothesis (H_3) that farmer perceptions of own learning behaviour in the student-to-farmer university outreach is significantly different from that of public and non-public agricultural extension services.

Regarding knowledge sharing, there were significant differences in favour of the student outreach when compared to public extension ($Z = -12.60$; $P < 0.0125$), NGO extension ($Z = -7.24$; $P < 0.0125$), and farmer extension ($Z = -7.40$; $P < 0.0125$). A similar pattern of significant differences was also found for seeking feedback and giving feedback when student outreach was compared with other three service providers examined in this study.

Table 2. 4: Friedman and Wilcoxon signed-rank tests for differences between extension services

Tests/ Comparisons	Information Seeking		Knowledge Sharing		Feedback Seeking		Giving Feedback	
	Z-Val.	ρ	Z-Val.	ρ	Z-Val.	ρ	Z-Val.	ρ
Friedman Test								
Chi-Square/ $\chi^2(3)$	180.38**		170.91**		186.62**		190.68**	
Wilcoxon Signed-Rank Test								
Student Outreach – Public Extension	-12.81*	-0.76	-12.60*	-0.75	-13.04*	-0.77	-12.94*	-0.77
Student Outreach – NGO Extension	-7.12*	-0.42	-7.24*	-0.43	-7.23*	-0.43	-7.02*	-0.42
Student Outreach – Farmer Extension	-7.38*	-0.44	-7.40*	-0.44	-7.67*	-0.46	-8.31*	-0.49
NGO Extension. – Public Extension	-8.75*	-0.52	-8.71*	-0.52	-9.14*	-0.54	-9.54*	-0.57
Public Extension – Farmer Extension	-5.80*	-0.34	-5.93*	-0.35	-5.84*	-0.35	-6.35*	-0.38
NGO Extension – Farmer Extension	-2.08	-0.12	-1.67	-0.10	-2.18	-0.13	-2.88*	-0.17

* Significantly different at $P = 0.0125$ (after Bonferroni adjustment for multiple comparisons); ** $P = 0.01$

There were also significant differences in favour of NGO extension compared to public extension for seeking information ($Z = -8.75$; $P < 0.0125$), knowledge sharing ($Z = -8.71$; $P < 0.0125$), seeking feedback ($Z = -9.14$; $P < 0.0125$) and giving feedback ($Z = -9.54$; $P < 0.0125$). Surprisingly, when NGO extension was compared to farmers' extension, significant differences were only found in giving feedback ($Z = -2.88$; $P < 0.0125$) and for other three indicators, there was no statistical differences. Lastly, the respondents rated farmer extension better than public extension with significant differences found in seeking information ($Z = -5.80$; $P < 0.0125$),

knowledge sharing ($Z = -5.93$; $P < 0.0125$), seeking feedback ($Z = -5.84$; $P < 0.0125$) and giving feedback ($Z = -6.35$; $P < 0.0125$).

A further examination of the triggers of superior rating of student outreach for farmer learning behaviour revealed more frequent student-farmer contacts compared to public and non-public extension service. These farmers also reported that they expected better knowledge from students compared to their peers. In most cases, the respondents expressed preference of student-to-farmer outreach to public extension service, as some farmers articulated below:

“... the students are more frequent and are easier to access compared to government workers...”, (Farmer, Boke Village, Bungatira Sub county, November 2017).

“... I think students are studying and always reach us with adequate knowledge, and are easier to access too. Government workers, provide free inputs but do not come down to individual farmers to guide us on the use of such inputs...”, (Farmer, Holly-Rosary village, Laroo Sub County, November 2017).

The lower rating of NGO extension was attributed to downscaling of services to farmers. That aside, much as these farmers recognized that peer farmers (farmer-to-farmer extension) were more accessible, they still preferred university outreach as articulated by some respondents below:

“... NGOs give information on managing village saving and loan associations. However, of late they have not been coming to us...”, (Farmer, Kalam-Omida, Bobi Sub County, December, 2017).

“... peer farmers only give knowledge learnt from other sources. But university students have been taught and have more new knowledge to share compared to peer farmers”, (Farmer, Boke Village, Bungatira Sub county, November 2017).

“... peer farmers are more close to me and provide knowledge on a daily basis.... University students, however, have always given us first-hand knowledge on farming”, (Farmer, Holly-Rosary, Laroo Division, November 2017).

Conversely, effect sizes were equally interesting. In the comparison of student outreach to public extension service, the effect sizes were as follows: knowledge sharing (-0.75), information seeking (-0.76), feedback seeking (-0.77) and giving feedback (-0.77). This meant that the differences between student outreach and public extension service explained the variation in farmers' learning behaviour ranging from 75% up to 77%. In the comparisons between student outreach and NGO extension, the effect sizes ranged from 0.42 – 0.43 while between student outreach and farmer-to-farmer extension, the effects ranged from 0.44 to 0.49. Surprising findings were detected in the comparisons of NGO extension service and farmer-to-farmer

extension, in which effect sizes were small (0.10 – 0.17). However, the effects in the comparison of NGO and public extension were larger than medium sizes (0.52 – 0.57).

The findings corroborated with previous studies, which have reported inadequacies in linkages between farmers on one hand, and on the other hand, public extension systems and research (Sewell, et al., 2017; Klerkx, Seuneke, De Wolf, & Rossing, 2017). Surprisingly, NGO agricultural extension service did not significantly differ from the farmer-to-farmer extension. This could be because most structures of farmer-to-farmer extension have been established by the NGOs themselves, and as such, farmers might be finding little differences between the two forms of service. The high rating of student outreach had a connection to frequent student visits to farms and expected knowledge quality. This finding is in support of the studies which have reported that frequent contacts between extension agents and farmers influence information seeking among farmers and the ultimate learning outcome (Goud & Ram, 2018; Dambazau, Srivastava, & Tajudeen, 2015). In relation to farmer extension, respondents acknowledged that their peers were equally easily accessible and were useful in the learning process, a finding in support of results in Karubanga et al. (2017).

2.6 Conclusion and recommendations

It has been established that farmstead distance to the university and the length of experience of hosting university students significantly influenced farmer learning behaviour towards student outreach. Farmers within short-distance from the university are better at the learning behaviour elements of knowledge sharing and giving feedback in the student-to-farmer university outreach. Similarly, farmers with long experience of participating in student outreach are better than their counterparts at interacting with students for seeking information, knowledge sharing, seeking feedback and giving feedback. This study also demonstrated that the student-to-farmer university outreach is a valuable service to host communities. It has been shown that student outreach services have a relative advantage at influencing farmer learning behaviour in areas that are proximal to the university compared to public agricultural extension, NGO extension and farmer-to-farmer extension. However, it is also evident that the comparative advantage of student outreach services over public extension service is because these farmers experience more contacts with students, a fact that can be attributed to the rural nature of Gulu University location.

This study contributes by enriching the literature on farmer learning behaviour. The four domains of farmer learning behaviour namely information seeking, knowledge sharing, feedback seeking and giving feedback have been applied to assess how social demographic differences are related to farmer learning behaviour towards student outreach. Further, these concepts have been used to compare farmers' perceptions of the student-to-farmer university outreach with public and non-public extension service. From a managerial perspective, it has been shown that university student outreach to farmers brings more meaningful impact and lasting learning relationships with the community when three conditions are met. These include: 1) frequent student visits to the farming households; 2) students exhibiting sound knowledge quality; and 3) nearness of farmsteads to the university. Thus, student outreach models can be exploited to complement public and non-public extension approaches in supporting farm-level learning and innovation. This is more likely to succeed with rural-based universities whose campuses tend to be in close proximity to farming households. This study recommends better logistical support to be accorded to university outreach programs so as to improve delivery of community outreach and complement existing public extension systems. For more impact, it is also recommended that universities take a lead in facilitating farmer learning spaces that bring together extension service providers, private sector actors and financial service providers which ensures complementarity of services. Future research should evaluate the role of human resources in supporting student-centered outreach to facilitate farmer learning for innovation.

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CHAPTER THREE

FACILITATING CONDITIONS INFLUENCING FARMER LEARNING BEHAVIOUR IN THE STUDENT-TO-FARMER UNIVERSITY OUTREACH²

Abstract

This study elucidates on how faculty supervision support to students during farm placements and other facilitating conditions influence farmer learning behaviour in the student-centred university outreach. Cross-sectional data were obtained from a sample of 283 farmers who had previously hosted students of Gulu University in the student-to-farmer university outreach. Structural equation modelling was used to analyse how faculty supervision support to students in combination with other facilitating conditions affect the formation of intentions for learning and actual farmer learning behaviour. Findings show that faculty supervision support in the student-to-farmer university outreach positively and significantly influence the formation of intentions for learning ($\beta = 0.380$; $t = 5.263$; $P < 0.01$) and farmer learning behaviour ($\beta = 0.182$; $t = 2.081$; $P < 0.05$). The implications of these findings are that faculty supervision support to students is critical to fostering lasting learning relationships in university outreach. Thus, it needs to be a part of the transformation agenda of the higher education sector for improved community linkages and innovation. On theoretical contribution, the study uses empirical data obtained from the context of student-centred university outreach to extend the model of facilitating conditions with results on how faculty supervision support to students influences farmer learning behaviour. The value of the study is that it addresses how faculty supervision support to students combine with farmer perception of student attitudes and the value of the learning content influence farmer learning behaviour during university outreach.

Keywords: Higher education, community linkages, supervision support, farmer learning, Uganda

3.1. Introduction

Higher education systems have witnessed a growing demand for participation in community development work. This is due to the recognition that in pursuit of the knowledge-economy agenda, universities through community linkages are capable of generating and diffusing

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knowledge thereby influencing farmer learning behaviour for local development (Cloete & Maassen, 2015). In this case, farmer learning behaviour refers to learning activities involving information seeking, knowledge sharing, seeking feedback and giving feedback to facilitators. The expectation from linkages of HEIs and communities is fostering symbiotic learning relationships between universities and host communities. For instance, universities can learn about indigenous knowledge from the mutual learning relationships with communities. Further, students and staff may also learn about existing community development problems which require research attention and therefore, an opportunity for academic growth. On the other hand, the linkages afford host communities access to intellectual resources generated in universities. However, it has been reported that because of limited funding and prioritization, community outreach functions are not well developed in most of African universities (Sherrard, 2016). As such, a lot of research work done in African universities remains shelved and hardly reaches the intended communities and at the same time, these universities miss out on learning from communities (Mirembe, Obaa, & Ebanyat, 2016).

There are success stories on university community outreach where African universities can learn and domesticate good practices. For instance, the agricultural land-grant institutions in the United States of America [US] are known for delivering on community outreach objectives (Mack & Stolarick, 2014). These land-grant institutions reportedly disseminate life-changing knowledge to local communities thereby contributing to socio-economic transformation (Liu, 2014). Thus, if African higher education institutions (HEIs) take lessons from the US land-grant institutions model, they may easily spur learning, uptake of innovations, and ultimately improve the quality of community life.

In this regard, African universities have been urged to partner with the private sector and local communities to facilitate inclusive agricultural innovation systems (Regional Universities Forum for Capacity Building in Agriculture [RUFORUM], 2018). For instance, it has been argued that universities are well placed for integrating the excluded and poor people in localized innovation systems in Sub Saharan Africa [SSA] (Halme, Lindeman, & Paula, 2012). In a broader sense, the innovation system notion is an outcome of the realization of deficiencies in the linear approach of technology transfer. In the technology transfer model, the assumption is that scientists and change agents would take technologies and innovations to farmers for uptake (Leeuwis & Aarts,

2011). However, promising technologies would mostly end up not getting adopted because of a poor fit with the farmers' contexts.

The alternative approach of the innovation systems thinking that consequently emerged demands a discursive space that brings together stakeholders including the scientists, change agents, farmers and other actors to actively engage in problem-solving and contribute to the innovation process (Leeuwis & Aarts, 2011). Essentially, this calls for universities to be more proactive if they are to be relevant to community innovation processes. Yet, many universities in SSA still need capacity building in order to take the lead in facilitating the innovation systems. Such universities may seize the opportunity of availability of students for service learning programs to engage communities including farmers for innovation.

Of late, student-oriented outreach models are increasingly taking root in African universities following successful experimentation in non-African universities such as EARTH University in Costa Rica (Sherrard, 2016). For example, in Kenya, Egerton University runs a farm-attachment program in which students are positioned at commercial farms to gain working experience while providing service to host farmers (Mungai & Njuguna, 2016). In Uganda, Makerere University runs a field placement program for agriculture students that targets student experiential learning while contributing to farmer learning (Opolot, Isubikalu, Obaa, & Ebanyat, 2018). Gulu University (GU) also runs a Student-Centred Outreach (SCO) Program that offers practical training to students and agricultural extension services to the farming community (Odongo et al., 2017).

In the original design of the SCO (the case for this study), as discussed in Kalule et al. (2016b) study, students upon attachment to an individual farming household were required to commute to and from the farmsteads. Each student was meant to visit an allocated household for at least once a week for a minimum of a year. This had restricted the outreach program operation to a short radius of 10 km from the University campus. In Kalule & Ongeng's (2016) study, it was further reported that in 2014, following the introduction of graduate training programs in the Faculty of Agriculture and Environment at GU, the area of coverage for outreach was extended to longer distances of up to 60 km. The reorganization of the SCO services introduced an alternative approach of community attachment. Particularly, graduate students are attached to farmer groups

and other farmer organizations, allowing for a wider reach. The SCO has reportedly been a success in offering information services (Mugonola & Balliddwa, 2014). However, Roberts & Edwards (2017) observed that some community members were critical of the program with respect to some of the agricultural information received from the students and inadequate student supervision during field attachment.

In student-centred outreach models, a key facilitating condition is faculty supervision support to students. Notable ingredients of good quality faculty supervision of students include: 1) faculty staff mediating students and host farmers meetings at the farms; 2) follow-up on student-farmer interactions on farmsteads; and 3) supplementing students' knowledge and complementing student-farmer interactions by university staff. It has been argued that supervision support plays key roles of stimulating, guiding, encouraging and reinforcing learning behaviour (Okorji & Ogbo, 2013). It is also important for providing feedback and improving educational outcomes. During the student-farmer interactions, the expectation is that learning would happen for both students and farmers. However, this study has preferred the side of farmer learning which earlier research has not adequately attended to (Preece, 2013a; Erickson, 2010).

Field supervision support can influence the attitudes exhibited by the students during field attachment (Darishah, Daud, & Omar, 2017). The attitudes could be exhibited in the form of student affection for farm work, caring for farmers' concerns and overall conduct while on host farms. Consequently, the host-farmers' perception of student attitudes together with the perceptions they hold about the value of the learning content can influence the actual learning behaviour. Elsewhere, Cooper, Orrell, & Bowden (2010) observed that student field supervision mirroring the above narrative on faculty supervision support faces a myriad of problems. For example, it is costly to manage and laborious to faculty staff.

Most studies on university outreach have been either descriptive or speculative in analysis (Preece, 2013a). For instance, Sherrard (2016) and Kalule & Ongeng (2016) majorly concentrated on describing the design and evolution of university outreach while Kalule et al. (2016b) and Mungai & Njuguna (2016) focused on processes of community engagement. Similarly, Sherrard & Alvarado (2017) focused on describing success factors of student service learning programs. In all, little research attention has been paid to assessing how faculty

supervision support to students together with other facilitating conditions influence farmer learning behaviour in the student-to-farmer university outreach. Previous studies applying the facilitating conditions model have tended to rely on the variables of attitudes, supervisor support, perceived value of the learning content and facility (Shuhaiber, 2016), which have not been applied to university outreach context. Therefore, this study aims to elucidate on how faculty supervision support to students during farm placements and other facilitating conditions influence farmer learning in the student-centred university outreach. Insights from this study are useful not only in informing the policy debate on enhancing university-community linkages but also explaining how the supervision support affects the learning behaviour of host farmers.

3.2 Related literature and hypotheses

The inclusive innovation approach of university outreach is premised on the fact that universities are useful in the development of capabilities of local communities (Halme, Lindeman, & Paula, 2012; Kraemer-Mbula, 2014). In this approach, the interacting actors may include the faculty staff, outreach students, community members and other stakeholders. Such interactive arrangements enhance a discursive space and may enact new forms of collaborative learning for grassroots innovation (Grobelaar et al., 2017). However, this study focuses more on how the interactions between faculty staff and outreach students affect the host farmers' learning behaviour during student farm placements. While the design of the student-centred outreach at GU aimed at spurring community level innovations, the interactive arrangement is largely restricted to faculty staff, students and host farmers thereby excluding other stakeholders and supportive services.

Central to the inclusive innovation notion of university outreach are the following features: 1) drivers of interaction and participation, 2) interface structures, enablers and constraints, and 3) flow of knowledge and skills (Kruss & Gastrow, 2015). These features mirror the components of the facilitating conditions framework. Facilitating conditions (FC) refer to enablers or barriers within the learning environment that influence one's perception of ease or difficulty of performing a task (Teo, 2010). FC constitutes a branch of the theory of interpersonal behaviour advanced by Triandis(1977). Accordingly, the kind of support from the people that learners value may either facilitate or inhibit the learning behaviour. Thus, this study used the theoretical strand of facilitating conditions to assess the role of faculty supervision support to students,

student attitudes and perceived value of learning content in farmer learning behaviour during university outreach. As enablers, facilitating conditions may offer social support for interaction and participation thereby eliciting positive behaviour for learning at farm-level (Venkatesh, Thong, & Xu, 2012).

Previous research, mostly in information and communication technology, has shown that faculty supervision support is related to the attitudes exhibited by students during a learning situation (Shuhaiber, 2015). Further, the same supervision support has been shown to affect the value that learners attach to the learning content (Akbar, 2013). Similar studies in the context of student-to-farmer university outreach are however lacking, necessitating further investigation. It is presupposed that relationships exist between faculty supervision support, perceived student attitudes and perceived value of learning content which combine as facilitating conditions to affect the learning behaviour of the host farmers (see Figure 3.1).

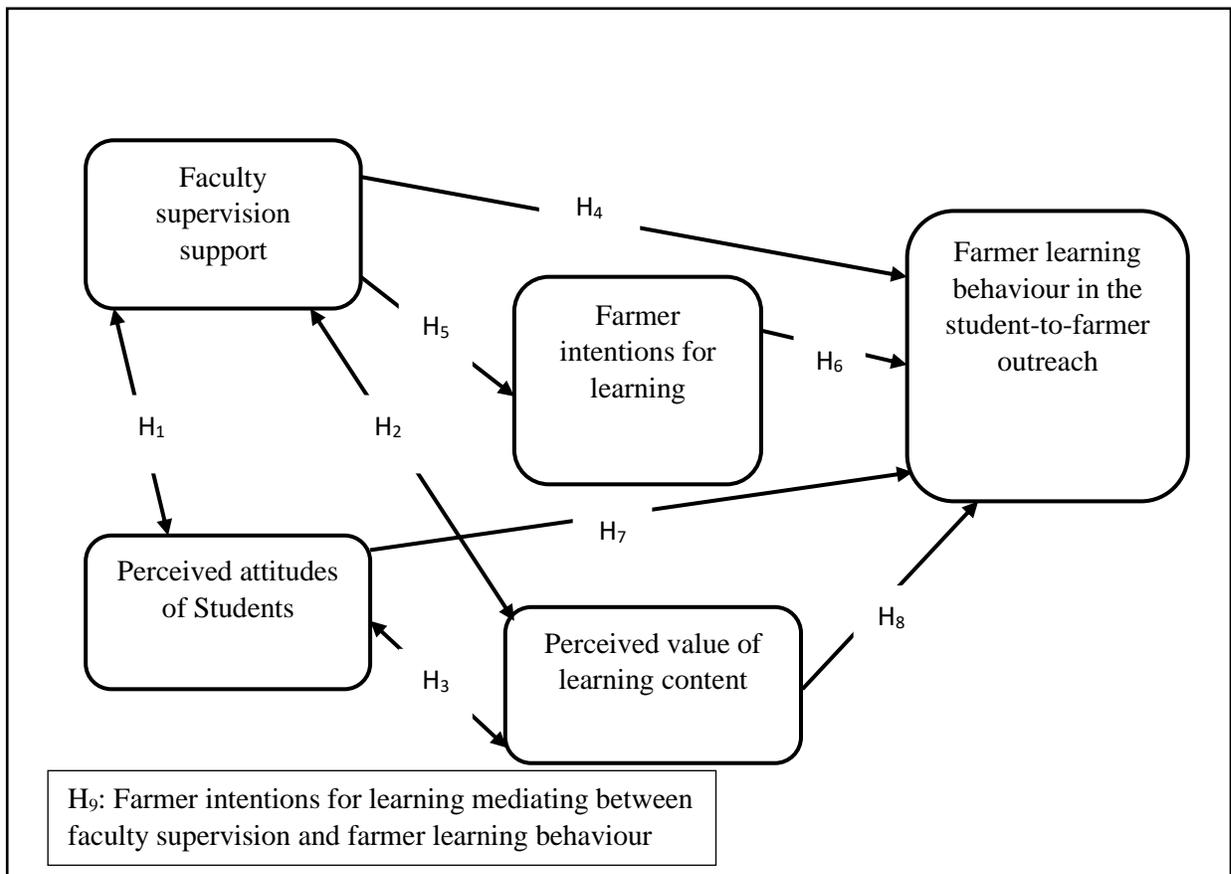


Figure 3. 1: Hypothesized relationships in Facilitating conditions of farmer learning behaviour

Therefore, the following hypotheses were derived:

H₁: Faculty supervision support is positively related to farmers' perception of attitudes of students who facilitate learning.

H₂: Faculty supervision support is positively related to farmers' perception of the value of learning content that the students offer.

H₃: Farmers' perceived attitudes of students who facilitate learning is positively related to perceived value of learning content.

Learning theories suggest that supervision support helps to fulfil learner needs and to overcome the problems associated with the learning environment (Vieira, 2000). It creates a favourable learning atmosphere, achieving synergy and coordinated efforts to improve education outcomes (Dickson, 2011). Based on this theoretical prediction, it can be argued that faculty supervision support to students during university outreach may positively influence farmer learning behaviour. In this study, farmer learning behaviour refers to four key learning activities: 1) seeking information, i.e., searching for information (Wilson, 2000) from university students; 2) knowledge sharing, i.e., exchange of information, skills or expertise (Hasmath & Hsu, 2016); 3) seeking feedback from the students concerning the way they effect learning; and 4) giving feedback to the students regarding what they (students) discuss with farmers.

Research postulates that psychosocial antecedents are mediated by behaviour intentions in predicting outcome behaviours (Ajzen, 2002). In this case, behavioural intentions refer to a condition of conscious goal pursuit that is necessary but not sufficient for predicting behaviour. Intentions are assumed to depend on, among other factors, the beliefs that link a given behaviour to certain outcomes and on the perceived social pressure to perform the behaviour (Ajzen, 2002). In this study, the formation of farmers' intentions is operationalised as the formulation of plans and intentions to try out the farming competencies gained from students through concrete experience, reflection, analysis, conceptualisation and testing. Theories on behavioural intentions predict that the stronger an individual's intent to perform behaviour, the more likely the individual will engage in that behaviour (Ajzen, Czasch, & Flood, 2009). Accordingly, the following hypotheses were derived for testing the influence of faculty supervision support through the mediation of formation of intentions on farmer learning behaviours:

H₄: Faculty supervision support to students during outreach positively influences farmer learning behaviour

H₅: Faculty supervision support to students during outreach positively influences farmer formation of intentions

H₆: Farmer formation of intentions for learning positively influences farmer learning behaviour

Literature on learning shows that attitudes and learning content predict actual learning behaviour (Shuhaiber, 2015; Lakhal, Khechine, & Pascot, 2013). Host farmer perceptions about attitudes of facilitators (for example, student affection for farm work and good conduct during farm placement) may motivate or inhibit overall behaviours of learners (Shuhaiber, 2016). Similarly, host farmer perceptions about knowledge or the value of learning content (for instance, learning content on farm practices, postharvest management and produce marketing provided by outreach students) may be an important enabler of learning behaviour (Abu Baker & Abdul Razak, 2014). It remains unclear whether host farmer perceptions about student attitudes and the value of learning content predict their own learning behaviour in the student-to-farmer university outreach. Thus, the following hypotheses were also derived:

H₇: Perceived attitudes of students who facilitate learning positively influence farmer learning behaviour

H₈: Perceived value of learning content delivered by students positively influences farmer learning behaviour

H₉: Farmer formation of learning intentions mediates faculty supervision support to students in predicting farmer learning behaviour

3.3 Methodology

3.3.1 Participants

A cross-sectional survey was conducted on a sample of 283 farmers who had previously hosted agricultural students of Gulu University in the outreach program from 2007 to 2016. Participant farmers were drawn from the sub counties of Paicho and Bungatira (Gulu District) and Koro and Bobi (Omorro District). To ensure representativeness, proportional sampling was used to distribute the sample between the selected districts. Outreach program managers estimated that up to 65% of program participants were from Gulu District because of the district's proximity to GU. Thus, 181 participants representing 64% (Paicho = 94 and Bungatira = 87) were sampled from Gulu District and 102 representing 36% (Koro = 61 and Bobi = 41) were sampled from Omorro District. Social demographic characteristics of the sample i.e. means (M) and standard

deviations (SD) were as follows: experience of host farmer in the student-to-farmer university outreach in years (M = 2.18; SD = 1.99), distance of the household from the university in km (M = 12.60; SD = 8.86), farming experience of host farmers in years (M = 23.20; SD = 15.15) and age of host farmers 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 post-primary education (33.9%). In terms of gender of household heads, females constituted 35.3% of the sample and the rest were male.

3.3.2 Data sources

In this study, farmer learning behaviour as the dependent variable was measured using seven items as adapted from (Edmondson, 1999) to suit the context of the student-to-farmer university outreach (Table 3.1). The items captured the elements of information seeking, knowledge sharing, and giving feedback. A sample item from the domain of information seeking reads as follows: “I seek information on farming practices from university students”. All items were rated on a 5-point scale (1 = not at all and 5 = always). Farmers’ intentions were measured on a scale of four items adapted and modified from Ajzen (2002) and Ajzen et al. (2009).

Table 3. 1: Operationalization of study constructs

Construct	Indicators	Rating scale
1. Faculty supervision support to students	a) Mediating meetings between students & host farmers; b) staff follow-ups; c) supplementing student knowledge	1-5 point scale: where 1 = Strongly Disagree & 5 = Strongly Agree
2. Perceived student attitudes	a) Student performance of farm work; b) student conduct; & c) student affection towards Farm work	1-5 point scale: where 1 = Strongly Disagree & 5 = Strongly Agree
3. Perceived value of learning content	Value of student knowledge on: a) crop husbandry, b) postharvest handling, & c) marketing farm produce	1-5 point scale: where 1 = Strongly Disagree & 5 = Strongly Agree
4. Farmer learning intentions [scale adapted from Ajzen et al 2009]	a) Formulating learning plans & b) trying out learning plans on: farm records, postharvest & marketing	1-5 point scale; 1 = unlikely & 5 = most likely
5. Farmer learning behaviour [Scale adapted from Edmondson, 1999]	a) Information seeking., b) knowledge sharing, c) seeking feedback & d) giving feedback to students as facilitators	1-5 point scale; 1 = not at all & 5 = always

The items were modified following the experiential learning cycle capturing the domains of concrete experience, analysing, conceptualising and testing. A sample item from the construct is: “I plan to analyse records at my farm to identify any source of success”. The items were rated on a 5-point scale (1 = unlikely and 5 = most likely). Perceived value of learning content had three items adapted and modified from the Facilitating Conditions Questionnaire [FCQ] (Fraide, Allan, & King, 2013). A sample item of the construct is: “I think that learning from university students on marketing farm produce is important to me”. These items were rated on a 5-point scale ranging from 1= strongly disagree to 5 = strongly agree. Perceived attitudes of students were measured with four items as modified from Ajzen (2002). The items covered the three domains that are commonly used to measure attitudes: behavioural, affective and evaluative. A sample item reads as follows: “I like the conduct of university students while on my farm”. The items were rated on a 5-point scale (1 = strongly disagree and 5 = strongly agree). Lastly, faculty supervision support was measured using a three-item scale. A sample item is: “University staff follow up on my interactions with their student(s) on my farm”. The items were also rated on a 5-point scale, ranging from 1= strongly disagree to 5 = strongly agree.

3.3.3 Data analysis

Data were cleaned and transferred to the SPSS-AMOS version 23 for Structural Equation Modelling (SEM). Unlike other methods of data analysis, for example the Ordinary Least Squares (OLS), SEM is credited for its ability to simultaneously estimate multiple cause-effect inter-relationships among independent, mediating and dependent variables (Mittal & Dhar, 2015). The analysis process followed a three-step procedure i.e. data reduction, evaluation of the measurement model and Confirmatory Factor Analysis (CFA) to test for the hypotheses. In the first step, data reduction was done using Exploratory Factor Analysis (EFA) that reduced the number of items for each construct to only those that exhibited the best fit. In the second step, the measurement model was evaluated for the contribution of each item to the construct (latent variables) variance being assessed using factor loadings and Average Variance Extracted (AVE). In the third step, the structural model was tested to determine the strength of the hypothesized relationships between the latent variables.

Diagnostic test results presented in Table 3.2 show that correlates ranged from weak to only moderate correlation ($r = 0.031$ to $r = 0.342$), implying existence of relationships amongst the specified constructs.

Table 3. 2: Descriptive statistics and correlations of facilitating conditions in University Outreach

Variable	Mean	SD	CR	AVE	1	2	3	4	5
1. Value of learning content	4.717	0.502	0.993	0.716	0.846 ^a				
2. Perc. attitudes of students	4.651	0.491	0.996	0.627	0.320	0.792 ^a			
3. Faculty supervision support	4.271	0.733	0.986	0.649	0.092	0.305	0.806 ^a		
4. Formation of intentions	4.225	0.837	0.817	0.650	0.031	0.104	0.342	0.806 ^a	
5. Farmer learning behaviour	3.992	0.860	0.934	0.529	0.053	0.173	0.260	0.283	0.727 ^a

Note: Values on the diagonal with superscript 'a' = \sqrt{AVE}

Table 3. 3: Estimates of factor loadings in the facilitating conditions of learning behaviour

Item	Factor loadings				
	FLB	FI	PVLC	PAS	FSS
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 on new ideas of farming practices with university students (KS_5)	0.732				
I share knowledge on postharvest handling with university students (KS_9)	0.712				
I seek feedback on produce postharvest handling from university students (FS_9)	0.793				
I give feedback on farming business plans to university students (PF_1)	0.759				
I give feedback on new ideas of farming practices to university students (PF_5)	0.737				
I plan to take records of farming activities on my farm (IE_2)		0.697			
I plan to analyse records at my farm to identify any sources of success (IA_2)		0.839			
I plan to think through records at my farm on what has gone well in the previous year (IC_3)		0.874			
I will try to use records on my farm for making future decisions (IT_3)		0.805			
I think that learning from university students how to search for marketing information is important to me (LC_7)			0.936		
I think that learning knowledge on negotiation with product buyers from university students is important to me (LC_8)			0.853		
I think that learning knowledge on how to position my farm produce for the market from university students is important to me (LC_9)			0.737		
University students are good listeners to the farming challenges we experience (USA_3)				0.695	
I like the university students' farm work skills (USA_4)				0.838	
I like the conduct of university students while on my farm (USA_5)				0.847	
The conduct of university students while on the farm is valuable (USA_8)				0.778	
University staff make appropriate preparations for me to learn from their students (TB_1)					0.615
University staff make follow ups on farmers' interactions with students on the farm (TB_2)					0.881
University staff supplement the knowledge farmers learn from students (TB_3)					0.891

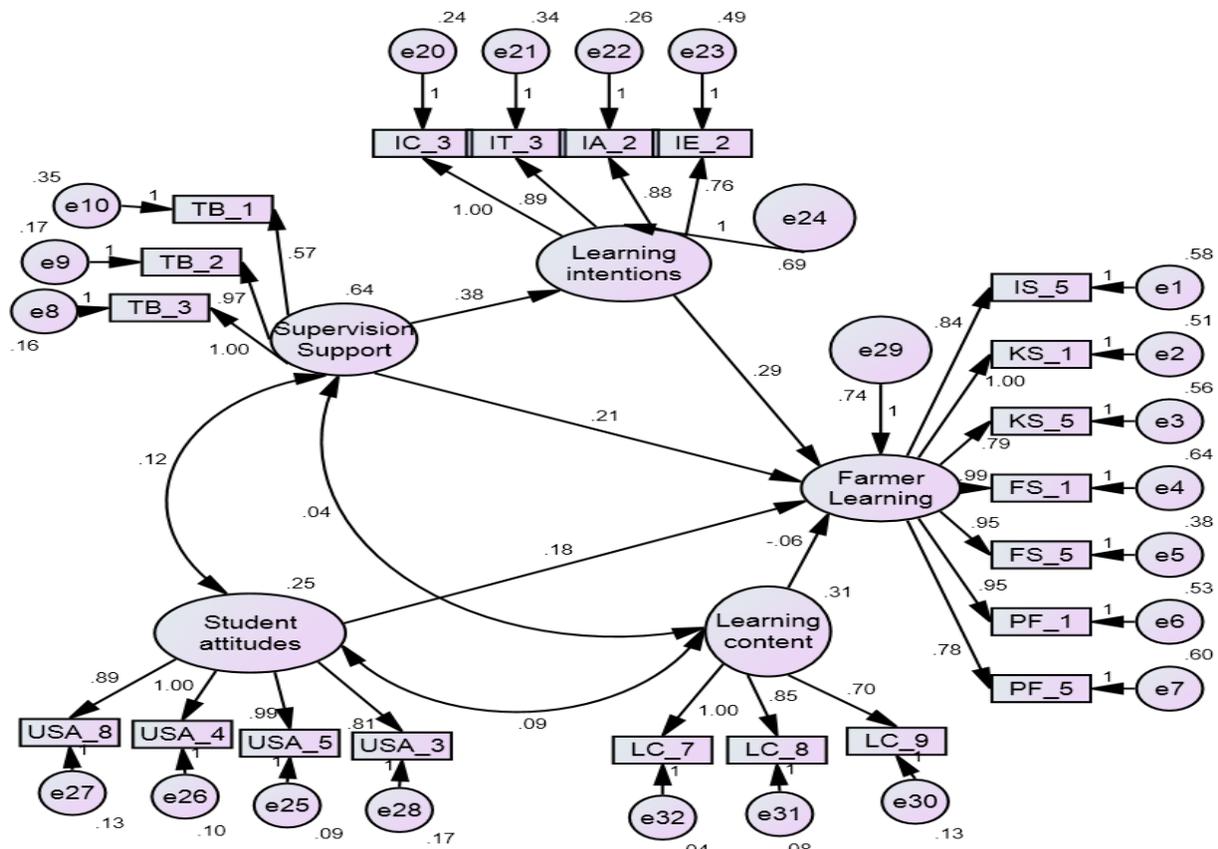
Where FLB = farmer learning behaviour; FI = farmers' formation of intentions, PAS = Perceived student attitudes, PVLC = perceived value of learning content; FSS = Faculty supervision support

Since, there were no high correlations amongst the constructs, it follows that there was no risk of multicollinearity affecting sound interpretation of the SEM results as explained in Mittal and Dhar (2015). Further, indices of composite reliability (CR), an alternative to Cronbach alpha (Mittal & Dhar, 2015), were above the minimum threshold of 0.7 for all constructs confirming measurement reliability of the instrument. Similarly, convergent validity was confirmed since the indices of average variance extracted (AVE) and factor loadings as indicated in Table 3.3 exceeded the minimum threshold value of 0.5. Lastly, on the basis of square root values of AVE being greater than the correlates, discriminant validity was confirmed.

3.4 Results and discussion

3.4.1 Confirmatory factor analysis

Results of confirmatory factor analysis presented in Figure 3.2 below show that the Goodness of Fit Index (GFI) = 0.92 (spec. \geq 0.90), adjusted GFI (AGFI) = 0.90 (spec. \geq 0.90), Tucker-Lewis Index (TLI) = 0.97 (spec. \geq 0.95), and the comparative Fit Index (CFI) = 0.98 (spec. \geq 0.95) fulfilled the acceptable baseline values. Also, the root mean square error of approximation (RMSEA) at (0.04) was far less than the acceptable maximum value of 0.08 while the ratio of chi-square to degrees of freedom (1.39) was less than the cut-off point of \leq 3. These model fit results show that the empirical data fit the specified model of facilitating conditions that explain farmer learning behaviour in the student-to-farmer university outreach well. The R-square value of 0.12 imply that facilitating conditions account for 12% of the total variation in farmer learning behaviour. This suggests that there could be other factors, as intervening variables, not captured in the model that also explain farmer learning behaviour.



Goodness-of-fit indices: Chi-sq = 277.7; df = 181; chi-sq/df = 1.53; GFI = 0.92; TLI = 0.97; CFI = 0.97; RMSEA = 0.04.
 Acronyms (e.g. KS_5) are as shown in Table 3.2

Figure 3. 2: Path diagram for facilitating conditions of farmer learning behaviour

3.4.2 Path analysis

Results of SEM in Table 3.3 show that a significant relationship exists between faculty supervision support ($\beta = 0.121$; $t = 4.299$; $P < 0.01$) and farmers' perception of quality of students attitudes. Similarly, the the relationship between farmer perception of student attitudes ($\beta = 0.088$; $t = 4.564$; $P < 0.01$) and perceived value of learning content was significant. There was no significant relationship between faculty supervision support and farmers' perception of the value of learning content ($\beta = 0.041$; $t = 0.167$; $P > 0.05$). Therefore, the hypotheses of covariance paths were supported for H₁ and H₃ but not H₂. The results mean that increasing faculty supervision support on farm placement is associated with farmer positive perceptions of student attitudes, just like the positive perception of student attitudes is related to the perceived value of learning content. Previous research has shown that supervision support positively affects emotions, attitudes and mental preparation of students for field work (Anorico, 2019).

Table 3. 4: Hypotheses testing of facilitating conditions predicting farmer learning behaviour

Path	Path Est. β (S.E.)	t-value	Hypothesis testing Decision
Estimates of construct relationships			
H ₁ : Faculty supervision Support ↔ Perceived student attitudes	0.121(.028)	4.299**	Supported
H ₂ : Faculty supervision support ↔ Perceived value of learning content	0.041(.030)	0.167	Supported
H ₃ : Perceived student Attitudes ↔ Perceived value of learning content	0.088(.019)	4.564**	Not supported
Regression estimates			
H ₄ : Faculty supervision support → Farmer learning behaviour	0.182 (.087)	2.081*	Supported
H ₅ : Faculty supervision support → Farmers' formation of intentions	0.380 (.072)	5.263**	Supported
H ₆ : Farmers' formation of intentions → Farmer learning behaviour	0.234 (.075)	3.089**	Supported
H ₇ : Perceived student attitudes → Farmer learning behaviour	0.196 (.138)	1.417	Not supported
H ₈ : Perceived value of learning content → Farmer learning behaviour	-0.001 (.114)	-0.011	Not supported

Note: ** = P<0.01; and * = P<0.05

Similarly, the finding on the relationship between student attitudes and the value of content is reinforced by the study of Darishah et al. (2017) which revealed that student attitudes were positively associated with the content of learning (i.e. knowledge, interpersonal skills and technical skills). It can be argued that in pursuit of farmer learning, faculty supervision support and students' attitudes cannot be delinked from each other. Again, student attitudes cannot be separated from farmer perception of the value of learning content that these students deliver.

Regression results revealed that faculty supervision support ($\beta = 0.182$; $t = 2.081$; $P < 0.05$) significantly predicts farmer learning behaviour, supporting hypothesis H₄. Likewise, faculty supervision support ($\beta = 0.380$; $t = 5.263$; $P < 0.01$) significantly predicts farmers' formation of intentions for learning, and at the same time, farmers' formation of intentions ($\beta = 0.234$; $t = 3.089$; $P < 0.01$) significantly predicts farmer learning behaviour. The last two findings support hypotheses H₅ and H₆ respectively. The results are corroborated by previous research on supervision support such as Cooper, Orrell & Bowden (2010) and Ram (2008) who both reported the existence of a positive relationship between supervision support and learning. It has been reported that intentions are good predictors of behaviour (Evers & Sieverding, 2015). Generally, extant literature on student community engagement supports the view that supervision is important not only for the educational outcomes of the students but also for community learning. Examples of such studies include Emslie (2010) and Erickson (2010) which assert that supervision support by university field educators is critical for active engagement of the students with host-communities.

On a contrasting note, neither perceived value of learning content ($\beta = -0.001$; $t = -0.011$; $P > 0.05$) nor perceived attitudes of students ($\beta = 0.196$; $t = 1.417$; $P > 0.05$) significantly predicted farmer learning behaviour. Hence, hypotheses H₇ and H₈ were not supported. This was surprising and contradicted other studies which established that host-communities of student outreach tend to consider that these students possess state-of-the-art knowledge which can be utilized to improve learning and adaptation of innovations (Rothman, 2007; Shuda & Kearns-Sixsmith, 2009). Farmers in the study area have hosted students for a long time and it is probable that this could have made them familiar with students' knowledge. In turn, perceived students' attitudes, a major covariate of perceived value of learning content, also emerged as a non-significant predictor of farmers' learning behaviour. Nevertheless, further research on the two constructs in a different study context could help to resolve the inconclusiveness of these findings.

Bootstrapping results (Table 3.4) indicate that the mediation effect of farmers' formation of intentions ($\beta = 0.075$; 95%CI = 0.027 ~ 0.153) between faculty supervision support and farmer learning behaviour (H₉) was significantly different from zero. Accordingly, hypothesis H₉ on mediation was supported. In social science related research, it is important to evaluate effect sizes alongside co-efficients for practical relevance.

Table 3. 5: Bootstrapping for mediation test in the facilitation conditions model

Path	Standardized Effects			Bias-corrected (95% CI)	
	Direct	Indirect	Total	Lower Bound	Upper Bound
H ₄ : Faculty supervision support → Farmer learning Behaviour	0.154	0.075	0.229	-0.013	0.312
H ₅ : Faculty supervision support → Farmers' formation of intentions	0.342	-	0.342	0.211	0.463
H ₆ : Farmers' formation of intentions → Farmer learning behaviour	0.220	-	0.220	0.066	0.389
H ₇ : Perceived student attitudes → farmer learning behaviour	0.096	-	0.096	-0.086	0.269
H ₈ : Perceived value of learning content → Farmer learning behaviour	-0.036	-	-0.036	-0.171	0.110
H ₉ : Faculty supervision support → Farmers' formation of intentions → Farmer learning behaviour	-	0.075	0.075	0.027	0.153

It has been suggested that for results to be practically meaningful, the effect sizes should be $\beta = 0.2$ or greater (Medina, 2017; Ferguson, 2009). In this study, the biggest standardized total effects were found in the prediction relationship between faculty supervision support ($\beta = 0.342$; 95%CI = 0.211 ~ 0.463; hypothesis H₅) and farmers' formation of intentions. This finding meets the criterion of practical relevance. The estimate (0.342) implies that faculty supervision support predicts up to 34.2% of variance in farmers' formation of intentions. This implies that if universities are to achieve meaningful farmer learning during outreach, they need to focus more

attention on influencing farmers' formation of intentions. Relatedly, the prediction relationship between faculty supervision support and farmer learning behaviour ($\beta = 0.229$; 95%CI = -0.013 ~ 0.312; hypothesis H₄) satisfied the criterion of practical relevance. Lastly, farmers' formation of intentions and farmer learning behaviour ($\beta = 0.220$, 95%CI = 0.066 ~ 0.389; hypothesis H₆) also met the criterion of practical relevance. The relationships that did meet the criterion of practical relevance include perceived student attitudes and farmer learning behaviour ($\beta = 0.096$, 95%CI = -0.086 ~ 0.269; hypothesis H₇) as well as perceived value of learning content and farmer learning behaviour ($\beta = -0.036$, 95%CI = -0.171 ~ 0.110; hypothesis H₈). In these two relationships, the effect sizes (β) fell below the threshold value of $\beta \geq 0.2$. This implied that perceived student attitudes and value of learning contents (even when significantly related to faculty supervision support to students) are not important predictors of farmer learning behaviour in the SFUO. The findings on the role of perceived student attitudes and value of learning content in farmer learning behaviour varied from earlier studies that reported that these variables are important for learning behaviour by Shuhaiber (2015) and Abu Baker & Abdul Razak (2014), respectively. Generally, the findings on effect sizes were small suggesting a possibility of some other factors not covered in this study that affect farmer learning behaviour during outreach.

Overall, results in this study give an impression that realizing lasting learning relationships in the student-to-farmer university outreach is likely to depend on the level of efforts that faculty staff put to supervision of students during outreach. Key activities of faculty supervisions include 1) mediating student-farmer meetings prior to farm placement; 2) providing supplementary knowledge during the period when students are engaging farmers; and 3) making regular follow ups to students while on farmsteads. Literally, the results suggest that the presence of faculty staff at farmsteads enacts favourable farmer learning behaviour, probably because there is expectation of superior knowledge from the faculty staff. This might also be impacting on the kind of attitudes and conduct the students exhibit towards host farmers and in turn, interesting the farmers to learn from the student outreach program. It can therefore be argued that achieving more vibrant learning relationships in the SFUO requires a re-orientation of approach from that kind of supervision where the faculty staff waits to receive reports from the student(s) to one

where such staff make regular and more frequent contacts with the student and farmer at the farmstead.

3.5 Conclusion and recommendations

In this study, it has been established that faculty supervision support to students is significantly related to farmer perceptions of attitudes of students. In turn, perceived attitudes of students are also significantly related to perceived value of the learning content. Faculty supervision support significantly predicts both farmer formation of intentions and learning behaviour. It suffices to conclude that in the student-to-farmer university outreach, faculty supervision support is an important factor influencing farmer formation of intentions and learning behaviour. This supervision support is also connected to farmers' perceptions of student attitudes, and in the same way, perceived student attitudes are linked to farmers' perceptions of the value of learning content from the students.

From a theoretical perspective, the study has integrated farmer intentions and learning behaviour into the facilitating conditions model and shows that faculty supervision support predicts the former two variables. A key practical implication for policy is that faculty supervision support to student field activities is critical for fostering lasting learning relationships in the student-to-farmer university outreach. Thus, faculty supervision support to students during field attachment needs to be part of the transformation agenda of the higher education sector for improved community linkages and innovation. This could be achieved through capacity building and refresher training to faculty staff as well as provision of more support to outreach programs to effectively support students while facilitating discursive spaces for improved community innovation. Future research on the student-to-farmer university outreach should assess how farmer motivation and social factors influence farmer learning. However, this study had some limitations among which included; some participants in the study area hosted graduate students while others hosted undergraduate students. These differences were not analysed in this study. Therefore, the results need to be applied with caution to situations of monolithic systems of student community attachment.

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CHAPTER FOUR

MOTIVATIONAL PATHWAYS FOR FARMER LEARNING BEHAVIOUR IN THE STUDENT-TO-FARMER UNIVERSITY OUTREACH³

Abstract

The growing demand for universities to be community-connected in the face of staff number limitations has made the integration of students into outreach services a necessity. However, empirical evidence on whether student-led outreach models adequately respond to the psychological learning needs of community members and subsequently, motivate them for learning is lacking. The study used a structural equation modeling technique on a sample of 283 farmers who previously had participated in the student-to-farmer outreach of Gulu University. Respondents were sampled from the districts of Gulu and Omoro of Northern Uganda. Results revealed that satisfaction of relatedness learning needs of farmers is a positive and significant predictor of intrinsic motivation, farmers' formation of intentions and farmer learning behaviour. Intrinsic motivation was also a significant mediator in the relationship between the satisfaction of relatedness learning needs and farmer learning behaviour. Conclusively, satisfying relatedness learning needs is a strong initiator of motivational pathways and the intentions for farmer learning behaviour in the student-to-farmer university outreach. It is therefore recommended that in pursuit of lasting learning relationships and stronger university-community linkages, outreach program managers should focus attention on instilling in students a sense of care for farmer concerns and responsiveness to farmer learning interests.

Key words: *Higher education, psychological learning needs, farmer motivation, community linkages, Uganda*

4.1 Introduction

Globally, a dominant discourse on policy reforms in higher education has called for universities to develop strong linkages with the community to usher in knowledge-oriented development (Jacob et al., 2015; WorldBank, 2009). Essentially, community linkages are considered necessary for fostering mutual learning relationships. For the HEI, community linkages can enable universities to learn about local knowledge from host communities which helps in academic growth. On the other hand, the connection of host communities, including smallholder

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farmers, to universities can enhance utilization of researched knowledge and technologies for learning and innovations (Nakayiwa et al., 2016). It has also been argued that if the knowledge generated in universities is appropriately disseminated to the intended end-users, in this case the farming community, it can catalyze social transformation, economic growth and contribute to national development (Mugabi, 2015). Universities are also considered to be well-endowed with the requisite human resources for knowledge transfer, and these include the faculty staff, researchers, and students. As such, the current focus of the discussion is on reorganizing the outreach services and strategies to ensure that universities, especially in Africa, become more relevant to society through contributing solutions to community development challenges. In enabling farmer learning, a key factor worth paying attention to is farmer motivation. This means that university outreach programs must not only focus on the farmer learning needs alone but also satisfying psychological needs of host farmers which might initiate the motivational pathways for learning and innovation.

However, many African universities have continued to live with the dual challenge of inadequate staff numbers and competence limitations in managing outreach functions (Juma, 2016). Most of these staffs are aging; a considerable number were trained long time ago and have hardly had opportunities of refresher training (Blackie, 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 (Larsen, 2016; Blackie, 2016; Sherrard, 2016). This has necessitated universities to search for cost-effective alternatives for organizing outreach services. One such option is the engagement of university students in community outreach through service learning programs [in this study, referred to as the student-to-farmer university outreach (SFUO)]. Owing to deficiencies amongst university staff enumerated above, students might not be adequately prepared to be responsive to the psychosocial environment of host communities and hence, may not be able to stimulate host communities for learning.

In Africa, student-oriented outreach models have largely been practiced in South African [SA] Universities (Preece, 2013a). In non-SA universities, student centered outreach programs are only emerging and require further nurturing to effectively deliver beneficial services to host communities. Prominent among these universities is Gulu University running the student-to-farmer university outreach program. In this SFUO, students, as part of their training, are attached

to smallholder farms in areas surrounding the university campus (Kalule & Ongeng, 2016). A similar program is run at Egerton University in Kenya in which students are placed at commercial farms for service learning and provision of advisory services to farmers (Mungai & Njuguna, 2016). Again in Uganda, Makerere University has a student internship program that involves student attachment to smallholder farmers for experiential learning and advisory services (Opolot et al., 2016). A striking difference in these outreach models is that whereas in the latter two universities, community attachments or farm placements take shorter periods of 2-3 months for a student or a group of students, at GU, student field attachment lasts for periods of not less than a year (Kalule & Ongeng, 2016).

Regardless of the design of the student outreach programs, careful response to the motivational needs of the target beneficiaries, for example the farmers, is crucial for building lasting partnerships with the host community (Jacob et al., 2015). What cannot be ignored is keeping an eye on the psychological learning needs and overall motivation of the farmers. Short of this, it means that little learning may be realized and consequently, a likelihood of less than vibrant university-community linkages. Unfortunately, there is a reported mismatch between what university outreach programs offer to host communities on one part, and on the other part, the learning needs as well as the psychological and motivational needs of the beneficiaries (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, Gillison, & Treasure, 2007). Others include student study teams and educational psychology (Haichun & Chen, 2010; Spittle, Jackson, & Casey, 2009) and ICT acceptance behaviour (Lee, Lee & Hwang, 2015; Hung, Durcikova, Lai & Lin, 2011). However, similar research approaches (that use social psychology) in agriculture, and particularly on farmer learning, are still limited. The few exceptions (Charatsari, Lioutas, & Koutsouris, 2016; Triste et al., 2018) have applied the Self-determination theory (SDT) 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 economic gains, the desire to learn, usefulness of the content and technology applicability affect farmer motivation to participate in educational programs (Moumouni & Streiffeler, 2010). In all, the

concepts of psychological satisfaction of relatedness needs and intrinsic motivation, rooted in the SDT, have received little application in analyzing farmer learning. Specifically, empirical testing of how satisfying relatedness learning needs along with intrinsic motivation predict farmer learning behaviour in the student-to-farmer university outreach is lacking. This has created a knowledge void on the role of motivational factors in the SFUO and how such factors could be harnessed to foster lasting learning relationships between university students and host communities. Results on motivational factors influencing farmers learning present a good opportunity to universities on improving university-community linkages, farmer learning, and hence contributing to the much-cherished knowledge-oriented development.

4.2 Theoretical foundations and hypotheses

The design of the SFUO at GU seeks to promote demand-driven service provision for farmer learning. The assumption is that farmers can from time to time demand for the services of the students for farm placement with particular learning needs in mind. This line of thinking seems to suggest that the SFUO targets to exploit self-motivated farmer behaviour that the self-determination theory (SDT) of learning articulates. 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 SFUO (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). 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 (BNT) is popular in studies on human behaviour. Triste et al. (2018) emphasizes that BNT assumes that individuals have three basic psychological needs of 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 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 relatedness learning needs is presupposed to influence farmer learning behaviour through motivation and other mediating variables. These relationships are as summarized in figure 4.1.

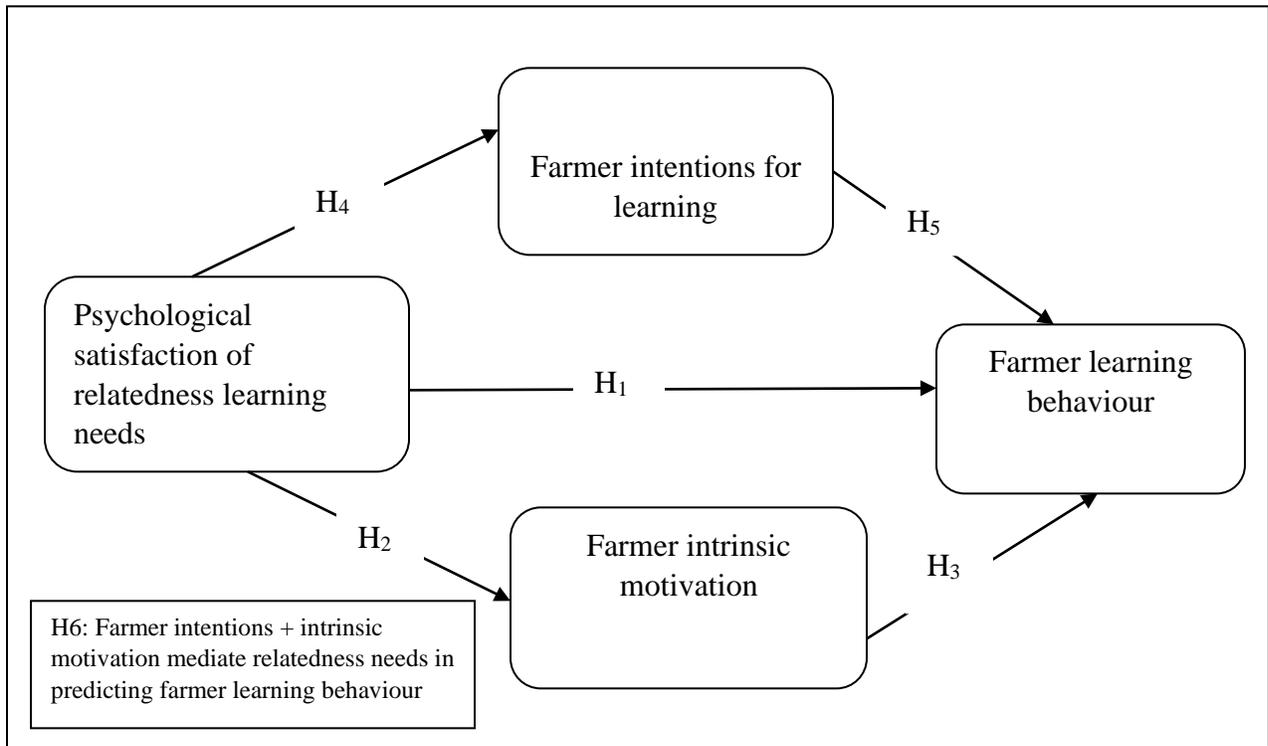


Figure 4. 1: Hypothesized relationships in motivational factors for farmer learning behaviour

Further, the following hypothesis was derived to examine the relationship between satisfaction of relatedness learning needs and farmer learning behaviour (Figure 4.1):

H₁: 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 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, Durcikova, Lai, & Lin, 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 SCO are likely to be interested in learning from the student outreach program 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 behavior (Ryan & Deci, 2000). On the other hand, extrinsic motivation involves performing the behaviour in order 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 (for example 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 program:

H₂: Psychological satisfaction of relatedness learning needs positively influences farmer intrinsic motivation

H₃: Farmers' 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, 2012). These intentions indicate how much effort an individual will exert to perform a behavior (Herath, 2010). In this study, farmers' 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 behavior is, the more likely the individual will engage in that behavior (Ajzen et al., 2009). Lastly, farmer learning behaviour refers to learning activities namely: 1) seeking information i.e. searching for information (Wilson, 2000) from university students; 2) knowledge sharing i.e. 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 above theories and reported relationships from previous studies, the following hypotheses were derived:

H₄: Psychological satisfaction of relatedness learning needs positively influences farmer' formation of intentions for learning from the students on farm placement

H₅: Formation of intentions for learning positively influences farmer learning behaviour

H₆: Intrinsic motivation combines with the formation of intentions for learning to mediate psychological satisfaction of relatedness learning needs in predicting farmer learning behaviour

4.3 Methodology

4.3.1 Participants

A cross-sectional survey was conducted on a sample of 283 farmers who had previously hosted agricultural students of GU in the SFUO program 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 (Omor District). To ensure representativeness, proportional sampling was used to distribute the sample between the selected districts. Records available at FAE indicate that up to 65% of program 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. Social demographic 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). Others were as follows: 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 post-primary education (33.9%). In terms of sex of household head, females constituted (35.3%) of the sample and the rest were male.

4.3.2 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 4.1). 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 were rated on a 5-point scale (1-5, where 1 = not at all and 5 = always). The construct of farmers' 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 behavioral regulation exercise questionnaire 2 [BREQ-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, Paixão, Lens, Lacante and Sheldon (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).

Table 4. 1: Operationalization of motivational factors and farmer learning behaviour

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

4.3.3 Data analysis

Data were cleaned and transferred to the SPSS – AMOS version 23 for Structural Equation Modeling (SEM). The analysis process followed a three-step procedure i.e. 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). The indices applied in this study included: ratio of Chi-square to degrees of freedom (Chi_Sq/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).

4.4 Results and discussion

4.4.1 Testing Motivation model constructs for SEM analysis

Diagnostic test results are indicated in Table 4.2. 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 psychological satisfaction of relatedness 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.

Table 4. 2: Descriptive statistics and correlations of motivational factors of learning behaviour

Variables	Mean	SD	CR (ρ)	AVE	Correlations			
					1	2	3	4
1. Satisfaction of rel. learning needs	4.491	0.610	0.994	0.749	0.865 ^a			
2. Farmer intrinsic motivation	4.775	0.431	0.991	0.630	0.339	0.794 ^a		
3. Farmers' formation of intentions	4.225	0.837	0.979	0.650	0.166	0.076	0.807 ^a	
4. Farmer learning behaviour	3.992	0.860	0.934	0.529	0.158	0.078	0.161	0.727 ^a

Key: rel. = relatedness

The highest correlation was between psychological satisfaction of relatedness learning needs and farmers' intrinsic motivation ($r = 0.339$; $P < 0.01$) while the weakest was between farmers' 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 (ρ), showed that psychological satisfaction of relatedness needs ($\rho = 0.996$) exhibited the highest value while farmer learning behaviour ($\rho = 0.934$) was the lowest. Since the ρ 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 4.3) and Average Variance Extracted (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, intra-construct variance exceeded inter-construct variance, meaning existence of construct distinctness from each other and thus, the assumption of adequacy of discriminant validity was supported.

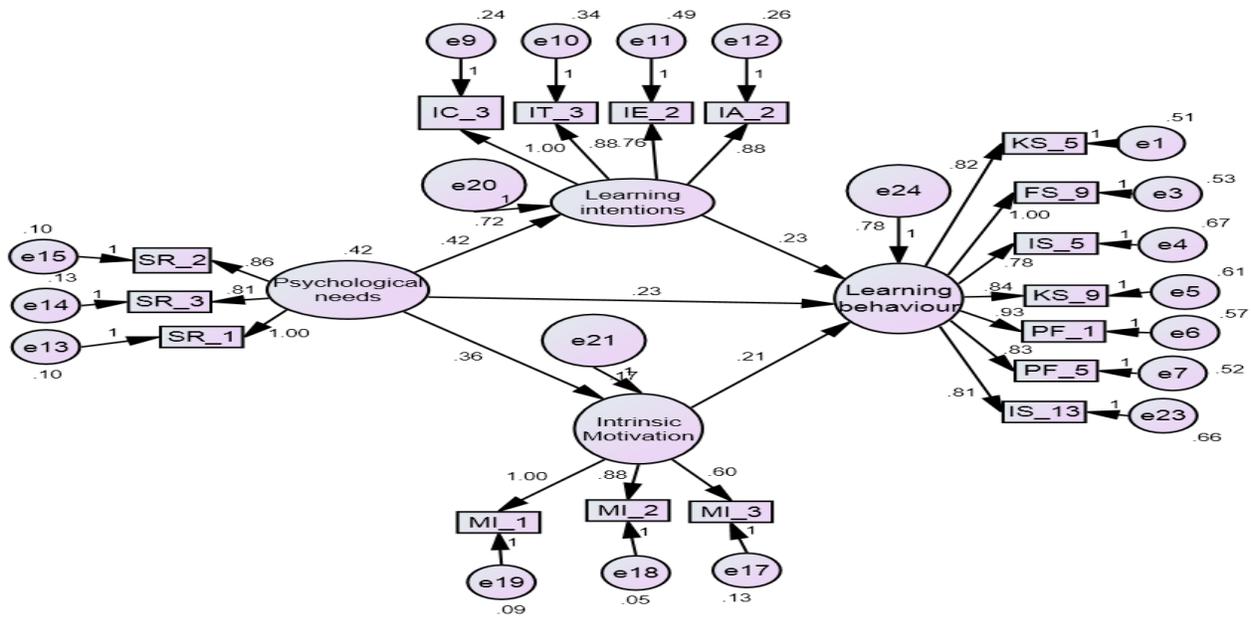
Table 4. 3: Estimates of factor loadings of motivational factors of learning behaviour

Item	Standardized Factor loadings			
	FLB	FFI	PSY	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 on new ideas of farming practices with university students (KS_5)	0.733			
I share knowledge on 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

Key: FLB = Farmer learning behaviour; FFI = Formation of farmer intentions; PSY = Psychological satisfaction of relatedness learning needs & MOT = Intrinsic motivation

4.4.2 Confirmatory factor analysis and testing of hypotheses

Results of confirmatory factor analysis presented in figure 4.2 show that the specified structural model yielded SEM results that depicted an almost perfect model fit.



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 4. 2: Path diagram of motivational factors of farmer learning behaviour

The comparison of goodness-of-fit indices (Fig. 4.2) with baseline values (spec.) as articulated in Bhatti et al. (2014) revealed that the ratio of chi-square to degrees of freedom (chi-sq/df) = 1.62 (spec. ≤ 3), GFI = 0.93 (spec. ≥ 0.90), and AGFI = 0.91 (spec. ≥ 0.90) met precondition specifications. Similarly, the preconditions of goodness-of-fit were met for the following indices: TLI = 0.97 (spec. ≥ 0.95), CFI = 0.97 (spec. ≥ 0.95), and RMSEA = 0.05 (spec. ≤ 0.08).

SEM results of hypothesis testing (Table 4.4) revealed that the antecedent of psychological satisfaction of relatedness needs of the farmers was a significant predictor of farmer learning behaviour ($\beta = 0.227$; $t = 1.978$; $P < 0.05$), supporting hypothesis H₁. The same antecedent significantly predicted farmer intrinsic motivation ($\beta = 0.358$; $t = 7.422$; $P < 0.01$) and farmers' formation of intentions ($\beta = 0.419$; $t = 4.682$; $P < 0.01$) thus, supporting hypotheses H₂ and H₄. Lastly, farmers' formation of intentions was a significant predictor of farmer learning behaviour ($\beta = 0.233$; $t = 3.193$; $P < 0.01$), and thus, supporting hypothesis H₅. However, farmers' intrinsic motivation did not significantly predict farmer learning behaviour ($\beta = 0.207$; $t = 1.366$; $P > 0.05$), meaning that hypothesis H₄ was not supported.

Table 4. 4: Testing of hypotheses of motivational factors of farmer learning behaviour

Path	Path Est., β(S.E)	t-value	Hypothesis Testing Decision
H ₁ Psy-satisfaction of rel. Learning needs →Farmer learning behaviour	0.227(0.115)	1.978*	Supported
H ₂ Psy-satisfaction of rel. learning needs →Farmer intrinsic motivation	0.358(0.048)	7.422**	Supported
H ₃ Farmer intrinsic motivation →Farmer learning behaviour	0.207(0.151)	1.366	Not Supported
H ₄ Psy-satisfaction of rel. learning needs →Farmers' form. of Intentions	0.419(0.089)	4.682**	Supported
H ₅ Farmers' form. of intentions → Farmer learning behaviour	0.233(0.073)	3.193**	Supported

* & ** represent significant at 5% and 1%, respectively; psy = psychological; rel. relatedness & form. = formation

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 psychological satisfaction of relatedness needs on intrinsic motivation matched theoretical prediction (Brunet & Sabiston, 2009; Deci & 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 (Triste et al., 2018; Halvari, Halvari, Bjørnebekk, & Deci, 2010). Similarly, the result of positive influence of psychological satisfaction of relatedness 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 psychological satisfaction of relatedness needs is an important initiator of the motivational pathway and farmers' 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, Ferris, Chang and Rosen (2016) suggests 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, Patrick, Deci and Williams (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 behaviors. 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 farmers' formation of intentions for learning. In turn, intrinsic motivation and farmers' 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 4.5. These results indicate that the combined indirect effects of intrinsic motivation and farmers' formation of intentions in the relationship between psychological satisfaction of relatedness learning needs and farmer learning behaviour were significant ($\beta = 0.118$; 95% CI = 0.014 ~ 0.257). Thus, the mediation hypothesis (H₆) was supported. This finding is in conformity with research which revealed that intrinsic motivation along with other motivation factors mediate basic psychological 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 psychological satisfaction of relatedness needs and farmers' intrinsic motivation ($\beta = 0.486$; 95%CI = 0.339 ~ 0.604), hypothesis H₂.

Table 4. 5: Bootstrapping Results for motivational factors of learning behaviour

Path	Standardized Effects			Bias-corrected (95% CI)	
	Direc t	Indi.	Total	Lower	Upper
H ₁ : Psy. satisfaction of rel. learning needs→Farmer learning behaviour	0.157	0.118	0.275	0.158	0.400
H ₂ Psy. satisfaction of rel. learning needs →Farmers' intrinsic motivation	0.486	-	0.486	0.339	0.604
H ₃ Farmer intrinsic motivation→Farmer learning behaviour	0.105	-	0.105	-0.082	0.332
H ₄ Psy. satisfaction of rel. learning needs → Farmers' form. of intentions	0.306	-	0.306	0.166	0.431
H ₅ Farmers' form. of intentions →Farmer learning behaviour	0.220	-	0.220	0.078	0.379
H ₆ Psy. satisfaction→ motivation + Far. intentions → Farmer learn. beh.	-	0.118	-	0.014	0.257

Key: Psy = Psychological; rel = relatedness; Far. = Farmer; beh. = behaviour; & Form = formation

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 farmers' formation of intentions ($\beta = 0.306$; 95%CI = 0.166 ~ 0.431), hypothesis H₄, which was also significant. This means that relatedness learning needs explain about 31% of variance in farmers' formation of intentions. Other relationships that met the criterion of practical relevance were psychological satisfaction of relatedness learning needs and farmer learning behaviour ($\beta = 0.275$; 95%CI = 0.158 ~ 0.400), the predictor accounting for 28% of the variance in the outcome variable. Lastly, farmer learning intentions in predicting farmer learning behaviour ($\beta = 0.220$; 95%CI = 0.078 ~ 0.379) accounted for the variance of about 22%. In either case of the former two findings (for hypotheses, H₁ and H₅), 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 SFUO program.

In this study, it is evident that satisfying farmer learning interests is key for stimulating farmer motivation to learn from student outreach program. It is clear that if the SFUO pays attention to ensuring: 1) preparing students to responsive to farmer concerns; 2) students are socially caring e.g., assisting farmers during farm work; and 3) matching student knowledge with farmer learning needs, 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 on the farm. Such motivation is likely to generate favourable learning behaviour towards the SFUO and therefore, lasting learning relationships between the university and the host communities. It is thus arguable that achieving desirable farmer learning behaviour in the SFUO is dependent on satisfying farmer learning interests which university outreach programs need to attend to.

4.5 Conclusion and recommendations

This study has yielded results suggesting that psychological satisfaction of relatedness learning needs of the farmers is a strong initiator of the motivational pathway for farmer learning

behaviour in the student-to-farmer university outreach. The construct of relatedness learning needs was a significant predictor of intrinsic motivation, farmers' formation of intentions for learning and farmer learning behaviour. As such, psychological satisfaction of relatedness needs influences farmer motivation (including interest in students; enjoyment of associating with the university; and pleasure at applying student knowledge), farmers' intentions and farmer learning behaviour. The results point to the possibility of developing lasting relationships in the SFUO by ensuring that students on farm placements are sensitive to the learning needs of the farmers. This could be through students demonstrating care for farming 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 contributes to extension of the SDT model by enriching the literature on basic psychological needs and motivation sub-theories with empirical data and concepts derived from the context of SFUO. Pertinent concepts of SFUO integrated in the SDT include farmers' formation of intentions for learning from university students and farmer learning behaviour. From a practical standpoint, the results are applicable to SFUO management through exploitation of social support from students to host farmers. This could be harnessed through appropriate orientation of students prior to farm placement so as to instill a sense of care for farmers' concerns and responsiveness to farmer learning interests. It is also important that SFUO programs regularly identify farmer learning needs so that such needs are matched with the knowledge of students participating in outreach programs. For the on-going discourse on policy reforms in higher education, the results are useful in terms of informing the debate on strengthening university-community collaborations via policy advocacy for resources to facilitate university-community linkages to catalyze knowledge-oriented development.

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 data used in the study were self-reported responses from the host farmers with no data source and method triangulation. 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 three

measurement items are adequate for data analyzed using structural equation modeling. Further, potential biases were minimized by the large sample used in this study.

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CHAPTER FIVE

SOCIAL COGNITIVE DRIVERS OF FARMER LEARNING BEHAVIOUR IN THE STUDENT-TO-FARMER UNIVERSITY OUTREACH⁴

Abstract

Universities are repositioning themselves for community outreach although with difficulty in responding to the unpredictable social features of host communities. Accordingly, this study aims to assess the role of social cognitive factors in farmer learning behaviour during university outreach. Structural equation modeling was conducted on the data obtained from a sample of 283 participants of the student outreach program of Gulu University, Uganda. The results indicate that social outcome expectations ($\beta = .227$, $t = 1.978$, $P < 0.05$), social influence ($\beta = .372$, $t = 4.448$, $P < 0.01$) and farmers' formation of intentions ($\beta = .214$, $t = 3.254$, $P < 0.01$) positively and significantly predict farmer learning behaviour. The results also show that social influence combines with formation of learning intentions to mediate social outcome expectations in predicting farmer learning behaviour. The study highlights that tapping into the social setting of host farmers is critical for the success of university student outreach in the sense that it generates social reinforcements for effective farmer learning behaviour. The findings point to the fact that the managers of university outreach programs should devote efforts to prepare students to be sensitive to the concerns and needs of the host community as a whole rather than just the individual host farmer.

Keywords: Higher education, community linkages, outcome expectations, social influence

5.1 Introduction

Recent deliberations on university–community linkages have increasingly urged higher education institutions (HEIs) to play an active role in promoting socio-economic transformation (Jacob et al., 2015; Nakayiwa et al., 2016). This development is a result of the realization that countries, such as China and India that have adequately exploited their knowledge-economy have registered tremendous development over time (Cloete et al., 2011). Notably, both the universities and local communities stand to benefit from the above linkages especially if the outreach services are organized as a two-way learning process. In this case, local communities

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able to connect with intellectual resources of the university. On the other hand, university can learn about local knowledge from their hosts as well as existing community development needs for research attention.

However, in sub-Saharan Africa (SSA), the situation is different as evidenced by limited university engagement with communities. Most universities in SSA have barely taken advantage of the vast resources within their reach, particularly the researched knowledge, technologies and innovations as well as the human resources to advance the transformation agenda (Cloete & Maassen, 2015). The poorly developed outreach functions in these universities have been partly blamed for this inadequacy. A growing body of literature has suggested that in many African universities, outreach functions appear to be managed as an afterthought rather than a key mandate (Jacob et al. 2015). This scenario implies that in these universities, community outreach is not well prioritized right from the administration to faculty and student levels (Muriisa, 2015). Consequently, the engagement of knowledge end users who are meant to be served by the universities is limited.

Nevertheless, African universities are repositioning themselves for community outreach as a strategy of pursuing more societal relevance (Nampala et al., 2016). Majority of community-oriented universities are those involved in agricultural training and research. These universities seem to be motivated by the belief that partnership with the community can usher in a new model of agricultural extension that exploits farmer social cognitions for learning and innovation at the grassroots (Sewell et al., 2017). However, a number of African universities have not satisfactorily embraced the ideology of community connectedness. For instance, Kraemer-Mbula (2014) illustrated that science and technology universities are less likely to engage in community outreach when compared to community-based universities. The Kraemer-Mbula study (2014) further articulated that even within a given university, some faculties and departments tend to participate in community outreach activities more than others. In this regard, the departments of agriculture, environmental science, social work and health are more likely to be active in community development work than of the disciplines of engineering. This pattern of orientation is not any different when viewed from the perspective of student outreach activities. As an example, agriculture students tend to engage in outreach activities more than those from technical and engineering disciplines (Kraemer-Mbula, 2014). As such, student-oriented outreach approaches are on the rise mostly in the agricultural-leaning universities.

Student-centered outreach models appear to be best suited for addressing local development needs, an aspect that African universities can easily perform well (Kruss & Gastrow, 2015; Grobbelaar et al., 2017) rather than partnerships with firms, which is the case for universities in developed countries (Kruss et al., 2011a). Accordingly, if African universities adopt or strengthen student-centered outreach activities, such universities will most likely have an edge for championing innovation systems as articulated in earlier research (Lundvall et al., 2009). Examples of student outreach activities are commonly cited in South African universities, where such activities are implemented as service learning programs (Preece, 2013a). In the East African region, student-oriented outreach activities have emerged as an option that complements the traditional approach of staff community outreach. Prominent among these universities is Gulu University (GU) in Uganda that runs the student-to-farmer university (SFUO), which involves undergraduate and graduates in communities to offer services to farming households (Kalule & Ongeng, 2016). Other active universities implementing student-oriented outreach include Egerton University in Kenya (Mungai & Njuguna, 2016) and Makerere University in Uganda (Opolot et al., 2018).

Essentially, the SFUO strategy of GU is intended to create farmer learning within the farming community that neighbours the university campus through knowledge and experience sharing with the hosted students (Odongo et al., 2017). Further, Kalule et al. (2016b) explained the core features of the SFUO as follows: 1) Students interact with farmers to facilitate learning; 2) Farmers participate in problem communication and knowledge sharing with students; 3) Students transmit identified farming problems to the faculty; 4) Students return and share the researched solutions to the community. Existing studies on the SFUO approach of GU are generally characterized by mixed results; yet, these studies are mostly qualitative in nature. First, it has been reported that this outreach approach had registered success in delivering experiential learning to both the students and host farmers (Mugonola & Balliddwa, 2014). On the contrary, (Roberts & Edwards, 2017) contended that the partnership-building between the staff and students of GU on one part and the host-communities on the other was still limited. This deficiency was blamed on the fact that the managers of the SFUO while delivering outreach services did not pay adequate attention to the social context of the host farmers. Further, the Roberts and Edwards study (2017) reported that the existing stereotypes amongst farmers affect their learning behaviour in the student-to-farmer university outreach. This finding suggests that

the SCO may have fallen short in responding to the features of the social cognitive environment in which the host farmers are embedded. Such a problem has far-reaching implications on the SCO of GU and other universities in Africa. Notably, it may be affecting the long-term strategy of catalyzing sustainable learning relationships in the SFUO.

Literature on application of social cognitive theory (SCT) is largely rich in the fields of health and physical activity (Scullin, Le, & Shelton, 2017), social marketing (Chin & Mansori, 2018) as well as learning behaviours amongst students (Marx, Simonsen, & Kitchel, 2014). Even then, existing literature (De Snoo et al., 2012) stress that as much as socio-psychological factors are known to predict human behaviour, the influence of these factors is not fixed. Instead, their predictive role varies depending on the psychology of individuals, the behaviour under question and the study context. In all, a clear knowledge gap exists on how social outcome expectations and social influence affect farmer learning behaviour in the student-to-farmer university outreach. The results of this study are insightful in explaining how the social cognitive environment of host farmers of student outreach programs can be better harnessed to ensure lasting learning relationships and sustainable university–community linkages.

5.2 Theories and formulation of hypotheses

Student-to-farmer university outreach targets creating farmer learning in which the influence of the social environment on farmer cognitions cannot be ruled out. In this regard, SCT (Bandura, 1977) seems well-suited for the SFUO study context. SCT is concerned with human behavioural functioning and particularly how people, such as smallholder farmers in student-to-farmer university outreach, acquire and maintain knowledge, skills and beliefs through their interactions with others (Sewell et al., 2017). The central notion of SCT is maintaining a certain favourable behaviour, as every newly cultivated behaviour faces the risk of relapsing if it is not properly practiced (Chin & Mansori, 2018). According to psychosocial literature (Bandura, 1989), SCT explains reciprocal interacting influences amongst 1) personal factors, ranging from thoughts, beliefs, skills and affection, 2) behaviours (for example, farmer learning) and 3) the environment (for instance, social influence). It also explains that people's perceptions, beliefs, self-confidence and outcome expectations determine their abilities to perform the behaviour in question (Bandura, 1982). Personal factors, particularly cognitive beliefs, play an important role in people's capability to perceive a situation, construct the reality and execute behaviours

(Anderson, Wojcik, Winett, & Williams, 2006). Environmental influences are seen as factors that are physically external to a person that provide opportunities and social supports, determining superior performances (Bandura, 1989).

A key sub-theory of SCT is cognitive-based expectations (Chlebowy & Garvin, 2006). For instance, in research literature (Bandura, 1982), it has been argued that two types of cognitive-based expectations influence human behaviour: self-efficacy expectations and outcome expectations. The construct of self-efficacy expectations (SE) relates to the self-confidence one holds in carrying out a behaviour and can be defined as the conviction that one can successfully execute the required behaviour to produce the desired outcomes (Anderson et al., 2006). The concern of SE is the linkage between self-perceptions and individual actions (Chlebowy & Garvin, 2006). Given the fact that farmers normally form judgmental groups that play a critical role in learning and technology uptake decisions (De Snoo et al., 2017), SE may not adequately interrogate farmer behaviours in the SCO. It, therefore, follows that outcome expectations, linked to social phenomena and concerned with the beliefs that certain behaviours will lead to certain socially desired outcomes (Bandura, 1977), can be more appropriate. For instance, host farmers' expectations of social reactions for participation in university outreach activities. These social reactions may or not be supportive that participation in university outreach can result in improved farm yields, better quality farm produce or farm incomes. Hence, social outcome expectations, as the beliefs about the expected social reactions (Hall et al., 2012) from others, for instance, members of the farmer group have been preferred in this study.

Social outcome expectations may be an important factor that universities may want to exploit in the processes of curricula reviews that bring students training closer to farming communities. If such curricula prepare students to be responsive to the social concerns of the community as a whole, then the students will deliver better outreach services to farming communities. Accordingly, this study is premised on the assumption that social outcome expectations of the host farmers of university outreach may be affecting the learning behaviour at farm-level with far reaching implications for the sustainability of university-community linkages.

Empirical research has shown that social outcome expectations as a construct is important in predicting behaviour. Examples of research areas in which this construct has been applied include nutrition and physical activity (Dewar et al., 2012), career decision-making amongst

college students (Marx, Simonsen & Kitchel, 2014) and health studies (Hall et al., 2012). However, the application of social outcome expectations in farmer learning behaviour, specifically in the context of student-to-farmer university outreach, is still lacking, necessitating further research. In this study, the construct of social outcome expectations is operationalized as beliefs amongst host farmers that peer farmers expect participation in student-to-farmer university outreach brings improvements in farm yields, incomes and product quality.

A second sub-theory of SCT is the environment of the learner, comprising the physical environment (e.g., infrastructure and soils) and the social environment [e.g., family members, farmers' group(s) and the broader community] (Slater, 1989). University outreach similar to that of GU may be more concerned with the notion of social environment, which presents social pressures to farmers while interacting with students (De Snoo et al., 2012). Thus, the current study prefers to concentrate on the social environment of the farmer because it is insightful for farmer learning and innovation if appropriately exploited as stressed by Sewell et al. (2017). Within the broad framework of the social environment of SCT, it has been argued that social influence, either internal or external, offers social reinforcements in the process of executing and maintaining a learning behaviour (Naslund et al., 2017; Scullin et al., 2017).

Previous research has also demonstrated that social influence is an important factor in explaining the behaviour in career decision-making (Gushue & Whitson, 2006) and behaviour towards the adoption of information and communication technologies amongst farmers (Shuiqing, Yaobin, Gupta, Cao, & Zhang, 2012). Central to the construct of social influence is the concept of subjective norms, defined as the degree to which one feels that 'significant others', also known as social referents, think they should perform the behaviour (Ajzen, 1991). The theory on 'significant others' explains farmer desires to comply with the norms of that particular social category, for instance, a farmers' group. Farmers, in their communities, are known to constantly compare themselves against each other's performances (De Snoo et al., 2010). Therefore, it is possible that the 'significant others' may be bringing social reinforcements to farmer learning behaviour during university outreach through social persuasion or encouragement as articulated by Ajzen (1991). Thus, the construct of social influence was further tested in the context of student-to-farmer university outreach to ascertain its role in farmer learning behaviour. In this study, therefore, social influence is operationalized as the social persuasion on and encouragement to an individual host farmer by peers (and 'significant others') that the

participation in student-to-farmer university outreach will result in improved farm yields, quality of farm products and farm incomes. The ‘significant others’ are presumed to be members of farmers’ groups, the community, and the people whose opinion is valued by the individual host farmers in question and may influence farmer learning behaviour. As such, the following hypotheses were derived (also summarized in Figure 5.1):

H₁: Host farmers’ perceived social outcome expectations is positively related to social influence

H₂: Host farmers’ perceived social outcome expectations positively influence farmer learning behaviour.

H₃: Social influence on the host farmers of student outreach positively influences farmer learning behaviour.

A host of behaviour research postulates that psychosocial antecedents are mediated by behaviour intentions in predicting outcome behaviours [for instance, farmer learning] (Ajzen 1991). In this case, behavioural intentions refer to a condition of conscious goal pursuit that is necessary but not sufficient for predicting behaviour (Ajzen, 2012).

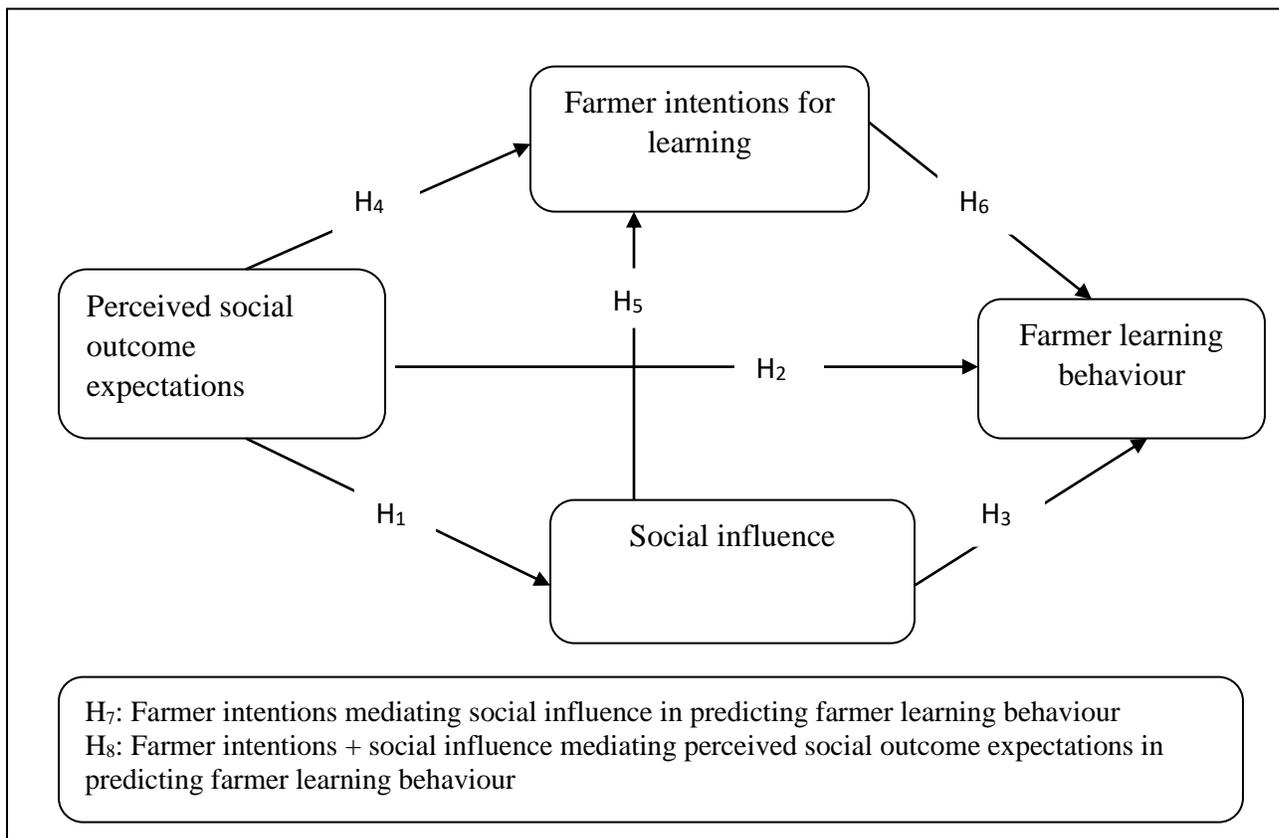


Figure 5. 1: Hypothesized relationships in social cognitive drivers of farmer learning

Intentions are assumed to depend, among other factors, on beliefs that link a given behaviour to certain outcomes and on the perceived social pressure to perform the behaviour (Menozzi et al., 2015). In this study, farmers' formation of intentions is operationalized as the formulation of plans and intention to try out the farming competencies 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 the behaviour, the more likely the individual will engage in the learning behaviour (Ajzen et al., 2009). Thus, the hypotheses below were derived:

H₄: Host farmers' perceived social outcome expectations positively influence the formation of intentions for learning.

H₅: Social influence on host farmers positively influences the formation of intentions for learning.

H₆: Farmers' formation of intentions for learning positively influences farmer learning behaviour.

Lastly, farmer learning behaviour refers to learning activities, namely 1) seeking information, i.e., searching for information (Wilson, 2000) from university students, 2) knowledge sharing, i.e., exchange of information, skills or expertise (Hasmath & Hsu, 2016), 3) seeking feedback from university students concerning the way they effect learning, and 4) giving feedback to university students regarding what they (students) discuss with farmers. Based on the above theories and literature, the following hypotheses on farmer intentions mediating social influence and perceived social outcome expectations in predicting farmer learning behaviour were also derived:

H₇: Formation of learning intentions mediates the relationship between social influence and farmer learning behaviour

H₈: Formation of learning intentions mediates the relationship between perceived social and farmer learning behaviour

5.3 Methodology

5.3.1 Research design and sample selection

A cross-sectional survey was conducted on a sample of farmers purposively selected from the previous host farmers in the student-to-farmer university outreach of GU. These farmers had participated in hosting either undergraduate or graduate or both types of students in the outreach program during 2007–2016. In this study area, the undergraduate students of GU commute to and from the farming households for a period of not less than a year (Kalule et al., 2016a). For the graduate students, the focus is on working with farmer groups and organizations, an approach that allows these students to reach a large number of farming households, for a period of 2–3 months. Participant farmers were drawn from two neighbouring districts of Gulu and Omoro. From Gulu District, two sub-counties namely Paicho and Bungatira were purposively selected for the sampling of respondents because of relatively higher numbers of previous host farmers of university outreach students compared to other sub-counties. Similarly, two sub-counties of Koro and Bobi from Omoro District were selected for the same reason as in the case of Gulu District. The method suggested by Krejcie and Morgan (1970) for estimating sample size was followed. Accordingly, the estimated sample size was 274; however, it was adjusted to 283 to cater for any possible dropping out of study participants. Proportional sampling was applied to distribute the sample between the selected districts to ensure representativeness.

5.3.2 Data and data sources

Four constructs were measured using the rating scale and these include: farmer learning behaviour, farmers' formation of intentions, social outcome expectations and social influence. Farmer learning behaviour, the dependent variable, comprised of seven items modified and adapted from Edmondson (1999) capturing the elements of information seeking, knowledge sharing, feedback seeking and giving feedback (Table 5.1). A sample item from the domain of information seeking reads as follows: 'I seek information on farming practices from university students. All items were rated on a 5-point scale (1–5, where 1 = not at all and 5 = always). The construct of formation of farmers' intentions, the mediating variable, was measured on a scale of four items adapted with modifications 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 as follows:

‘I plan to analyze records at my farm to identify any sources of success’. The items were rated on a 5-point Likert scale (i.e., 1–5, where 1 = unlikely and 5 = most likely).

Table 5. 1: operationalization of constructs on social cognitive drivers of farmer learning behaviour

Construct	Indicators	Scale definition
Perceived social outcome expectations [Adapted from Wójcicki et al., 2009]	peer expectations of better farm yields, product quality & income upon involvement in SFUO	1-5 point scale; 1 = Strongly Disagree & 5 = Strongly Agree
Social influence [Adapted from Ajzen, 2002]	Social encouragement, social persuasion	1-5 point scale; where 1 = Does not Correspond & 5 = Corresponds exactly
Farmer learning intentions	Planning & try out learning	1-5 point scale; where 1 = unlikely & 5 = most likely
Farmer learning behaviour	a) Seeking Information, b) knowledge sharing; c) seeking & d) giving feedback	1-5 point scale; where 1 = not at all & 5 = always

This study had two psychosocial antecedents: social outcome expectations and social influence. The antecedent of social outcome expectations was adapted and modified to suit the study context from a previously tested scale (Wójcicki et al., 2009). This construct comprised three items capturing the elements that the farmers learn, namely farming practices, postharvest handling and produce marketing. These elements were related to improvement in farm yields, produce quality and farm incomes. A sample item reads as follows: ‘I expect learnt knowledge on postharvest handling to make the quality of my produce more socially acceptable’. All items were rated on a 5-point Likert scale (1–5, where 1 = strongly disagree and 5 = strongly agree). Finally, for the construct of social influence, the scale was adapted and modified from Ajzen (2002), capturing the elements of social persuasion (influence) from members of the community. A sample item of the construct reads as follows: ‘Farmers whose opinion I value influence me to practice learnt knowledge on crop storage from university students’. The four items on social influence were rated on a 5-point Likert scale (1-5, where 1 = does not correspond at all and 5= corresponds exactly).

5.3.3 Data analysis

Data were cleaned and transferred to the SPSS–AMOS version 23 for Structural Equation Modeling (SEM). First, the means, standard deviation and percentages for describing the sample characteristics were computed from the social demographic factors. In addition, descriptive statistics were generated for the four constructs. Second, correlates were generated for two reasons: (1) to establish before SEM analysis whether the relationships between the constructs for the study existed and (2) to assess before further analysis whether a risk of multicollinearity existed amongst the constructs. A key precondition for ruling out the possibility of multicollinearity affecting the sound interpretation of SEM results is that there should be no more than two correlates that are above the minimum threshold value of 0.6 (Hamilton, 2006).

The SEM for path analysis followed a three-step procedure: data reduction, evaluation of the measurement model and Confirmatory Factor Analysis (CFA). In the first step, data reduction was done using Exploratory Factor Analysis (EFA) that reduced the number of measurement items in each construct to only those that exhibited the best fit. The reason for the EFA procedure was that all the constructs used in this study had been adapted and modified for the current study, which differed from the study contexts in which they were initially developed and tested. In the EFA, measurement items that exhibited cross-loading in different components in an iterative process were dropped. In the second step, the measurement model was evaluated for internal consistency, convergent validity and discriminant validity. This was done through the examination of construct reliability, factor loadings and Average Variances Extracted (AVE) as well as the comparison of the correlates between the constructs with square roots of AVE, respectively. In the third step, the structural model was assessed to determine the strength of the hypothesized relationships between the latent variables.

In the SEM, the common indices for assessing model fit were used following the criteria for baseline cut-off points (Bhatti, Sharrifah, & Battour, 2014). The goodness-of-fit indices included the ratio of Chi-square to degrees of freedom (Chi_Sq/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). Besides path coefficients, SEM in AMOS generates bootstrapping results of standardized effect sizes, which are important for examining the practical relevance of the relationships between the constructs. In behavioural science, it has been argued that it is important to evaluate effect sizes (β) in addition to regression

coefficients to explain the practical meaningfulness of the results (Medina M. N., 2017). Effect size refers to the degree to which the phenomenon being studied is present in the population (Cohen, 1988). Accordingly, the criterion for determining the practical relevance of the results of $\beta = 0.2$ (Ferguson, 2009) was applied. The study further applied the criteria for evaluating effect sizes suggested by Cohen (1988). The Cohen criteria indicate that the magnitudes of such effect sizes are considered small if $\beta \leq 0.1$. These effect sizes are medium in size, if $\beta \leq 0.3$, and they are large if $\beta \geq 0.5$.

5.4 Results and discussion

5.4.1 Sample characteristics

Survey results indicate that up to 65% of outreach program participants hail from the Gulu District. As such, 181 participants representing 64% (Paicho Sub county = 94 and Bungatira Sub county = 87) were sampled from Gulu District, and 102 farmers representing 35% (Koro Sub county = 61 and Bobi Sub county = 41) were sampled from Omoro District. The characteristics of the selected sample-based means (M) and standard deviations (SD) are as follows: the experience of the household head in hosting university students in years (M = 2.18, SD = 1.99), the distance of the household from the university in km (M = 12.60, SD = 8.86), the farming experience of the household head in years (M = 23.20, SD = 15.15) and the age of the 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 post-primary education (33.9%). Concerning the sex of the household heads, females constituted 35.3% of the sample, and the rest were male.

5.4.2 Testing social cognitive constructs for SEM analysis

The results of the descriptive statistics and correlation analysis of the constructs used in this study are presented in Table 5.2. The results show that the respondents rated the construct of perceived social outcome expectations the highest (M = 4.606, SD = 0.614). The least rated construct was farmer learning behaviour (M = 3.992, SD = 0.860). For the other two constructs, farmers rated the construct of formation of intentions for learning the second highest (M = 4.225, SD = 0.837) while the second lowest rated construct was social influence (M = 4.080, SD = 0.851). Correlation analysis results show that all the constructs in this study were related to each other but of varying degrees.

Table 5. 2: Descriptives and correlates of social cognitive determinants of farmer learning

Variables	Mean	SD	CR (ρ)	AV E	Correlations			
					1	2	3	4
1. Perceived social outcome expectations	4.606	0.614	0.955	0.579	0.761 ^a			
2. Social influence	4.080	0.851	0.931	0.581	0.503**	0.762 ^a		
3. Farmers' formation of intentions	4.225	0.837	0.918	0.651	-0.005	0.224**	0.807 ^a	
4. Farmer learning behaviour	3.992	0.860	0.936	0.529	0.409**	0.511**	0.278**	0.727 ^a

** means significant at $P < 0.01$, all figures on the diagonal = \sqrt{AVE}

Significant correlates were found in the following relationships: perceived social outcome expectations and social influence ($r = 0.503$, $P < 0.01$), perceived social outcome expectations and farmer learning behaviour ($r = 0.409$, $P < 0.01$) as well as social influence and formation of intentions ($r = 0.224$, $P < 0.01$). Other significant correlations were between social influence and farmer learning behaviour ($r = 0.511$, $p < 0.01$) and the formation of intentions and farmer learning behaviour ($r = 0.278$, $P < 0.01$).

Table 5. 3: Estimates of factor loadings in the social cognitive model of farmer learning

Item	Standardized factor loadings			
	FLB	FFI	PSOE	SI
I seek information on farming practices from university students (IS_5).	0.667			
I seek information on produce marketing from university students (IS_13).	0.681			
I share the knowledge of new ideas of farming practices with university students (KS_5).	0.738			
I share the knowledge of postharvest handling with university students (KS_9).	0.716			
I seek feedback on produce postharvest handling from university students (FS_9).	0.791			
I give feedback on farming business plans to university students (PF_1).	0.755			
I give feedback on new ideas of farming practices to university students (PF_5).	0.734			
I plan to take records of the farming activities on my farm (IE_2).		0.700		
I plan to analyse records at my farm to identify any sources of success (IA_2).		0.842		
I plan to think through the records at my farm on what has gone well in the previous year (IC_3).		0.874		
I will try to use the records of my farm for making future decisions (IT_3).		0.800		
I expect the learnt knowledge on farm practices to improve my performance to the level more valued by other farmers (POS_1).			0.667	
I expect the learnt knowledge on postharvest handling to make the quality of my produce more socially acceptable (POS_5).			0.851	
I expect the learnt knowledge on farming business plans to put me at ease with other people of high incomes (POS_13).			0.754	
Farmers in my community influence me to share with others the learnt planting knowledge from university students (FM_1).				0.675
Farmers in my community influence me to share with others the postharvest handling knowledge from university students (PH_1).				0.883
Farmers whose opinion I value influence me to practise the learnt crop storage knowledge from university students (PH_5).				0.717
Farmers in my community influence me to share with others the knowledge on the marketing of crop produce from university students (PM_1).				0.759

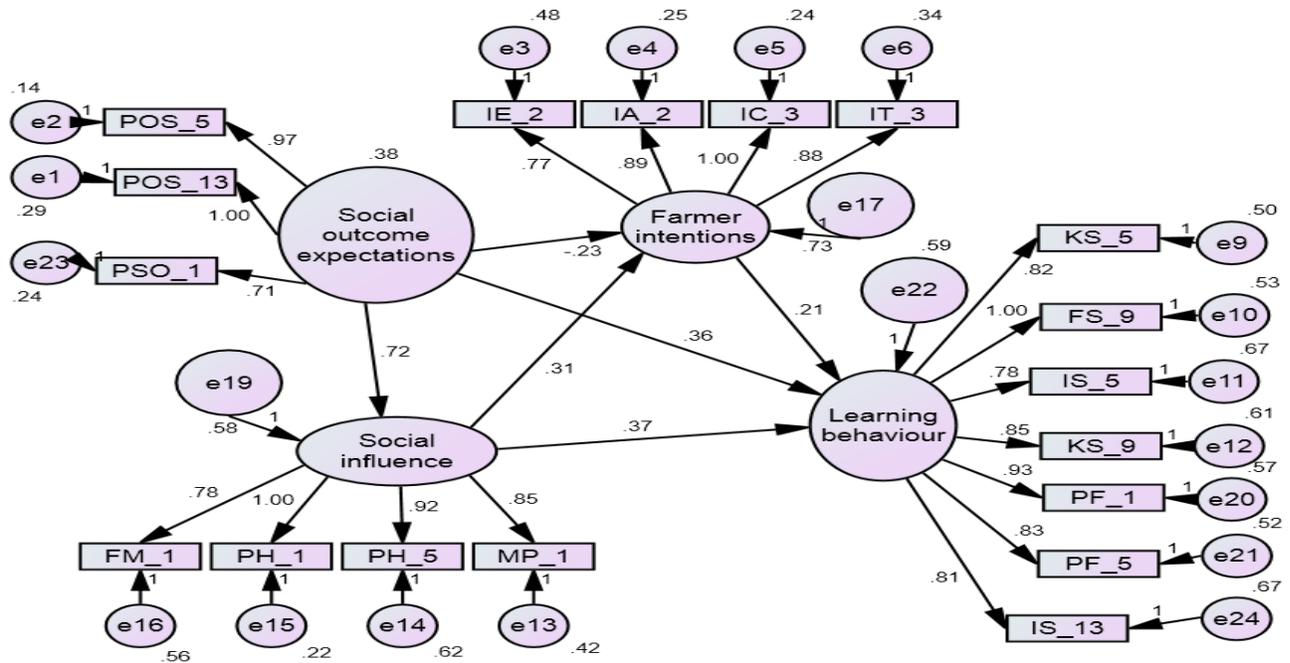
FLB = Farmer learning behaviour, FFI = Formation of intentions, PSOE = Perceived social outcome expectations, SI = Social influence

Still in the correlation analysis, the only non-significant relationship was found between perceived social outcome expectations and the formation of intentions for learning ($r = -0.005$, $P > 0.05$). Since all relationships had correlates that were less than the value of 0.6, it meant that the assumption of no risk of multicollinearity was confirmed. The results of internal consistency assessment i.e. construct reliability (CR) revealed that all constructs exhibited sound measurement validity. Perceived social outcome expectations (CR = 0.955) had the highest value of construct reliability while farmers' formation of intentions (CR = 0.918) was the lowest. Given that all the CR indices were above the recommended minimum threshold of 0.70, then measurement validity amongst the study constructs was confirmed. Similarly, convergent validity assessed using both standardized estimates of factor loadings (Table 5.3) and AVE (Table 5.2) was adequate.

The precondition for attaining convergent validity is that the estimates in either case of factor loadings and AVE must be above the minimum threshold of 0.50 (Bhatti et al, 2014). In this study, the factor loadings in the four constructs ranged from 0.667 to 0.883. The AVE values ranged from 0.579 for perceived social outcome expectations (the lowest) to 0.651 in formation of intentions (the highest). These findings confirmed that the precondition of convergent validity was met. Lastly, the comparison of correlates amongst constructs with the values of the square root of AVE revealed adequate discriminant validity. The precondition is that the square root of AVE values must be greater than the correlates. In this study, all the values of the square root of AVE indices that ranged from 0.727 (farmer learning behaviour) to 0.807 (formation of intentions for learning) were greater than the correlates. This meant that the intra-construct variance was greater than the inter-construct variance, justifying construct distinctness, and thus, discriminant validity was confirmed. The results of confirmatory factor analysis (Figure 5.2) show that the specified structural model yielded SEM results that depicted adequate model fit.

5.4.3 Confirmatory factor analysis and hypothesis testing

The comparison of model goodness of fit indices with baseline values (spec.) as articulated in Bhatti et al. (2014) revealed adequate fit (Figure 5.2).



Goodness-of-fit indices: Chi-sq = 190.9; df = 113; Chi_sq/df = 1.48; GFI = 0.93; AGFI = 0.91; TLI = 0.97; CFI = 0.97; RMSEA = 0.04; R-Square = 0.33; Variable acronyms (e.g. KS 5) are as described in Table 5.2

Figure 5. 2: Path diagram of social cognitive drivers of farmer learning behaviour

The ratio of chi-square to the degrees of freedom (chi-sq/df) = 1.48 (spec. ≤ 3) together with GFI = 0.93 (spec. ≥ 0.90) and AGFI = 0.91 (spec. ≥ 0.90) met precondition specifications. Similarly, the preconditions of goodness-of-fit were met for the following indices: TLI = 0.97 (spec. ≥ 0.95), CFI = 0.97 (spec. ≥ 0.95), and RMSEA = 0.05 (spec. ≤ 0.08). The R^2 at the dependent variable was .33, meaning that social cognitive predictors specified in this study explained up to 33% of the total variation observed for farmer learning behaviour in the student-to-farmer university outreach.

Table 5.4 presents results of hypothesis testing for prediction relationships amongst social cognitive factors that influence farmer learning behaviour, whereas the bootstrapping results of the post-hoc analysis using standardized effect sizes are presented in Table 16. Concerning the path analysis, the results showed that perceived social outcome expectations of host farmers was a significant predictor of social influence ($\beta = 0.717$, $t = 7.090$, $P < 0.01$), supporting H_1 . Similarly, perceived social outcome expectation was a significant predictor of farmer learning

behaviour ($\beta = 0.227$, $t = 1.978$, $P < 0.05$), a finding that was in support of H₂. Further, social influence was a significant predictor of both farmer learning behaviour ($\beta = 0.372$, $t = 4.448$, $P < 0.01$) and farmer's formation of intentions for learning ($\beta = 0.306$, $t = 3.695$, $P < 0.01$). These two findings were thus in support of hypotheses H₃ and H₅ respectively. Lastly, farmer formation of intentions were a significant predictor of farmer learning behaviour ($\beta = 0.214$, $t = 3.254$, $P < 0.01$) hence supporting H₆.

However, perceived social outcome expectation was not a significant predictor of farmers formation of intentions ($\beta = -0.227$, $t = -1.885$, $P > 0.05$), meaning that H₄ was not supported. As the construct of perceived social outcome expectations predicts social influence, it means that the result is in conformity with the theoretical expectation. This is because with the assumption of reciprocal influences of SCT between cognitive factors and environment factors, either the construct of social outcome expectations or social influence can predict the other (Anderson et al. 2006).

Table 5. 4: Testing of hypotheses of social cognitive drivers of learning behaviour

Path	Path Est., β (S.E)	t-value	Hypothesis Testing Decision
H ₁ : Per. social outcome expectations→Social influence	0.717 (0.10)	7.09**	Supported
H ₂ : Per. social outcome expectations→Farmer learning behaviour	0.227 (0.12)	1.98*	Supported
H ₃ : Social influence→Farmer learning behaviour	0.372 (0.08)	4.45**	Supported
H ₄ : Per. social outcome expectations→Farmer formation of intentions	-0.227 (0.12)	-1.89	NS.
H ₅ : Social influence→Farmer formation of intentions	0.306 (0.08)	3.70**	Supported
H ₆ : Farmer formation of intentions→Farmer learning behaviour	0.214 (0.07)	3.25**	Supported

* and ** = $P < 0.05$ and $P < 0.01$ respectively; Per. = Perceived; NS = Not supported.

The result is also in agreement with related studies on the role of outcome expectations on farmer behaviour, particularly, the continued usage of technologies (Spaulding, Tudor, & Mahatanankoon, 2015). The positive influence of social outcome expectations on farmer learning behaviour was also in conformity with theory as explained in the study of Dewar et al. (2012). Similarly, the positive effect of social influence on farmer learning behaviour corroborated with the results reported in the study of Zeweld et al. (2017) which indicates that social support predicted farmer behaviour. However, the results on social influence in significantly predicting the formation of intentions differed from a related study by Menozzi et al. (2015) who reported insignificant findings. Lastly, the positive influence of formation of

intentions on farmer learning behaviour also matched the findings from earlier studies that have reported that formation of intentions influences learning behaviour (Ajzen et al., 2009).

The findings of the current study, particularly those pertaining to the role of social outcome expectations and social influence, are in agreement with the line of thinking suggested by Sewell et al. (2017). The argument in Sewell et al. (2017) study supports the view that new extension approaches exploit the social cognitive environment of farmers for long lasting learning and uptake of innovations. It has been suggested that farmer learning is embedded in their social interactions as a community of learners (Sewell et al., 2014). Therefore, it can be argued that in the context of student-to-farmer university outreach, actual farmer learning behaviour is influenced by the social reactions from peers that the participation in student outreach activities may bring improved benefits to the target communities. Second, for social influence, the host farmers perceive their peers, in farmer groups, the community and other people whose opinions they value, to expect and approve their decisions of participating in the student-to-farmer university outreach. This finding is in agreement with the argument by De Snoo et al. (2012) that social support is important for stimulating farmer behaviour. The influence of these peer farmers can be important for social reinforcements either through positive persuasion (influence) or encouragement to the host farmers. This can be in terms of sharing with other farmers the knowledge learnt from students or putting in practice such knowledge in their farms.

Bootstrapping results presented in Table 5.5 show that the indirect standardized effects for the formation of intentions ($\beta = 0.061$, 95%CI = 0.019 ~ 0.143) in the mediation relationship between social influence and farmer learning behaviour were statistically significant. Thus, H₇ that farmers' formation of intentions for learning mediates social influence in predicting farmer learning behaviour was confirmed. Further, social influence together with farmers' formation of intentions mediated perceived social outcome expectations in predicting farmer learning behaviour ($\beta = 0.174$, 95% CI = 0.074 ~ 0.299). This mediation was statistically significant; thus, H₈ was confirmed. The result suggests that based on farmer social cognition perspective, perceived social outcome expectation is a strong initiator of farmer learning behaviour, and this antecedent is mediated by social influence and formation of intentions in the student-to-farmer university outreach. Apart from the relationship between perceived social outcome expectations and farmers' formation of intentions (H₄: $\beta = -0.005$, 95%CI = -0.123 ~ 0.122), all other effect sizes conformed to the criterion of practical relevance as suggested by Medina (2017). The

biggest effect size was detected in the relationship between perceived social outcome expectations and social influence ($H_1: \beta = 0.503, 95\%CI = 0.357 \sim 0.634$). This finding was significantly different from zero and met the criterion of large effect size suggested by Cohen (1988). This meant that within the study population, perceived social outcome expectations predict more than 50% of the total variation in social influence.

Table 5. 5: Bootstrapping and mediation analysis in social cognitive drivers of farmer learning behaviour

Path	Standardized Effects			Bias-corrected (95% CI)	
	Direct	Indi.	Total	Lower	Upper
H ₁ : Per. social outcome expectations→Social influence	0.503	-	0.503	0.357	0.634
H ₂ : Per. social outcome expectations→Farmer learning behaviour	0.235	0.174	0.409	0.233	0.569
H ₃ : Social influence→Farmer learning behaviour	0.348	0.061	0.409	0.226	0.577
H ₄ : Per social outcome expectations→Farmer formation of intentions	-0.158	0.152	-0.005	-0.123	0.122
H ₅ : Social influence→Farmer formation of intentions	0.303	-	0.303	0.128	0.495
H ₆ : Farmer formation of intentions→Farmer learning behaviour	0.201	-	0.201	0.066	0.352
H ₇ : Social influence→Formation of intentions→Farmer learning behaviour	-	0.061	0.061	0.019	0.143
H ₈ : Per. social outcome expectations→Social influence + Formation of intentions→Farmer learning behaviour	-	0.174	0.174	0.074	0.299

This new piece of evidence suggests that perceived social outcome expectation was an important factor for social influence amongst the host farmers of students during community outreach. It means that social outcome expectations stimulate social reinforcements among host farmers to engage in learning behaviours with students. It is therefore worth arguing that beliefs, among members of the farmer communities, that learning from university students brings improvement in farm yields, quality of farm products and farm incomes are important for achieving lasting relationships in university-community linkages. These beliefs can stimulate social influence, including social persuasion and encouragement from peers to host farmers to embrace university student outreach as a platform for farmer learning.

The second biggest effect sizes were detected in two prediction relationships: perceived social outcome expectations and farmer learning behaviour ($H_2: \beta = 0.409, 95\%CI = 0.233 \sim 0.569$) as well as social influence and farmer learning behaviour ($H_3: \beta = 0.409, 95\%CI = 0.226 \sim 0.577$). The two findings were above the medium size criterion ($\beta = 0.3$) but still less than the large effect size ($\beta = 0.5$). These two findings imply that both perceived social outcome expectations and social influence predict (each separately, and holding other factors constant) up to 41% of the variation in farmer learning behaviour. The results also show that social influence ($H_5: \beta =$

0.303, 95%CI = 0.128 ~ 0.495) predicts more than 30% of the variation in farmers' formation of intentions. The result met the criterion of medium effect size. Lastly, farmers' formation of intentions (H_6 : $\beta = 0.201$, 95%CI = 0.066 ~ 0.352), predicts 20.1% of the variation in farmer learning behaviour. Accordingly, it is bigger than small effect size ($\beta = 0.1$) but still less than the medium size criterion.

The role of social influence in predicting farmer intentions and actual learning behaviour detected in this study corroborates well with the results reported in the study by Zeweld et al. (2017). Previous research suggested that host farmers perceived that the quality of knowledge as well as the attitudes that university students exhibit during field/farm placement are important factors for farmer-level learning during the student-to-farmer university outreach (Kalule, Sseguya, Ongeng, & Karubanga, 2019). Further, previous research has shown that host farmers exhibit considerable motivation for learning if there is sufficient faculty supervision support to students while on field attachment (Darishah et al. 2017). Both the student- and faculty-based factors are intervention factors that originate from the university. However, the results from the current study suggest that student- and faculty-based factors, as perceived by host farmers, may not be the only relevant drivers of farmer learning in university student outreach. In addition to these factors, the social environment (for instance, social approvals) in which the host farmers are embedded is equally important for farmer learning. It can be argued that farmer perceptions of social outcome expectations and social influence cannot be ignored for farmer learning, rather complement the perceived quality of student knowledge and attitudes as well as faculty supervision support in the SFUO.

5.5 Conclusions and recommendations

This study underscores the importance of the perceived social outcome expectations and social influence as factors that determine farmer learning behaviour in a student-oriented university outreach format. It has been demonstrated that the construct of social outcome expectations is positively and significantly related to both social influence and farmer learning behaviour. It has also been shown that social influence significantly predicts both the formation of learning intentions and farmer learning behaviour. In all, both social influence and the formation of intentions mediate social outcome expectations in predicting farmer learning behaviour. The results indicate some degree of dependence of farmer learning behaviour on non-personal factors, particularly within the host farmer social environment.

The findings in this study suggest that paying attention to the social setting of host communities is important for achieving learning in student-to-farmer university outreach. Particularly, the social reactions anticipated by the host farmers of university students are important for their effective participation in university outreach. The construct of social outcome expectations is related to social influence (in the form of social persuasion and encouragement) and together, the factors stimulate active engagement of host farmers in learning activities facilitated by university students. It then follows that the social setting of the host farmers is critical for student-to-farmer university outreach in a sense that it can generate social reinforcements for effective farmer learning if well exploited. Meaningful farmer learning can also be negatively affected if student deployment to the communities and actual student outreach activities are not sensitive to the social cognitive environment in which the host farmers are embedded.

This study contributes to the further development of the social cognitive theory as well as practice. It has successfully applied two constructs of SCT, namely perceived social outcome expectations and social influence. These constructs have been used to assess the influence of social cognitive environment on farmer learning behaviour in student-to-farmer university outreach. Indeed, the results suggest that farmers' social cognitive environment cannot be taken for granted in pursuit of farmer learning in student-oriented outreach approach. Strategic targeting of these social cognitions can easily guarantee sustainable university–community linkages. From a practical perspective, the outcomes of this research give an impression that understanding the social context of the host communities is critical for designing an effective university outreach program that impacts on the learning of these communities. The key elements of farmers' social cognitive environment which the managers of outreach programs should not overlook are host farmers' expectations of social reactions for their participation in outreach activities of university students. These social expectations, if positive, are likely to stimulate social persuasions and reinforcements from peers to host farmers in support of learning. Thus, managers of university outreach programs should devote efforts to prepare students to be sensitive to the concerns of the community as a whole, rather than just the host farmers. For instance, outreach managers should organize community sessions to explain the objectives and procedures of student–community attachments before concentrating on individual host farmers. Similarly, an exit strategy should be planned to be shared with the community members on what was achieved during the student involvement period. If such a process is well

managed, host communities may easily appreciate the efforts of the managers of university outreach and consequently trigger the social reinforcement of farmers to learn from students. As the current study focused only on the positive social outcome expectations, future research should examine the negative aspects of the social outcome expectations of host communities in student-oriented university outreach. It is presumable that negative expectations may influence student involvements. Further studies can re-examine the influence of social outcome expectations on farmers' formation of intentions for learning. This is because the relationship turned out to be insignificant in the current study. Such a study can be done using datasets drawn from an environment that is different from the current study context.

5.6 Study limitations

As earlier mentioned in the methodological section, it is worth pointing out that this study relied on one instrument to collect primary data from host farmers of SFUO. Also, the data used for analysis were self-reported responses from host farmers of student outreach activities. Since opinions of students who worked with host farmers are excluded from data used in this study, then a potential bias that arises because of no data triangulation could not be completely ruled out in the results used to derive conclusions and recommendations. In addition, it was not possible to separate the differences in the effects of graduate and undergraduate student involvement with farmers. This makes it difficult for the current study to be generalized to situations of monolithic systems of student university outreach. Secondly, the study was conducted in two neighbouring districts with relatively similar social agro-ecological conditions. This limitation can be overcome in the future by replicating the research design employed in the current study to include regions with varying social cultural and agro-ecological conditions.

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CHAPTER SIX

GENERAL DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

6.1 General discussion

In recent times, calls for universities to become more actively engaged in community outreach have intensified, amidst widespread criticisms that in many universities, the aims and operations are disconnected from the development needs of society (Makkawi, 2013). This has meant that universities, especially in African, fail to create mutually beneficial partnerships with external stakeholders for purposes of reciprocating knowledge for learning, joint research and innovation (Blackie, 2016). Notably, university staff and student are not well oriented to engage local communities for joint learning and as such, they tend to miss out on the opportunity of tapping into indigenous and practice-based knowledge. On the other hand, the detachment of universities from host communities means that researched knowledge, technologies and innovations generated in universities are barely disseminated to end users for learning (Jacob et al., 2015; Cloete & Maassen, 2015). In the context of agricultural universities, most especially in Sub Saharan Africa, a number of scholars argue that outreach functions, are not well developed for stimulating meaningful farmer learning behaviour (Muriisa, 2015; Kraemer-Mbula, 2014). For instance, faculty staff including those at Gulu University tend to lack resources and the requisite competences for managing the student-to-farmer university [SFUO] (Blackie, 2016; Thoron, Barrick, Roberts, & Samy, 2018). This has serious implications on farmer learning at grassroots level. Generally, an assessment of the SFUO has revealed that a knowledge void exists on the role of contextual factors and farmer psychosocial environment in farmer learning behaviour.

The purpose of this study was to establish how psychosocial factors influence farmer learning behaviour in the student outreach formats. Specifically, it sought to elucidate on what contextual factors (as an environment in which the SFUO is implemented) determine differences in the elements of farmer learning behaviour and whether there are perception differences between extension services and student outreach programs. It also focused on the role of facilitating conditions in the SFUO since the quality of faculty supervision to students as well as student attitudes and knowledge might be important enablers or barriers for farmer learning behaviour. In addition, stimulation of farmer motivation is important for farmer learning in the SFUO. Thus, this study assessed whether the SFUO program stimulates motivation at farm-level for the

desired farmer learning behaviour. Lastly, this research examined the influence of social cognitive factors on farmer learning behaviour since the social environment in which the farmer is embedded might or might not be supportive of the SFUO activities.

For contextual factors, results show that farmstead distance to the university significantly differs for learning behaviour elements of knowledge sharing and giving feedback. Particularly, results have demonstrated that farmers within relatively short distance to the University exhibit better learning behaviour compared to their counterparts, a finding also affirmed in previous research (Mashavave et al., 2013). Furthermore, the results reveal that farmer experience in the student outreach program is also important since it determines significant differences in farmer learning behaviour. Notably, the results favour farmers more experienced in student outreach activities for the desirable learning behaviour. It implies that more experienced farmers might be finding the SFUO program useful, and so, are encouraged to exhibit better learning behaviour. Lastly, participation in farm-labour sharing was found to be only significant different in knowledge sharing. This gives an impression that since farmers tend to gather for rotational farm-labour sharing, they might be finding it an opportunity for sharing knowledge that they gain from the SFUO program.

A further examination of the contextual factors of the SFUO shows that host farmers perceive the student outreach program as being better for their own learning behaviour than any of the public agricultural extension, NGO extension, and farmer-to-farmer extension. Particularly, results show significant differences in favour of student outreach activities compared to alternative extension services in all elements of the learning behaviours namely: seeking information, knowledge sharing seeking feedback and giving feedback to facilitators. On the triggers of the above farmer perceptions, it is clear that among host farmers, the student outreach program rates higher than public extension and NGO extension services because of more regular and frequent student visits to farmsteads. It can be argued that preferential perceptions of the student outreach program in host communities compared to alternative extension service providers is mainly due to two critical factors. These factors are: 1) previous under-service from agricultural extension service; and 2) regular and frequent student visits to farmsteads. In addition, when compared with farmer-to-farmer extension, host farmers still perceive the SFUO program to be more beneficial because of expectation of better knowledge from students. Based

on the preferential perception of student outreach program being driven by regular and frequent contacts between students and host farmers, then the public extension systems ought to learn from this. The regular and frequent farm visits, as also evidenced in logbooks of students on outreach, are down to student expectation of assessment for academic grades, an incentive that motivates students. Thus, the public extension can also adapt a logbook system of recording farm visits for assessing and identifying staff deserving rewards, probably in form of promotions and other incentives.

This empirical evidence in this study further underscores the need for policy prioritization of agricultural universities as key players in the provision of agricultural extension service. Importantly, existing capacities (including a large student population) in agricultural universities could be harnessed to complement public agricultural extension structures. Particularly, the findings in the current research agree with previous studies which have reported that public agricultural extension service is characterized by low contact frequency between farmers and extension workers (Barungi, Guloba, & Adong, 2016; Buyinza, Sekatuba, Agaba, Kinuthia, & Kiptot, 2015). It means that the service gap in agricultural extension can be reduced if student outreach programs work alongside public extension systems.

On facilitating conditions, results have revealed that faculty supervision support to students (i.e. mediating student-farmer meetings on farmsteads, providing supplementary knowledge as students engage host farmers and follow up visits to students at farmsteads) is the single most important factor for formation of learning intentions and the resultant farmer learning behaviour. Indeed, faculty supervision support accounts for about 34% and 23% of total variation in farmer intentions for learning and the actual learning behaviour respectively. This result corroborates studies conducted by Emslie (2010) and Erickson (2010) which established that supervision support by university staff is critical for active engagement of the students with host communities. The results in the current study also show that faculty supervision support to students has a positive and significant relationship with farmer perception of the quality of student attitudes (e.g. good student conduct and affection towards farm work). In turn, student attitudes are positively related to farmer perception of the value of learning content from the student outreach programs. This piece of evidence affirms that faculty supervision support to students is important for the kind of attitudes that students exhibit while on farm placement. Yet,

these student attitudes have implications on the worthiness that host farmers attach on student knowledge. This, in turn, is important for the quality of learning behaviour that the host farmers exhibit towards student outreach programs. The implication of these findings is that if policy prioritization in agricultural universities targets improved logistics to community outreach, then faculty staff would efficiently supervise student outreach programs to provide services for grassroots innovation.

For motivation factors, results show that satisfaction of relatedness learning needs stimulates intrinsic motivation among host farmers. Satisfaction of relatedness learning needs also posts positive and significant effects on the formation of intentions for learning and eventual farmer learning behavior. The results support findings in earlier studies conducted by Ng et al. (2012) and Van den Broeck et al. (2016) who reported that satisfaction of basic learning needs, as a form of social support, motivates people's learning behaviour. Results from the current study imply that satisfying learning needs including caring for farmer concerns, psychological connectedness of host farmers to students, and matching student knowledge with farmer learning needs is essential for initiating intrinsic motivation. Such intrinsic motivation among farmers is reflected as: 1) enjoyment in associating with the university; 2) experiencing pleasure of learning from students; and 3) feeling satisfaction in applying student knowledge onto their farms. In turn, intrinsic motivation serves as the precursor to farmer learning behaviour in the student outreach program. Therefore, it is arguable that lasting learning relationships in the SFUO at farm-level are more likely to be achieved if students on farm placement exhibit a sense of responsiveness to farmer psychological learning needs.

For social cognitive factors, results show that perceived social outcome expectations and social influence positively and significantly influence farmer learning behaviour. These results are also in agreement with earlier studies (De Snoo et al., 2017; De Snoo et al., 2014) that indicated that social outcome expectations and social influence are important factors for supporting farmer learning behaviours. Such social factors at farm-level are crucial for the uptake of technologies and grassroots innovation (Sewell et al., 2017). Since the two antecedents positively affect farmer learning behaviour, it can therefore be argued that social approval of SFUO activities as well as social encouragement and persuasion from peers to host farmers are vital for eliciting the desired farmer learning behavior. This particular finding suggests that gaining community buy-in

while delivering SFUO activities is important for arousing interest among host farmers and members of the host community. It also stimulates social pressures to peer farmers in support of learning from students. The results on the positive role of social pressures and satisfying relatedness learning needs in farmer learning behaviour suggest implications for curricula of agricultural training programs. In this case, it might be important for agricultural universities to redesign curricula so that the learning content prepares students to deal better with farmer psychology while on farm placement.

In this study, farmer intentions for learning mediated facilitating conditions, motivational and social cognitive factors in influencing farmer learning behaviour. These results corroborate earlier research such as Ajzen (2012) and Ajzen (2009) that farmer intentions are the immediate precursors of the actual behaviour in question. The biggest effect size of farmer intentions was detected in the motivational factors ($\beta = 0.28$), followed by facilitating conditions ($\beta = 0.22$), while the smallest was found in the social cognitive factors ($\beta = 0.20$). The practical relevance of these findings suggests that learning and grassroots innovation in the SFUO program is more likely to succeed if attention is paid to factors that evoke farmer intentions, as plans for effective participation and learning from such outreach programs.

Overall, the results reveal that social cognitive drivers are the most important factors that explain farmer learning behaviour in university outreach. Evidently, the social cognitive drivers collectively account for up to 33% of the total variation in farmer learning behaviour. Ostensibly, this is higher than the variance explained by any of the motivational factors and facilitating conditions research models which account for only 18% and 12%, respectively of the variation in farmer learning behaviour. It re-affirms that community-level support for SFUO rather than host farmers alone is critical for stimulating the best farmer learning behaviour towards student outreach programs as compared to facilitating conditions and individual farmer motivation. A concerted effort is therefore necessary to promote SFUO programs in pursuit of improved service provision in farming communities for grassroots innovation.

6.2 General conclusions

The study set out to investigate the farmer learning behavior using the case of the student-to-farmer university outreach in Northern Uganda. This study reveals that farmstead distance to the university and farmer experience in the student-to-farmer university outreach (SFUO) program

are the most important contextual factors that determine differences in the quality of farmer learning behaviour. It is thus concluded that nearness of the farmstead to the university determines better farmer learning behaviour in the SFUO program. This is attributable to the fact that farming households in the near neighbourhood of the university are easily reached by students and thus, a better chance of frequent contact between the students and the farmers. Further, more experienced farmers in the SFUO program exhibit better learning behaviour than their counterparts. It is also concluded that there are preferential perceptions for student outreach program among host farmers compared to public agricultural extension, NGO extension and farmer-to-farmer extension. Such preferential perception appears to be informed by three factors. These factors are: 1) previous under-service from agricultural extension; 2) more frequent student visits to the farmsteads compared to public and NGO extension services; and 3) the belief that students possess superior knowledge compared to the agents of farmer-to-farmer extension (who also frequently visit farmsteads).

The study also shows that faculty supervision support to students during farm placements is an important facilitating condition that positively impacts on farmer learning behaviour. It thus concluded that the core activities of good supervision of students on farm placement are critical for enhancing successful farmer learning behaviour in the SFUO. Key among the activities that cannot be overlooked include: 1) preparatory meetings between the students and the host farmers being mediated by university staff; 2) faculty staff making regular follow-ups on the student-farmer interactions; and 3) supplementing student knowledge on farm placement and making complimenting comments on student-farmer interactions.

In terms of stimulating farmer motivation for learning during student farm placements, it is clear that satisfying relatedness learning needs is the main factor that initiates the motivational pathway for farmer learning behaviour. Therefore, stimulating motivation for lasting learning relationships in the student-to-farmer university outreach depends on the following: 1) learning situations reflecting psychological closeness of students to farmers, 2) students exhibiting a sense of care for farmer concerns, and 3) matching the learning content from student with farmer learning interests. Finally, in the social cognitive factors, it is evident that perceived social outcome expectations and social influence are important factors for farmer learning behaviour in university outreach. Thus, the study concluded that social outcome expectations that the SFUO

improves farm yields, product quality and farm incomes are associated with desirable farmer learning behaviour. Therefore, it is worth concluding that farmer learning behaviour towards student outreach activities is determined by the contextual setting of the SFUO under question. Further, the success of university outreach in influencing farmer learning behaviour is dependent on a combination of the quality of facilitating conditions in the SFUO coupled with farm-level stimulation of motivation and the social environment that exerts influences on host farmers.

6.3 Recommendations

6.3.1 Policy recommendations

This study has shown that host farmers perceive student outreach formats to be beneficial because of regular and frequent visits to farming households. Further, host farmers, especially in near distance to the university, have preferential perceptions of the student outreach program compared to other public and non-public extension services. Accordingly, this study recommends policy prioritization of student outreach programs in the higher education sector, most particularly in agricultural universities, for better budgetary provision. If budgets for SFUO programs are improved, then these programs might easily: 1) expand frontiers of service provision to reach large numbers of farmers; and 2) complement public and non-public agricultural extension services for better community-based learning and grassroots innovation. For instance, extensions agents can be paired with students who are carrying community outreach so as to reduce the service gap on the part of public extension systems.

It has also been shown that farmer learning from students on farm placement is dependent on the faculty supervision support to students. Yet, host farmers believe that the presence of faculty staff in field attachment is related to the attitudes that student exhibit while on farm placements. This, in turn, is related to the quality of knowledge that these students deliver. Thus, this study further recommends that faculty supervision support to students on farm placement should be made integral to the transformation agenda of the higher education sector. The focus of interventions should be on: 1) provision of better incentives to staff supervising students on farm placement; and 2) capacity building to enhance competences of faculty staff in supervision of students and management of outreach programs. Such interventions might improve efficiency in delivering community outreach for grassroots innovation.

6.3.2 Recommendations for practice

This study has shown that satisfying relatedness learning needs at farm-level stimulates the motivational pathway for farmer learning behaviour. Accordingly, the study recommends that SFUO programs always ensure the following; 1) make farmers feel contact with people (students) who care about their concerns, 2) make host farmers feel that the students are supportive during learning sessions at the farm-level, and 3) student knowledge matches farmer learning needs. It is thus crucial that SFUO programs regularly identify farmer learning needs and prepare students to respond appropriately while on farm placements. It also calls for redesigning curricula of study so as to enhance the content on dealing with farmer psychology. Such training curricula are likely to prepare agricultural students to focus not only on provision of technical knowledge but also satisfying psychological learning needs of host farmers. This particular preparation is also relevant for the students to practice as extension agents upon completion of their studies.

The study also shows that favourable social outcome expectations and social influence improve farmer learning behaviour. Particularly, the study shows that social outcome expectations that participation in the SFUO enhances farm yields, the quality of farm products and farm incomes generates social reinforcements to host farmers for appropriate learning behaviour. Thus, implementation of student farm placements should always strive to gain community support by illustrating the objectives and anticipated benefits of participating in the SFUO. This could be achieved through organizing pre-placement meetings between the students and all members of the host community before zeroing on individual host farmers. Further, upon completion of student field attachment, similar sessions should always be organized for purposes of sharing student field experiences with the wider community as well as taking stock of achievements, shortcomings and what ought to be expected in future.

6.4 Contribution of the study to existing body of knowledge

This research contributes to the existing body of knowledge by providing an analytical model of psychosocial factors that explain farmer learning behaviour in the student outreach program (see figure 6.1 below). This model is an outcome of empirical testing of a conceptual framework of integrated psychosocial theories hypothesized to influence farmer learning behaviour in the SFUO. These theories include: facilitating conditions, self-determination motivation and social cognition theories. Previous research as well as documented practice have always lacked a

holistic view of how contextual factors combine with farmer psychosocial environment to influence farmer learning behaviour in student outreach programs. Thus, this study applies a psychosocial approach that brings together intervention enablers from the university as well as the farm-based and community level factors to analyze farmer learning behaviour in the SFUO program. It demonstrates that in the SFUO, farmer learning behaviour depends on the following factors: 1) the quality of faculty supervision support to students, 2) stimulation of farmer motivation, and 3) the social environment of host farmers. Potentially, the analytical model developed in this study can be applied to many other forms of university-community linkages. It is particularly applicable in programming as well as explaining learning relationships that generate grassroots learning and innovation outcomes.

From a theoretical perspective, the present study has extended the learning behavior model suggested by Edmondson (1999). The Edmondson (1999)'s model emphasizes only four learning activities namely: seeking information, knowledge sharing, seeking feedback and giving feedback.

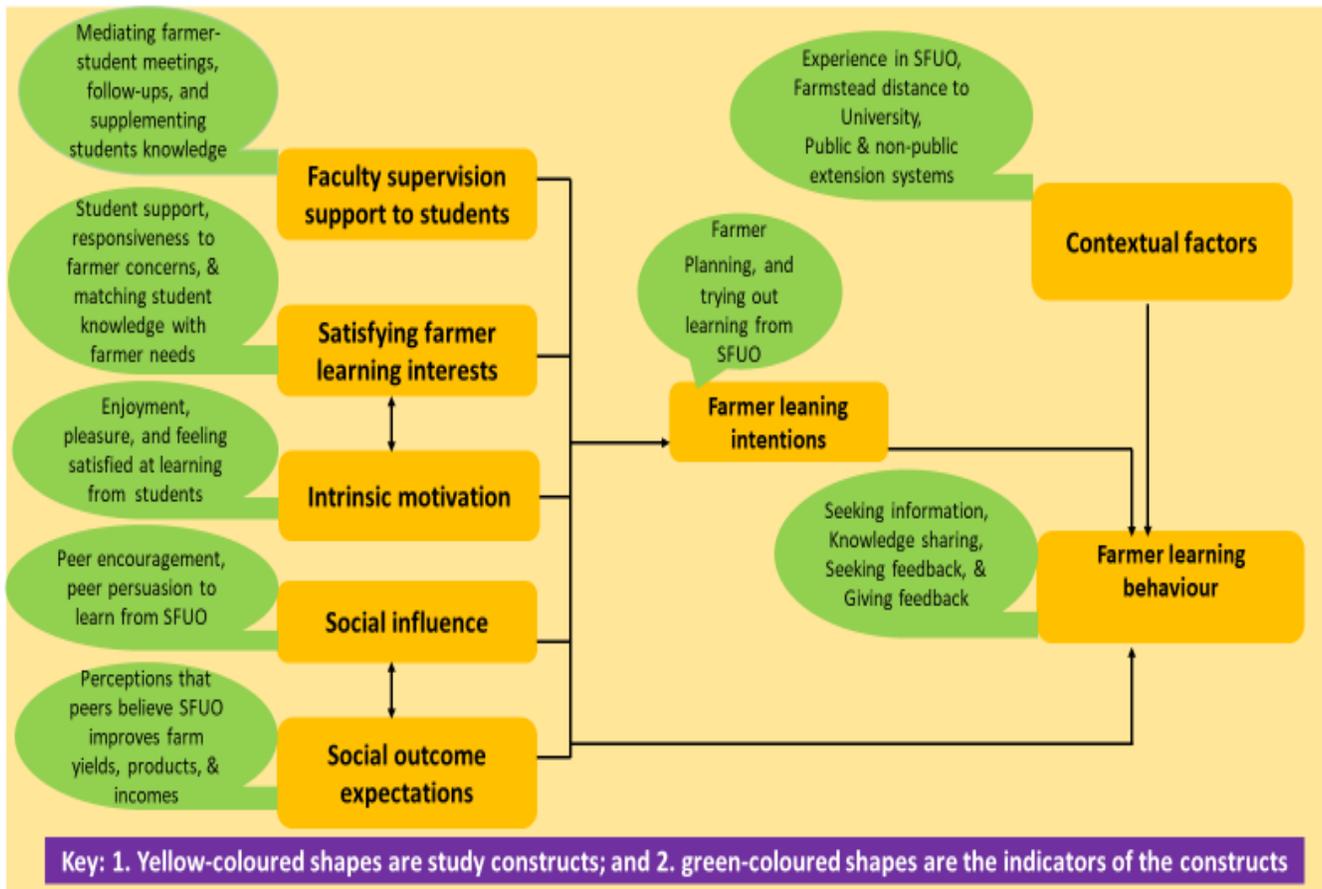


Figure 6. 1 : Analytical model of psychosocial factors explaining farmer learning behaviour in the Student-to-farmer University outreach

Previous research on university-community linkages and most particularly on the student-centered outreach programs (e.g. Grobbelaar et al 2017; Sherrard & Alvarado, 2017), has always seemed to be missing an application of the learning behaviour model. This study contributes by providing a deeper understanding of the farmer learning behaviour. It operationalizes the learning behaviour framework with learning content in the SFUO program including provision of knowledge on: farming business plans, farming practices, post-harvest handling and marketing of farm products. Based on this operationalization, the study demonstrates that contextual factors in the SFUO [1) farmstead distance to the university; and 2) experience of participating in student outreach activities] determine differences in the quality of farmer learning behaviour.

Further, the study extends three theoretical strands with empirical data from the SFUO and these are: 1) facilitating conditions [FC] framework (Teo, 2010); 2) self-determination theory [SDT] (Deci & Ryan, 1985), and 3) the social cognitive theory [SCT] (Bandura, 1977; 1989). In the

FC framework, the study integrates the construct of faculty supervision support to students which had not been previously applied to analyze host farmer learning behaviour. It particularly shows that good quality faculty supervision support [in form of: 1) mediating students and farmers meetings, 2) follow ups at farm-level, and 3) supplementing student knowledge during field attachment] improves farmer learning behaviour in the SFUO. Similarly, much as the SDT has received a lot of attention in physical science and student learning (Haichun & Chen, 2010; Hung et al., 2011), previous research had barely used this theory to assess farmer learning behaviour in the SFUO. The study operationalizes satisfaction of relatedness learning needs (a key concept in SDT) as: student support to farmers during learning sessions, responsiveness to farmer concerns and the matching of student knowledge with farmer learning needs. It has been demonstrated that paying attention to these features in the SFUO is important for stimulating farmer motivation for learning. For the SCT, the study extends two constructs namely social outcome expectations and social influence. It reveals that social outcome expectations in terms of improvement in farm yields, product quality and farm income generate social reinforcements for learning behaviour in the SFUO program. It has been shown that such community buy-in is important for social encouragement and persuasion of host farmers to actively engage in learning activities within the SFUO program.

6.5 Limitations and suggestions for further research

To re-echo, the study solely depended on one instrument, namely; the semi-structured questionnaire to gather primary data. As such, follow up studies using alternative and multiple data collection methods, and possibility in a different locality from the current study area, could be useful in further validation of the study findings. In addition, the data used for analysis were as self-reported from respondents. This means the possibility of exaggerated responses might have impacted on the study results. This study also mainly relied on data collected from farmers. Notably, students along with faculty staff as actors that work with host farmers during farm placements were not consulted and therefore, their opinions have not been integrated in the final analysis. This study thus, recommends a follow up study that takes care of the views of non-host farmer stakeholders for additional insights on the SFUO program. Such an approach will help to further improve on the understanding of student outreach formats and implementation. It is also vital that multi-methods approach that makes use of qualitative and quantitative research methods are used to validate the findings in this study.

It is also important to appreciate that the design and implementation approaches of SFUO programs differ across agricultural universities. For instance, rural-based agricultural universities (with many farming households in the neighbourhood) can easily foster regular commuting of students to and from farmsteads of placement compared to those located in cities. It would be interesting to compare the impacts on host communities of student outreach programs with differing designs. It is also important to compare graduates who come through outreach programs that differ in implementation approaches. A key assumption is that agricultural graduates who complete studies from rural-based universities where students regularly visit farmsteads in the neighbourhood of the university should be differing in competences from those completing at city-based universities when employed as agricultural extension workers.

The current study focused on farmer learning behaviour and the factors influencing it in the SFUO program. It should be noted that farmer learning behaviour is only one step in farmer innovation process and uptake of technologies and practices. It thus important that future studies on the SFUO programs give attention to the latter stage of farmer innovation process in the SFUO, namely; training transfer. Application of the training transfer concepts will help to demonstrate how much farmers put in practice what they learn from the SFUO and what factors actually influence host farmers' ability to transfer training onto their farmsteads.

Lastly, a few constructs posted inconclusive findings. For instance, much as perceived student attitudes and the value of learning content were positively related to faculty supervision support, the former two variables posted insignificant effects on farmer learning behaviour. Similarly, perceived social outcome expectations did not post significant effects on farmers' formation of intentions for learning despite significantly influencing farmer learning behaviour. It is thus necessary that future research re-examine these relationships, possibly, in study contexts different from the student-centered outreach of Gulu University.

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APPENDICES

Appendix A: Respondent’s consent form of confirmation of willingness to participate in the study

**Makerere University
College of Agricultural and Environmental Sciences
Department of Extension and Innovation Studies**

Psychosocial antecedents to farmer learning behaviour in the student-to-farmer University outreach in Northern Uganda

Consent of the Respondent

This study is concerned about assessing factors influencing farmer learning in the student outreach program of Gulu University. As a person who has previously participated in the student outreach activities, you have been selected to share your experiences and opinions with the research team. Information obtained from you will be treated with utmost confidentiality and be used for the purposes of only completing this study. We will not in any way reveal our source of information nor be used for any other activity other than this study or share with any other persons or organizations. I therefore request for your kind consent to participate in this interview and if you agree, kindly confirm with your signature or thumb print in the space below. Your candid responses will highly be appreciated.

Name:

Your signature or thumb print (in case of your consent) in the space below

.....

Appendix B: Data collection instrument

**Makerere University
College of Agricultural and Environmental Sciences
Department of Extension and Innovation Studies**

Psychosocial antecedents to farmers’ learning behaviour in the student-to-farmer University outreach in Northern Uganda

Introduction

My name is..... I am conducting a study examining “*Factors affecting farmers’ learning behavior in the student-to-farmer university outreach in Northern Uganda*”. You are being approached to participate in this study because of our understanding that you have previously hosted students of Gulu University in the student to farmer university outreach program. I appreciate that participating in this interview will require you to reserve time to respond to our study questions. I thank you for accepting to participate in the study.

Background Information

Questionnaire ID: Name of Respondent

Name of Farmer’s group:

Type of student hosted (tick appropriately): Undergraduate Graduate

Farmer’s Village:..... Parish:

Sub County: District:

PART ONE: FARMERS' LEARNING BEHAVIOR

1A. on a scale of 1-4, how would you rank the following sources of learning on your farm? Where 4 = most important, 3=important, 2=moderately important, 1=least important: University students Govt. ext. workers NGO staff Peer farmers

1B. what are the reasons for your ranking in 1A above?

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Farmers' Learning Behaviour: Adapted with modifications from Edmondson A. (1999)

a) Information seeking	University students	Govt. ext. workers	Staff of NGOs	Peer farmers
1C. How would you rate your seeking of information on the subjects given below from each of the following categories of people: university students, government extension workers, staff of non-governmental Organizations (NGOs) and peer farmers? Using a rating scale of 1 to 5 points; where 1 = Not at all and 5 = Always, indicate your rating in the spaces against all the provided categories of people				
I seek information on farming business plans				
I seek information on new ideas on farm field practices				
I seek information on produce postharvest handling				
I seek information on produce marketing				
b) Knowledge sharing	University students	Govt. ext. workers	Staff of NGOs	Peer farmers
1D. How would you rate your knowledge sharing on the subjects given below with each of the following categories of people: university students, government extension workers, staff of non-governmental Organizations (NGOs) and peer farmers? Using a rating scale of 1 to 5 points; where 1 = Not at all and 5 = Always, indicate your rating in the spaces against all the provided categories of people				
I share knowledge on farming business plans				
I share knowledge on new ideas on farm field practices				
I share knowledge on produce postharvest handling				
I share knowledge on produce marketing				

c) Feedback seeking	University students	Govt. ext. workers	Staff of NGOs	Peer farmers
1E. How would you rate yourself on seeking feedback on the subjects given below from each of the following categories of people: university students, government extension workers, staff of non-governmental Organizations (NGOs) and peer farmers? Using a rating scale of 1 to 5 points; where 1 = Not at all and 5 = Always, indicate your rating in the spaces against all the provided categories of people				
I seek feedback on farming business plans				
I seek feedback on new ideas on farm field practices				
I seek feedback on produce postharvest handling				
I seek feedback on produce marketing				
d) Providing feedback	University students	Govt. ext. workers	Staff of NGOs	Peer farmers
1F. How would you rate yourself on providing feedback on the subjects given below to each of the following categories of people: university students, government extension workers, staff of non-governmental Organizations (NGOs) and peer farmers? Using a rating scale of 1 to 5 points; where 1 = Not at all and 5 = Always, indicate your rating in the spaces against all the provided categories of people				
I give feedback on farming business plans				
I give feedback on new ideas on farm field practices				
I give feedback on produce postharvest handling				
I give feedback on produce marketing				

PART TWO: FARMER LEARNING INTENTIONS

Experiential learning intentions: *Adapted from Ajzen (2002; 2006); Machin M. A. and Fogarty G. J. (2004)*

2A. The statements below are intentions farmers tend to make towards learning, how do you rate them in your own situation?					
Use a rating of 1 to 5 points; where 1 = Unlikely and 5 = Most likely	1	2	3	4	5
Concrete experience					
I intend to attend sessions demonstrating farming practices					
I plan to take records of activities on my farmstead					
I will try to keep records of my farming activities					
Analyze					
I Intend to evaluate demonstrated farming practices					
I plan to analyze records at my farm to identify any sources of success					
I will try to review records so as to diagnose the sources of problems on my farm					
Conceptualize					
I intend to think through farming demonstrated					
I plan to use records at my farm to think through what has gone on well in the previous year					
I will try to use records to think through what has failed on my farm in the previous year					
Apply					

I intend to implement farming practices demonstrated on the farms					
I plan to continue taking records of activities on my farm					
I will try to use records kept on my farm for making future decisions					

PART THREE: SOCIAL COGNITIVE FACTORS

On your farm, which of the following activities have you received advisory services on?

- a) Crop production: Yes No if yes go to **section A)** below;
- b) Livestock production Yes No if yes to **section B)** below; and,
- c) If both a) and b) above are “yes”, answer sections A) and B)

1. Social influence: *Adapted from Ajzen (2002; 2006)*

A) Crop farming

3A. The statements below correspond to the crop production tasks learnt from university students, Govt. ext. workers, staff of NGO, and peer farmers that other people you value would support you to implement. Using a rating scale of 1 to 5 points, show the extent to which each statement corresponds for learnt knowledge from university students, Govt. ext. workers, staff of NGO, and peer farmers. Scale: Does not correspond at all = 1; Corresponds a little = 2; Corresponds moderately = 3; Corresponds a lot = 4; Corresponds exactly = 5.				
i) Farm field practices	University students	Govt. ext. workers	Staff of NGOs	Peer farmers
Farmers in my community influence me to share with others learnt planting knowledge				
Farmers whose opinion I value influence me to practice learnt crops husbandry knowledge				
People who are important to me encourage me to apply learnt crop harvesting knowledge				
ii) Postharvest management				
Farmers in my community influence me to share with others postharvest handling knowledge				
Farmers whose opinion I value influence me to practice learnt crop storage knowledge				
People who are important to me encourage me to apply crop processing knowledge (e.g. winnowing, drying, milling, solar drying, and shelling, slicing chips)				
iii) Marketing of farm produce				
Farmers in my community influence me to share with others knowledge on marketing of crop produce				
Farmers whose opinion I value influence me to practice learnt knowledge on marketing of crop produce				
People who are important to me encourage me to apply learnt knowledge on crop				

produce marketing				
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B. Livestock Production

3B. The statements below correspond to the livestock production tasks learnt from university students, Govt. ext. workers, staff of NGO, and peer farmers that other people you value would support you to implement. Using a rating scale of 1 to 5 points, show the extent to which each statement corresponds for learnt knowledge from university students, Govt. ext. workers, staff of NGO, and peer farmers. Scale: Does not correspond at all = 1; Corresponds a little = 2; Corresponds moderately = 3; Corresponds a lot = 4; Corresponds exactly = 5.

i) Farm production	University students	Govt. extension workers	Staff of NGOs	Peer farmers
Farmers in my community influence me to share with others learnt knowledge on livestock housing				
Farmers whose opinion I value influence me to practice learnt knowledge on management of livestock				
People who are important to me encourage me to apply learnt knowledge on collecting livestock products (e.g. eggs, milk)				
ii) Livestock Product Management				
Farmers in my community influence me to share with others learnt knowledge on safe storage of livestock products (e.g. eggs, milk)				
Farmers whose opinion I value influence me to practice learnt knowledge on storage of livestock products (e.g. eggs, milk)				
People who are important to me encourage me to apply learnt knowledge on packaging of livestock products (e.g. eggs, milk)				
iii) Marketing of livestock products				
Farmers in my community influence me to share with others learnt knowledge on marketing of livestock products (e.g. eggs, milk)				
Farmers whose opinion I value influence me to practice learnt knowledge on marketing of livestock products (e.g. eggs, milk)				
People who are important to me encourage me to apply learnt knowledge on marketing of livestock products (e.g. eggs, milk)				

3C. In your opinion, what are the weaknesses in people you value (e.g. family, opinion leaders etc.) in supporting you to share and apply farming knowledge learnt from university students?

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3D. In your opinion, what are the strengths in people you value (e.g. family, opinion leaders etc.) in supporting you to apply and share farming knowledge learnt from university students?

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2. Social outcome expectations: *Adapted with modifications from Wójcicki et al. (2009)*

3E. The statements below concerns your expectations from interacting with university students, Govt. ext. workers, staff of NGO, and peer farmers for learning purposes. Using a rating scale of 1 to 5 points, show in the spaces provided, the extent to which you agree with each statement for university students, Govt. ext. workers, staff of NGO, and peer farmers, where; strongly disagree = 1 and strongly agree = 5

Social outcome expectations – Positive	University students	Govt. extension workers	Staff of NGOs	Peer farmers
I expect learnt knowledge on farm practices to improve my performanceto the level more valued by other farmers				
I expect learnt knowledge on postharvest handling to make the quality of my produce more socially acceptable				
I expect learnt knowledge on marketing to improve produce bulking in my farmers’ group				
I expect learnt knowledge on farming business plans to make me at ease with other people ofhigh incomes				
Social outcome expectations - negative				
I expect participation in trainings to attract social disapproval from my community				
I expect postharvest handling knowledge to contradict messages from other farmers in my community				
I expect marketing knowledge not to improve bulking of produce in my farmers’ group				
I do not expect learning marketing to bring my income to the level of high-income earning people in my community				

PART FOUR: INTRA AND INTERPERSONAL FACTORS

Emotional intelligence: Adapted with modification from Ravichandran (2011) and Schutte et al. (1998)

4A. Using the scale provided below, how would you rate the following statements in describing your situation?					
Use a rating of 1 to 5 points; where 1 = strongly disagree and 5 = strongly agree	1	2	3	4	5
a) Recognition of Emotions					
i) Self-awareness					
I am capable of coming up with new farming ideas					
When I encounter farming problems, solving them is easy for me					
When I experience good farm yield, I get encouraged to work even harder					
ii) Social-awareness					
In the community I live in, I easily know what other farmers are feeling just by looking at them					
I can tell how other farmers are feeling by listening to the tone of their voices					
I can tell how other farmers are feeling by observing their actions					
b) Use of Emotions					
i) Self-management					
I know when to speak about my personal problems to others in my group.					
I motivate myself by imagining a good farming outcome					
I help myself to keep trying new farming methods in the face of difficulties					
ii) Relation management					
In my community, I help other farmers feel better when they are down because of unexpected farming problem					
I compliment my peer farmers when they have done something well					
I present myself in a way that makes a good impression on my peer farmers					

Facilitating Conditions: Adapted with modification from Facilitating Conditions Questionnaire (FCQ) of Fraide et al. (2013);McInerney (2005) and Yeung & McInerney (2000)

4B. I would like to get your opinion on the statements given below using the scale provided					
Use a rating scale of 1 to 5 points; where 1 = strongly disagree and 5 = strongly agree	1	2	3	4	5
a) Perceived value of learning content					
i) Farm field practices					
I think that learning crop farming practices from university students is important to me					
I think that learning livestock rearing practices from university students is important to me					
I think that learning harvesting of produce from university students is important to me					
ii) Postharvest management					
I think that learning storage of crop produce from University students is important to me					
I think that learning storage of livestock products (e.g. milk, eggs) from university students is important to me					
I think that learning processing of farm produce (e.g. winnowing, sorting, milling) from university students is important to me					

iii) Produce marketing					
I think that learning how to search for marketing information from university students is important to me					
I think that learning knowledge on negotiation skills with product buyers from university students is important to me					
I think that learning knowledge on how to position my farm produce for the market from university students is important to me					
b) Perceived affect/ attitudes of students <i>(Adapted with modification from Ajzen 1991;2014)</i>					
i) Behavioral					
It is generally a good idea to learn from university students farm work skills					
The conduct of university students on the farm is good					
Generally speaking, university students are good listeners to the farming challenges we experience					
ii) Affective					
I like the university students' farm work skills					
I like the university students conduct while on the farm					
I am encouraged by the university students' listening to the farming challenges we experience					
iii) Evaluative					
The university students' farm work skills are valuable					
The conduct of university students while on the farm is valuable					
It is beneficial for university students to listen to the farming challenges we experience					
c) Social Support					
i) Positive – student influence					
University student(s) are positive to me during training					
It is important to me to have university students help with farm work					
Students help me to practice new farming knowledge on my farm					
ii) Technical backstopping – positive influence					
University staff make appropriate preparations for me to learn from their students					
University staff make follow ups on interactions with their students on my farm					
University staff supplement learnt knowledge from students					
iii) Peer – positive influence					
Farmers in my community want to do well at their farms					
Farmers in my community always want to attend student organized training					
Farmers in my community always complete training sessions from students					
d) Social Barriers					
i) Technical backstopping – negative influence					
University staff do not pay any attention to what we learn from students					
University staff do not care whether we stop attending student organized trainings or not					
University staff do not care whether we practice learnt knowledge or not					

ii) Peer – negative influence					
Some members of my community do not want to attend student conducted training					
Some members of my community prefer alternative trainers to university students					
Some members of my community have stopped attending student conducted training schemes					

4C. Over the past two years of interacting with university student(s), what changes at your farm do you attribute to learning from these students?

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4D. Are there aspects you think these university students need to improve?

(Explain).....

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4E. What things do you think the university staff have done well in supporting the process of students and farmers learning at the farm?

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4F. Are there aspects you think the university staff could improve so as to support better the learning process between the students and the farmers?

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4G. Are there ways other peer farmers (e.g. in your family, village, group etc.) have facilitated you to learn better from university students?

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PART FIVE: SELF-DETERMINATION FACTORS

Motivational Factors – SDT

5A. I would like to know to what extent you are satisfied with interacting with students of Gulu university, using the statements provided. Use a rating scale of 1 to 5 points; where 1 = Not at all and 5 = Always

Psychological Satisfaction: Adapted from Cordeiro et al. (2016)	1	2	3	4	5
a) Perceived autonomous satisfaction					
I feel trusted by the students facilitating learning					
I openly share my feelings with students facilitating learning					
I feel free to put into practice in my own way what I have learnt from students					
b) Perceived Competence satisfaction					
Following learning from students, I feel capable of overcoming farming challenges					
After interacting with students, I am able to complete difficult tasks in marketing produce					
After interacting with students, I feel capable of dealing with hard challenges in running my farm					
c) Perceived Relatedness satisfaction					
I feel close to the students facilitating the learning processes					
I feel a sense of contact with people who care for me and whom I care for, during my interaction with students,					
I feel that the farming knowledge from students is close to my learning interests					

5B. Six (6) statements below correspond to the reasons that can motivate farmers to learn new knowledge. Kindly, indicate the extent to which each statement corresponds to the reasons why you participate in student organized trainings for farmers

Use a rating scale of 1 to 5 points i.e., Does not correspond at all = 1; Corresponds a little = 2; Corresponds moderately = 3; Corresponds a lot = 4; Corresponds exactly = 5

Intrinsic Motivation: Adapted from Behavioral regulation Exercise Questionnaire 2 (BREQ-2) of Moreno et al. (2007)	1	2	3	4	5
I enjoy associating with the university for learning					

I find using learnt knowledge from students pleasurable					
I feel satisfied when applying modern farming techniques					
Extrinsic Motivation: Adapted from Behavioral regulation Exercise Questionnaire 2 (BREQ-2) of Moreno et al. (2007)					
I am unlikely to perform well on my farm without learning new ideas					
I attend student organized training to please members of my farming community					
I practice learnt knowledge because I am under pressure from members of farming groups					

PART SIX: SOCIAL DEMOGRAPHICS

In this section, for questions with multiple options, where necessary, you can provide more than one response.

6A. Intra-household demographics

In the table below, I am interested in knowing some information concerning your household. Kindly, respond to the questions in the spaces provided.

Characteristics of Household Head				Household Structure		Labour Hiring			
6A.1 Sex of Household Head: (A1)	6A.2 Age of household head (years)	6A.3 Highest education level of household head (e.g. P4, S1, S6, diploma etc.)	6A.4 Marital status (A2)	6A.5 Farming experience of household head (Years)	6A.6 Household Size (number of members)	6A.7 Dependency (number of non-working household members)	6A.8 Do you hire labour for farm work in your household? (A3)	6A.9 If yes, how many permanent labour persons in year?	6A.10 If yes, how many casual labour persons per year?
<u>Sex (A1)</u> 1 = Male 2 = Female		<u>Marital status (A2)</u> 1 = Married 2 = Single 3 = Divorced 4 = Widowed					<u>Labour Hire (A3)</u> 1=Yes 2=No; if no skip questions 1.9 & 1.10		

Non-farm income

I would like to know more about your non-farm activities from which you earn income. Kindly, respond as appropriate to the questions in the table below.

6A.11 Are you involved in off farm work/ activities? (B1)	6A.12 On average, how much do you earn from each activity
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	(provide answers in the table below)?																							
	<table border="1"> <thead> <tr> <th>Type of Non-farm activity</th> <th>Amount earned per year</th> </tr> </thead> <tbody> <tr><td>1=Salaried job</td><td></td></tr> <tr><td>2=Labor on other farms</td><td></td></tr> <tr><td>3=Charcoal burning</td><td></td></tr> <tr><td>4=Petty trade</td><td></td></tr> <tr><td>5=Brewing</td><td></td></tr> <tr><td>6=Boda boda riding</td><td></td></tr> <tr><td>7=making bricks</td><td></td></tr> <tr><td>8=Stone quarrying</td><td></td></tr> <tr><td>9= Sand mining</td><td></td></tr> <tr><td>10=Other (specify):</td><td></td></tr> </tbody> </table>	Type of Non-farm activity	Amount earned per year	1=Salaried job		2=Labor on other farms		3=Charcoal burning		4=Petty trade		5=Brewing		6=Boda boda riding		7=making bricks		8=Stone quarrying		9= Sand mining		10=Other (specify):		
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10=Other (specify):																								
<u>Off-farm activities (B1)</u> 1= Yes 2= No; If no skip 2.2																								

6B. Land access

The table below concerns the land you have accessed and used in your household for the past one year. Kindly, respond to the questions as appropriate.

Land ownership			Land renting-in			Land renting-out	
6B.1 Do you own any of the land you used last year? (C1)	6B.2 If yes, how big is this land (acres)?	6B.3 How much of this land did you use for farming (acres)?	6B.4 Did you rent in any land? (C2)	6B.5 If yes, how much land did you rent-in (acres)?	6B.6 How much of this rented-in land did use for farming (acres)?	6B.7 Did you rent out any land? (C3)	6B.8 If yes, how much land did you rent out (acres)?
<u>Ownership (C1)</u> 1=Yes 2=No; if no skip questions 2.2 & 2.3			<u>Renting-in (C2)</u> 1=Yes 2=No; if no skip questions 2.4& 2.5			<u>Renting-out (C3)</u> 1=Yes 2=No; if no skip questions 2.8	

6C. Social Participation

In the table below, I am interested in knowing your engagement in community activities. I kindly request you to indicate your responses in the spaces provided against each question

Off-farm engagement						Farm labour sharing			
6C.1 Are you a member of any farmers' group? (D1)	6C.2 Are you a member of any social group? (D2)	6C.3 If yes, how many groups do you have membership with?	6C.4 If yes, what kind of activities does your group do? (D3)	6C.5 If yes, do you pay membership fees in your group? (D4)	6C.6 If yes, how much do you pay annually?	6C.7 On average, how many times in a year do you attend community/ group meetings?	6C.8 What role do you play in your community/ group meetings? (D5)	6C.9 Do you participate in rotational sharing of farm labour with members of your farmer group? (D6)	6C.10 If yes, how many members of your group participate in rotational farm labour sharing?
<u>Farmer group (D1)</u> 1=Yes 2=No If no, skip questions 4.3 – 4.8	<u>Social group (D2)</u> 1=Yes 2=No If no, skip questions 4.3 – 4.8	<u>Group activities (D3): select as many as applicable</u> 1. Collection of Saving 2. Provision of credit 3. Knowledge sharing 4. Collective marketing 5. Training of members Other (specify):		<u>Fees (D4)</u> 1=Yes 2=No If no, skip questions 4.6		<u>Role in the group (D5): select as many as applicable</u> 1=Chair meetings 2=Record minutes 3=collect group members' savings 4= Debate in meeting 5= Attend meeting 6 = Other specify	<u>Labour sharing (D6):</u> 1=Yes 2=No If no, skip questions 4.6		

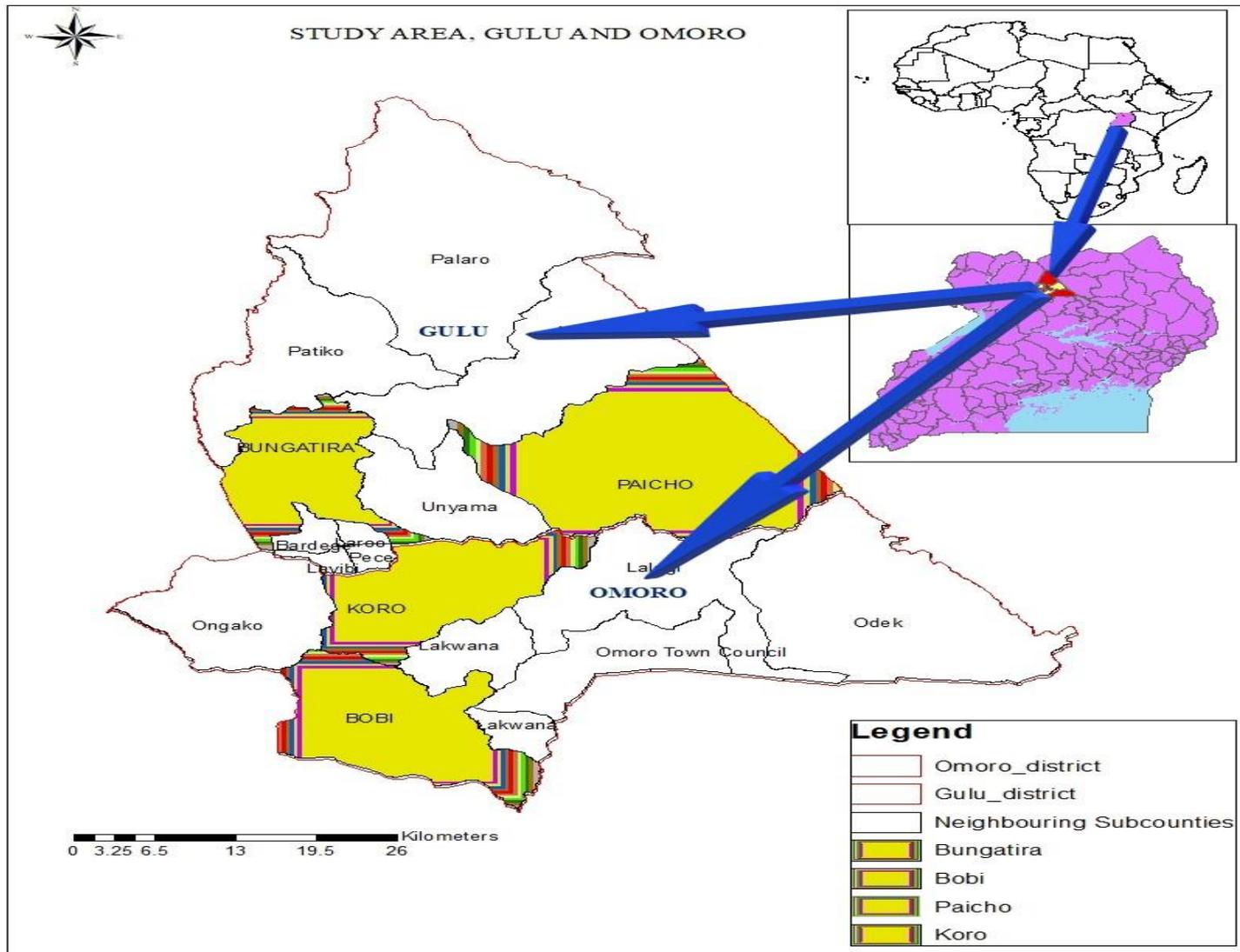
6D. Access to Agricultural Extension Service

In the table below, you are provided with questions regarding accessing agricultural extension services on your farmstead, I kindly request you to respond as applicable in your situation

Student-to-farmer University outreach	Other sources of extension service
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6D.1 How many years have elapsed ever since you first hosted a student(s) of Gulu university on your farmstead?	6D.2 Since then, have you continued hosting students? (E1)	6D.3 How many times have you hosted students on your farmstead? (number)	6D.4 What has been the purpose of student's visit to your farm? (E2)	6D.5 What is the distance of your homestead from Gulu university? (km)	6D.6 If no, what are the reasons for not hosting student anymore? (E3)	6D.7 In the past one year, have you been visited by an extension agent other than a student(s)? (E4)	6D.8 If yes, Identify the type(s) of extension agent (E5)	6D.9 What was the purpose of extension agent's visit? (E6)
<u>Continued hosting of students (E1)</u> 1= Yes 2 = No If yes, skip question: 3.6 If no, skip questions: 3.3 & 3.4	<u>Purpose of the student visit (E2)</u> <i>Select as many as applicable</i> 1= Provide farming advice 2= Identify farming problems 3=Advise on postharvest handling 4=Advise on farming business plans 5=Advise on group/produce bulking 6=Provide produce buyer information 7=Provide produce price information 8= other (Specify)		<u>Reasons for no continued hosting of students (E3)</u> 1=I am no longer interested 2=Not contacted by the university 3=No longer doing farming 4= Other (specify)		<u>Other extension agents (E4)</u> 1=Yes 2=No If no, skip questions 3.8 & 3.9	<u>Agent Types (E5)</u> <i>Select as many as applicable</i> 1= Gov't Agent 2 = NGO Agent 3=Private Agent 4=Other(specify)	<u>Purpose of visit of other agent (E6):</u> <i>Select as many as applicable</i> 1= Provide farming advice 2= Identify farming problems 3=Advise on postharvest handling 4=Advise on farming business plans 5=Advise on group/produce bulking 6=Provide produce buyer information 7=Provide produce price information 8= other (Specify)	

Appendix C: Map of the study area showing location of Gulu and Omoro Districts



Appendix D (i): Correlates between farmer learning behaviour and social demographics

Variable	Correlates (N = 283)									
	1	2	3	4	5	6	7	8	9	10
1. Seeking information	-									
2. Knowledge sharing	.73**	-								
3. Seeking feedback	.75**	.76**	-							
4. Giving feedback	.69**	.77**	.75**	-						
5. Sex	.02	.01	-.06	.01	-					
6. Farm-labour sharing	.07	.14*	.11	.12	-.01	-				
7. Age	-.04	-.05	-.06	-.05	.12	.09	-			
8. Education	.03	.05	.04	.04	-.36**	.16**	-.28**	-		
9. Farmstead distance	-.11	-.13*	-.10	-.14*	-.05	-.22**	-.02	-.07	-	
10. Experience of hosting students	.19**	.16**	.22**	.15*	.01	.00	.11	.04	-.12	-

* & ** means significant at P < 0.01 & P < 0.05 respectively