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REVIEW



Disentangling the experiential learning process of coffee farmers in Uganda's innovation platforms

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ABSTRACT

Purpose: While new rich learning opportunities emerged through the introduction of Innovation Platforms (IPs) in agricultural value chains, the extent to which IPs enhance farmer experiential learning is still unclear.

Design/methodology/approach: This paper brings clarity to the above question by interviewing 91 coffee IP farmers. Data were analyzed through content analysis to generate overarching themes for farmers' experiences, learning activities, and outcomes.

Findings: Results reveal that participation in IP learning activities generates farmers' knowledge to cope with coffee value chain challenges. Specifically, farmers' making-meaning of challenges and generating new solutions represents an iteration between individual critical reflection and experimentation of value chain activities. The IPs facilitated multi-directional knowledge flows among farmers by mobilizing necessary resources.

Practical implications: As many Sub-Saharan Africa (SSA) governments cannot provide sufficient extension support, farmers increasingly rely on IPs whose processes stimulate members' learning commitment and endeavors. Nevertheless, Governments can use these findings to tailor the design and implementation of IPs to farmers' experiential learning processes.

Theoretical implications: The study contributes to experiential theory in the context of agriculture by advancing a model on how IPs can accelerate farmers' experiential learning processes based on the challenges experienced.

Originality/value: This article extends knowledge of experiential learning in IPs context.

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Agriculture; coffee value chains; social networks; multi-stakeholder platforms; extension approaches; problem-based learning

1. Introduction

The coffee value chains in Sub-Saharan Africa (SSA) largely depend on smallholder farmers, who face numerous challenges such as high pests and disease incidences.

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Mainly attributed to farmers' limited coffee protection knowledge and practice arising from structural problems such as weak extension support, several extension approaches have been employed to address farmers' challenges with minimal success (Amankwah et al. 2015). Participatory approaches to extension, for instance, have failed to recognize the importance of multi-stakeholders involvement in new knowledge introduction and utilization (Akpo et al. 2015). Consequently, innovation platforms (IPs) emerged (Pali and Swaans 2013) under different names and heterogeneous forms (Camacho-Villa et al. 2016; Kilelu, Klerkx, and Leeuwis 2014). Unlike other commonly used extension approaches to knowledge sharing among actors in the Agricultural Knowledge and Innovation System (AKIS), such as innovation networks, innovation partnerships and multi-actor innovation, IPs are structured physical interfaces among farmers where they tap into the capacities of diverse stakeholders to learn how to diagnose their context-specific problems (Tui et al. 2013). For example, low yields due to a lack of productivity-enhancing technical knowledge and skills; (2) poor product quality due to poor postharvest handling practices; and limited access to markets due to a lack of information (Kelly, Bennett, and Starasts 2017; van Rooyen et al. 2017). Cost-effective IPs rely on farmer-to-farmer (Davis, Franzel, and Spielman 2019; Simpson et al. 2015; Akpo et al. 2020) and social learning methods (Vasilaky and Leonard 2018; Takahashi, Muraoka, and Otsuka 2020) where farmers learn among themselves (Mahiya 2020). Each stakeholder contributes to the platforms their previous experiences, knowledge, and proof of current resources (Mahiya 2020). Hence, IPs are ideal tools for addressing complex value chain challenges in holistic manner (Flor et al. 2016). IPs may comprise farmers, processors, traders, transporters, input suppliers, output handlers, policymakers, extension agents, researchers, and non-governmental organizations (NGOs) depending on the problem they are addressing (Fatunbi et al. 2016). The composition of the IP changes after a specific challenge has been addressed or as members take on a new challenge (Davies et al. 2018) when new stakeholders are added to address the new or emerging challenge and others exit (Ampadu-Ameyaw et al. 2016).

While a wide literature explores the functioning and impacts of IPs in SSA, little research focuses on how IPs enable farmer learning to solve their challenges (Schut et al. 2019; Probst et al. 2019). Notwithstanding, the most important learning outcome for farmers in the IPs are knowledge and skills (Brouwer et al. 2015). In IPs, farmers access knowledge and skills on crop and livestock production and value addition – along with information on inputs, credit, and markets (Mulema and Mazur 2016) – by attending training, meetings, workshops, exchange visits, and demonstrations. Thus, IPs facilitate multiple actors' engagement in learning activities. As facilitating entities, IPs help farmers to understand their common challenges, assist them to search for solutions, and make plans to realize them (Sanyang et al. 2014). Yet, a question that has persistently remained unanswered involves: how do IPs support farmers in developing knowledge and skills to make sense and address their production, postharvest handling, and market challenges?

The literature gives, so far, only gives partial answers to this broad question. Nevertheless, value chain-based IPs identify and address commodity-specific challenges from production through to obtaining a marketable product or consumption (Magala, Mangheni, and Miiro 2019). These IPs mainly support the following

farmers' endeavors: (1) identifying challenges and potential solutions; (2) testing and refining solutions; and (3) developing capacity to implement solutions (Probst et al. 2019). However, this support is not always successful (Faysse 2006; Warner 2005) because supporting actors in addressing specific challenges require a deep understanding of farmers' experiential learning (EL) (Gorman 2019; Pant 2012). Kolb defined EL as a context-specific process of knowledge creation through experience transformation. It involves an integrated functioning of thinking, feeling, watching, and doing (Kolb and Kolb 2005). EL represents a hands-on process to address complex challenges in which the process does not always unfold spontaneously and smoothly (Manolis et al. 2013). Addressing challenging experiences may increase farmers' attention, information, and knowledge, but also trigger negative emotions such as anxiety, fear, self-doubt, and distrust which may hinder knowledge development from experience (Vince 2010). To date, research does not shed light on if, when and how farmers learn effectively from challenging experiences.

Therefore, this paper investigates qualitatively how coffee farmers in IPs learn from challenging experiences in their coffee value chain work. The coffee sector represents an interesting rural context where IPs were introduced to stimulate the development of agricultural enterprises (Magala, Mangheni, and Miro 2019). Complementing the notion that IPs mean to provide a safe environment for actors to experiment and explore solutions to their joint challenges (Adjei-Nsiah and Klerkx 2016), this paper seeks to contribute to a theory on how IPs facilitate and enable farmers' EL.

2. Theoretical underpinnings

Where publications on EL have more than quadrupled in the last 20 years (Kolb 2015), little of this research has empirical nature (Bergsteiner, Avery, and Neumann 2010; Jarvis 2012). In existing research, Kolb's EL theory is widely used to explain how learning occurs over time (Seaman, Brown, and Quay 2017; Tomkins and Ulus 2016; Kisfalvi and Oliver 2015). Kolb defined EL as the process by which knowledge is created through the transformation of experience incongruent with the environment (Kolb 2015; Kolb and Kolb 2009). Kolb's definition indicates four interlinked concepts: (1) the experiences, (2) the transformation of the experiences, (3) the knowledge created, and (4) the environment.

2.1. Experiences

According to Roberts (2018), 'experience' means 'to test' and 'to risk' as per its Latin language root. The EL process integrally involves risk, as it incorporates unique, context-specific, and ill-structured challenging experiences (Blair 2016; Asfeldt and Beames 2017). In their learning, farmers usually find solutions to expected experiences either through active experimentation, i.e. direct performing activities meant to address challenges, or, indirectly, through interacting with others. Additionally, farmers find solutions to unexpected experiences or unplanned events (Krumboltz 2009). Thus, the emphasis of the concept of EL is on problem-solving (Miettinen 2000). Therefore, in line with the first of the four interlinked concepts, this study firstly tries to identify what challenging experiences trigger farmers' EL.

2.2. Making sense of challenging experiences

The complex nature of challenges solving involved with EL demands higher-order thinking (Collins, Sibthorp, and Gookin 2016). Thus, farmers may develop solutions to their challenges by watching what others do and thereafter perform reflective analysis of their challenges before acting. Reflective analysis encompasses the identification of expected and unexpected challenges, root causes, and solutions (Miller and Maellaro 2016) i.e. what, how, and why it happened (Wilson and Beard 2013). Resulting from reflective analysis is abstract conceptualization, where lessons are extracted and conclusions are drawn through identifying the challenges root causes, solutions (Miller and Maellaro 2016), and propose methods of action (Korthagen 2005). Thereafter to implementation of solutions and alternative methods of action (active experimentation). Alternatively, farmers may also act directly or start solving challenges immediately as a direct reaction to a challenge (Kayes, Christopher Kayes, and Kolb 2005). In this process, farmers try to apply the existing knowledge to solve current (abstract conceptualization) and future challenges (active experimentation). To which transformation mode coffee farmers engage is still indistinct. In line with the four interlinked concepts, the study, secondly, tries to capture the exemplary learning activities of farmers' EL.

2.3. Experiential knowledge created

Johanson and Vahlne (1977) defined experiential knowledge as the knowledge only gained through personal experience. experiential knowledge creation, as described by (Newman and Conrad 2000; Martín-de Castro et al. 2011), refers to a farmer's ability to develop, discover and capture solutions to problems, such as farming practices. Referring to the Knowledge-creating theory (Nonaka and Toyama 2015), knowledge is created through reflective analysis of both individual and social experiences. Typical of the farming context, problems are multi-dimensional (ill-structured) demanding more than one solution. This often involves collective action or knowledge acquisition through dialogue, which allows further deeper critical reflection (Asfeldt, Hvenegaard, and Purc-Stephenson 2018; Collins, Sibthorp, and Gookin 2016). Subsequently, knowledge is context-specific and relational (Bose 2004; Ipe 2003). Context-specific knowledge is location and time-bounded (Smith and Segbers 2018). Relationally, the complex nature of solving challenges demands knowledge development through social interactions (Harper 2018; Blair 2016) and application based on one's judgment and experience (Grant 2007). Hence, knowledge relates to one's ability to align information with own experience or the experiences of others and use it to perform 'challenge solving' activities. For example, IP farmers may learn about networks as well as associated support including farming practices information and technologies (Klerkx and Proctor 2013). Even though networks are supportive, successful learning is contingent on the proper management of relationships with diverse stakeholders (Hinnou et al. 2018). Thus farmers may learn how to manage such relationships. Finally, farmers may understand personal strengths and weaknesses (Welch et al. 2014). Hence, as argued in line with the four interlinked concepts of EL, this study explores – thirdly – the exemplary learning outcomes of farmers' EL.

2.4. The EL context

With the introduction of IPs, new potentially rich learning environments for EL have emerged. They are rich, because there are diverse stakeholders, and therefore IPs provide ample possibilities for getting new experiences that may lead to EL. As facilitating entities, IPs may perform two interlinked functions including mediation and moderation of farmers EL through enabling actors to engage in reflection and experimentation (Klerkx, Hall, and Leeuwis 2009). In terms of mediation, IPs provide space for reflective analysis through jointly identifying and prioritizing farmers' challenges, root causes, solutions, and experimentation. Regarding moderation, IPs enhance actor linkages and interactions for mutual learning through supporting and governing their activities (Martey et al. 2014). IPs support actor reflective analysis and experimentation through the following: mobilizing resources such as funds, stakeholders, land, meeting venue, seeds, transport, and research technologies (Schut 2017; Kusters et al. 2018). Correspondingly, IPs govern linkages and interactions through bringing together different stakeholders, assign roles, stimulate their interaction and motivate them to participate in IP activities (Cadilhon 2013). Equally, IPs manage the learning process by providing space for reflective analysis and experimentation. Then, IPs generate knowledge by enhancing communication and knowledge dissemination through trainings, exchange visits, look and learn (observation), experimentation (van Paassen et al. 2014; Vellema et al. 2013). Also, IPs generate knowledge through supporting farmers' access to value chain relationships by building common ground and stimulating new relationships amongst stakeholders (Kabambe et al. 2012; Thiele et al. 2011). For example, farmers obtain experiential knowledge from relations, neighbors, and friends (Hoang, Dufhues, and Buchenrieder 2016) and research-based knowledge, and training from visitors outside their community (Saint Ville et al. 2016). Second, IPs broker knowledge through facilitating multi-directional flows of information and views through networks. Finally, IPs integrate new value chain knowledge through matching knowledge demand and supply. However, in what way IPs facilitate EL is unclear. This is the fourth area of investigation of the four interlinked concepts of EL.

3. Methods

3.1. Description of the study area

The study was carried out in Kapchorwa, Manafwa, and Namisindwa districts, which are Uganda's main coffee-growing areas. Coffee contributes 20% to Uganda's total revenue, 49% to the total agricultural exports (UBOS 2017). Despite this enormous contribution, the coffee sector is dependent on 1.7 million households who face multiple challenges (UCDA 2019b). Consequently, IPs were established to enhance learning among diverse actors, a strategy to address multiple challenges hampering coffee value chains development and upgrade (UCDA 2014; MAAIF 2013). The target IPs were established in 2015 as part of the Value Chain Innovation Platforms for Food Security (VIP4FS) project. The aim of the project is to define values and drivers that support the scaling up of efficient and equitable innovation platforms that improve food security through greater engagement of smallholder farmers with markets. According to key informant interviews, each IP consists of approximately 25 coffee farmers. Other roles of these

coffee farmers include coffee picker, processor, contact/model/trainer farmer, buyer/trader, input stockiest, transporter, IP leader/facilitator, and so on. Once a month, the IP members gather for their regular IP events, which concentrate on learning about how to solve their farming problems. Each IP has a framework in place, with the IP facilitator organizing intra- and inter-IP learning events, as well as collaborations with other networks (Appendix 5). IP activities are carried out with funds raised at the IP level from a variety of sources, including membership dues, annual subscriptions, and fines imposed on members say, for absenteeism, late coming, and so on.

3.2. Sampling procedures and data collection

The study employed a multi-stage purposive sampling procedure starting with the districts through to the target respondents. The target respondents were selected in two sub-stages. Through a snowballing technique, the *first step* involved locating and interviewing (Bryman 2016; Holstein and Gubrium 2016) relevant key informants. Using a checklist, key informants were interviewed individually in their homes or offices for 1.5 hours on average to capture overall aspects of the study. The questions addressed include (1) farmers' challenges, (2) what activities were carried out by farmers to address their challenges, how, and (3) learning outcomes of coffee IPs farmers (Appendix 1).

The interviews with the key informants led to emerging conceptual categories of farmers' experiences that trigger learning activities, learning activities themselves besides several potential learning outcomes (Appendix 5). It also provided background information about the IP features. *Secondly*, based on the key informant interviews (KIIs), lists of IP facilitators/coordinators/chairpersons were crafted. After understanding the intent of the study, each district IP coordination team (the IP facilitators/coordinators) compiled a list of possible FGD participants during a one-day meeting with the researcher. This list was created based on their knowledge of the study topic. Following that, they made physical contact with participants at IP level and later made phone calls to confirm their availability. Four members were purposively picked from each IP. Three IPs were selected per district totaling 12 participants for a district-level focus group discussion (Yin 2003). Each FGD was facilitated in a central place by two trained research assistants; a moderator and a note taker with the help of the researcher. Participants were encouraged to openly discuss the responses using their local languages. Views agreed upon by consensus or hand vote were recorded for each group. Each focus group discussion (FGD) lasted about 4 h with a coffee break, one ice breaker, and lunch on completion.

Using the three thematic areas highlighted in Appendix 1, the learning process was discussed as follows: The first set of questions relating to experiences and learning activities were posed to the participants followed by discussion and agreement. As for the learning outcomes, in particular, networks ranking was preferred i.e. list the name and assign a numeric number from the smallest-big impact and biggest-smaller impact. During the discussion, the most dominating participants/speakers were men, model/contact farmers, traders, processors, opinion leaders, or those with leadership roles. These were educated, financially stable, or have well-managed coffee fields, well informed and networked. To achieve consensus, a hand vote with at least beyond half the participants won.

Finally, thematic areas from KIIs and FGD i.e. experiences, learning activities, and outcomes, were repeated at the individual coffee farmer level. At this stage of data collection, each research assistant interviewed a respondent face to face at their home. Each interview lasted about 2 hours. All interviews, completed for one district before heading to the next until all the three districts were captured, with interview results written down in notebooks and audio recorded. The data reference period is December 2018. At the end of this process, data were collected and analyzed from 6 key informants, 43 FGD participants, and 48 IP members (Appendix 2).

3.3. Data processing and analysis

After data collection, all interviews were transcribed verbatim and coded by Atlas.ti 8 for qualitative content analysis (Schreier 2012). Coding was both concept and data-driven. Concepts were derived from literature for farmer value chain learning experiences, activities, outcomes. From data and text fragments (cues) related to the research questions (Sections 2.1–2.4 & Appendix 1), the data analysis approach by Gioia et al. (2013) was employed. This approach is widely used to understand learning (Lindh and Thorgren 2016). In appendix 3, data were coded first as first-order codes, rather than as direct quotes from interviews, to keep the narrative of the findings more readable and concise. Then first-order codes were aggregated to second-level codes (abstract concepts from the first-order categories in the 3 P model cluster i.e. coffee value chain nodes, also known as code groups). Finally, the overarching theoretical dimensions (i.e. experiences, learning activities, and learning outcomes herewith referred to as smart codes). To ensure data triangulation, the authors jointly coded, defined first through third order concepts, and conducted consistency checks. After coding and categorizing, the emerging patterns and commonalities for each smart code were identified to facilitate (Miles, Huberman, and Saldana 2013) understanding of the EL process.

4. Results

4.1. Challenging experiences

Results from the interviews indicate that farmers continuously reflect and thus learn from their production, processing, and marketing challenging experiences (Appendix 3a & 5).

4.1.1. Production

At a *production* stage, for example, pests and diseases contribute up to 7 kgs of coffee berry losses per plant. For example:

Pests and diseases cause considerable losses. The stem borer pest burrow into the coffee stem leading to wilt and death. Along with diseases such as coffee berry disease reduce the coffee plant population per unit area of land leading to low yields. These pests and diseases would not be a problem of great concern if the required pesticides were available, affordable, and effective. (Interview 035, female, Bukhofu coffee IP)

In all districts, the pest and disease challenge is exacerbated by limited access to inputs e.g. pest and disease resistant coffee seedlings, adequate quality and required quantity

of agrochemicals and equipment (cross cutters, sprayers), labor for production, fertile land, and coffee production knowledge. Indeed, coffee farmers are dependent on the community nursery operators are the main suppliers either directly or through the Uganda Coffee Development Authority (UCDA). However, the action of these community nursery operators is questionable. They supply immature, poor-quality seedlings and inadequate quantities. For instance:

The trained and licensed nursery operators are few, ill-equipped, and poorly resourced to produce and supply adequate quantities of seedlings to all farmers. In particular, the nursery operators have inadequate knowledge and skills in nursery operations. A majority cannot afford to establish nursery structures, purchase the seeds, potting materials, fertilizers, and control pests and diseases. Alternatively, seedlings supplied by or through UCDA are costly. Consequently, some farmers end up planting bad seedlings or not planting at all. **(Interview 049, Manafwa FGD)**

According to Manafwa FGD participants, the low number of nursery operators is attributed to the inability to meet the certification criteria for UCDA. Besides, the few UCDA certified coffee seedling suppliers experience delayed payment for the seedlings supplied thus most avoid transacting business through UCDA-the quality regulator. Apart from community seedling suppliers, sometimes the government through Operation Wealth Creation(OWC) supplies free seedlings. However, farmers complained of the uncertainty of the seedling sources i.e. among many, the nursery location, variety, age. Moreover, often supplied off planting season(dry season) the supplied seedlings are not accompanied by follow-on extension services. Similarly, farmers complained of the new coffee varieties having a short life span (for instance, 3–7 years) as compared to 45 years for the indigenous. Apart from the short lifespan, the cost of their production is high in terms of inputs such as pesticides, fertilizer, and so on.

The other factor fueling up pest and disease infestation is farmers limited access to adequate quality and required quantity of agrochemicals as a stated farmer:

lack of agro-inputs like fertilizers as the accessible ones are fake and expensive. Additionally, I apply fertilizers to my soil randomly without minding whether or not these are suitable. My soils have not been tested to ascertain which nutrients are lacking. **(Interview 010, male, Arokwo coffee IP)**

The expensive nature of agro-chemicals was attributed to farmers' small funding sources. The most dependable source is the Village Savings and Loans Associations (VSLAs) savings which can't meet every member's financial needs during production while formal financial services providers like SACCOs, MFIs, DFIs, and commercial banks as an option have high lending rates and rigid finance access regulations such as the requirement of collateral, such as land titles or agreements. An alternative, the organic manure, which would otherwise complement inorganic fertilizers is inadequate to cover farmer's coffee gardens and slow at releasing nutrients. Moreover, very few farmers in Manafwa are aware of the existence of inorganic fertilizers.

Next, since coffee production is the main economic activity, pest and disease management labor is often inadequate. A few available laborers are expensive to hire while the strong and energetic youth who would otherwise provide labor is not available. For instance:

Production activities e.g. land preparation, pests, and disease management are very tedious. Family labor is not adequate making hiring inevitable. I cannot afford to hire additional labor. Coffee prices are low giving me no reason to maintain my gardens. (**Interview 027, Male, Butta coffee IP**)

Equally important, farmers' minimally implementation pest and diseases management practices due to their low level of knowledge about the different coffee pests and disease-resistant varieties, management e.g.fertilizer application. As a farmer explained concerning lack of knowledge about inputs:

Recently, a fellow farmer was disappointed by a colleague who ignorantly opened a bag of Calcium Ammonium Nitrate fertilizer, spread it to dry under the sun before applying it to his coffee. This farmer didn't know that Nitrogen is volatile and easily evaporates hence he lost everything. (**Interview 025, Male of Bukhofu Coffee IP**)

In Manafwa and Namisindwa the low level of farmers' knowledge is attributed to limited access to extension services. The government extension service providers mandated to equip farmers with necessary pest and disease management knowledge are few and ill-equipped with the necessary knowledge and skills. Even more, the limited focus of the private sector in their interest areas, as opposed to regular extension service provision, cannot allow them to bridge the extension gap.

4.1.2. Harvest, post-harvest, and processing

At the harvest, post-harvest, and processing stage, farmers recognize that low coffee quantity and poor quality are caused by pest and disease infestation. Results indicated that poor coffee quality was seen as having mixed colored cherries i.e. green and yellow for unripe and red for ripe. This challenge was attributed to poor coffee harvesting methods such as stripping as compared to picking by less skilled harvesters as the quote illustrates:

I sometimes employ people who because of inadequate coffee harvesting knowledge focus on quantity i.e. filling a sack(bag) of 100kgs at 5000shs as opposed to quality. Such pickers bend coffee plants which sometimes break to achieve the agreed target. The result is poor quality cherries i.e. mixing green(immature) and red(mature), broken and diseased, small and big from yet sorting the already mixed coffee is another cost. (**Interview 021, male, Busyula Coffee IP**)

Moreover, the low level of knowledge on proper coffee picking methods is attributed to limited access to training opportunities and the emergence of new market dynamics i.e. coffee demand, prices, customer preference, etc. Besides, being largely unskilled, available coffee pickers are few and costly to hire. Likewise, thieves (mostly neighbors) are a challenge as explained below:

There is a lot of theft in these villages, people steal coffee either from the garden or at home because they didn't or grew coffee which didn't do well. (**Interview 049**)

Then coffee not processed i.e. washed, floated, sorted, pulped, and fermented within 24 h after harvest is considered poor quality. Indeed coffee, farmers couldn't process their coffee in time due to limited access to pulping machines. The available pulping machines in the market are fake and expensive. Those available for either hire or borrowing within the community are few and expensive to hire. A farmer explained:

[...]obtaining pulping machines is costly i.e. involves costs of pulping and transportation. For example, on every 100kgs bag, 4kgs are deducted as pulping cost or 6000shs. After incurring this cost, often such machines crush seeds thus compromising quality. I sometimes take too long to get pulping machines and don't pulp in time, resulting in low prices, such as 4000shs. (**Interview 022, male, Bukusu Coffee IP**)

Likewise, all the available machines are manually run and take a long to pulp a large amount of coffee as it's also very tiring. Furthermore, most coffee pulpers are counterfeit i.e. crash and remove seed cover during pulping instead of properly separating the chaff from coffee beans. Sometimes farmers are forced to pulp coffee rudimentarily using local grinding stones. Similarly, knowledge on how to use the equipment is inadequate. Furthermore, the purchase of these machines is nearly impossible since a few genuine hand pulpers are expensive.

Again coffee dried on bare earth surfaces such as soil, roadside to moisture levels greater than 13° celsius is poor quality coffee. Extreme weather, such as too much rain or heat, and limited access to drying materials, was attributed to poor drying across the study site. Considering the following example:

Before realizing the need to produce high-quality coffee, I used leaves and my night covering blankets to dry coffee resulting in bad coffee aroma/smell (**Interview 007, male, Chema coffee IP**). I also can't get quality coffee because I sometimes dry coffee on bare ground or dusty places which reduces the value. (**Interview 041, male, Bukoho Coffee IP**)

Finally, coffee not properly stacked on pellets and away from any contaminants such as paraffin, livestock droppings is poor coffee. In the study site, limited access to or poor storage facilities, materials, and techniques, where farmers store their coffee in residential houses are a genuine challenge as stated:

I keep coffee in a congested place leading to loss of the nice taste and marketable value (**Interview 032, male, Bumbo Coffee IP**). We have a problem of where to store coffee and how to store, i.e. knowledge and skills in improved storage techniques. (**Interview 048, FGD Kapchorwa**)

4.1.3. Marketing

At the marketing stage, farmers consider the presence of a few, untrustworthy and unreliable coffee buyers as a key challenge. For example, to make big profit margins, middlemen add chaff to good quality coffee to increase coffee quantity, don't grade coffee, use uncalibrated weighing scales, and sometimes buy coffee on credit due to their small capital base. Sadly, even key coffee buying companies compete with middlemen to purchase poor quality ungraded coffee which is later mixed with good quality coffee. Some claim to want organic coffee but buy all coffees. While Kapchorwa District has a denser network of buyers, their conditions are unbearable: selling coffee harvested on the same day, between 1 pm to 5 pm at the buying centers, not at village level represents a condition that farmers cannot meet due to transportation challenges. Moreover, these buyers are unreliable-don't stick to their obligations to purchase coffee from specific farmers. In particular, farmers produce different coffee varieties with specific quality attributes which are not taken care of by coffee buyers, instead they mix all coffees at the time of purchase. As explained by an individual farmer and FGD participants:

... untrustworthy middlemen mix up good quality coffee with chaff, use faulty weighing scales and pay less for coffee supplied. I don't have a reliable market. Compared to cooperatives, middlemen's income allows them to buy coffee once a year. (**Interview 032**)

Hence, there are fluctuating and low coffee prices as was plainly illustrated below:

Coffee cherry prices fluctuate between 800 and 1800 per kilogram and dry parchment range of 3500/=(During harvesting period i.e. late August to September) and 5000/=(between December and January). (**Interview 014, female, Mt.Elgon women coffee IP**)

Other challenges faced by farmers in the marketing phase include: (1) transport means; (2) blindness to market opportunities; (3) limited access to information about coffee market prices; (4) poor collective bulking spirit among farmers; and, (5) negative attitude towards coffee farming and consumption, were mentioned. As these quotes illustrate:

We still grow coffee as a traditional cash crop rather than as a business.[...]we struggle to apply fertilizers, spray, and so on yet growing coffee with such an attitude demonstrates less value attachment. Also, some farmers sell their coffee when it is in the flowering stage.[...]as coffee farmers we don't consume our coffee (**Interview 049**). When I visited other countries such as the United Kingdom, I noticed people drinking Ugandan coffee in coffee shops that do not exist in our communities. Our organic and inorganic coffee would attract consumers and encourage value addition and scale-up of coffee production if our IPs had such. (**Interview 025**)

Cutting across the value chain, i.e. production to marketing is a poor division of roles and a policy gap. Referring to the former, men have control over value chain resources e.g. Land and coffee income. This limits women's ability to play a significant role in the coffee business. Concerning the latter, even though UCDA officials, extension workers, and private sector players such as Kawacom have made attempts to sensitize the farming community on existing coffee policies, Namisindwa and Manafwa farmers disagree on the effectiveness of such efforts. Since most farmers don't listen in to such radio programs, the medium of radio talk shows to sensitize the farming communities about the existing coffee policies is ineffective. Instead, the exiting extension workers through various farmer groupings would be effective. Still more, the government of Uganda through its agencies should regulate the quality of coffee inputs and output markets.

4.2. Learning activities

Through social interaction with IP members, coffee farmers reflect on their past challenging experiences (Appendices 3a & 5).

4.2.1. Production

On experiencing pest and diseases attack, coffee farmers' through routine IP activities such as meeting discuss their challenges before acting. Inevitably, such meetings provide a space for in-depth reflective dialogue. For example:

On experiencing such as pest and disease infestation, we came together, discussed, and agreed to share experiences amongst ourselves, seek trainings from local government and private sector, and collectively purchase or access certified coffee inputs. (**Interview 048**)

Then the IP members e.g. model farmers often well educated, informed, or experienced and networked train fellow farmers on various coffee pest and disease management

methods. Additionally, to boost their efforts, these IP members bring in external actors to train farmers on pest and disease management. Depending on the trainers, the funding comes from various sources, such as membership fees, monthly contributions, volunteer services members, and external support. Specifically, the external trainers fund bigger IPs level training, meetings, demonstrations, exchange visits within and outside the community. Knowledge for such learning activities is shared by the trainee with fellow IP members and also later trickles to farm families. Similarly, contributors to pest and disease management knowledge are farm families/relations. Subsequently, coffee farmers critically reflect and analyze the training content along with trying out (experiment) say planting pest and disease-resistant varieties, use of indigenous methods of pest and disease management, soil amendments, planting shade trees, phytosanitary measures, and spraying. As this quote illustrates:

After training, I was given Tuspan of about around 15mls to spray my coffee. After spraying, the yellow spots disappeared and the coffee pods no longer fall off. (**Interview 033, Male, Bumbo coffee IP**)

With experimenting, coffee farmers acquire new experiences, which experiences guide them to for example IP farmers either individually or as a group established UCDA certified coffee nurseries from improved or indigenous coffee plants. For example:

After training on nursery bed operations under the KIFANGO group, I was motivated to start up my nursery bed, which I later expanded to a fully-fledged commercial nursery site. (**Interview 026, female, Busyula Coffee IP**)

Moreover, through collective action, coffee farmers: (1) collectively purchase production inputs from or through reputable agencies; (2) borrow from fellow farmers; (3) hire from fellow farmers; and (4) receive free donations or offers from IP affiliated networks. As illustrated:

I decided to only buy my pesticides from the Bukusu coffee group because they have genuine products that are effective in pests and disease control. This limits my expenditure on fake products from other agro-stockists. I got all this information from my IP members. (**Interview 022**)

Also, with the help of local government officials developed bi-laws to reduce fake/adulterated inputs and substandard output plus encouraging fellow farmers to listen to UCDA radio programs on coffee policies. Similarly, through collective action, farmers rotationally provide production labor among themselves or finances to hire. Finally, coffee farmers through their interactions with IP members started to expand on their coffee acreages to cover for the losses, diversify their income sources, etc.

4.2.2. *Harvest, post-harvest, and processing*

Comparable to the production stage, farmers' routine IP activities such as training, demonstrations provide a space for in-depth reflective dialogue on *harvesting, post-harvest handling, and processing* challenges. In particular, through IPs, coffee farmers access training on coffee harvesting namely picking red ripe cherries, transporting home or sell immediately after picking, sort, float, wash, pulp, ferment, dry and store/sell or roast, grind, pack and sell as stated below:

After training on coffee picking, I was able to harvest only red ripe cherries that earned me more money compared to 700/= per kilogram for stripped mixed cherries. **(Interview 009, female, Chema coffee IP)**

Afterward, coffee farmers critically reflect and analyze the training content along with trying out (experiment) e.g. the challenge of inadequate labor is solved through collective action e.g. collective picking, use family and hired labor.

We practice group coffee picking, pulping, drying, bulking, buying, and selling of coffee (collective storage and marketing of coffee). All our members are skilled/trained coffee pickers. **(Interview 048)**

Furthermore, the challenge of poor quality (premature, broken, diseased coffee berries) was solved by inviting buyers to ascertain the quality of coffee before picking and pick only red ripe cherries by engaging, supervising, and motivating trained personnel. As one of the farmers recalled:

I train, demonstrate, and supervise people who help me in harvesting coffee to ensure coffee quality. **(Interview 021)**

For inadequate pulping machines, coffee farmers collectively purchase, borrow from fellow farmers or wash stations, hire, maintain existing machines, lobby from coffee buyers and other agencies to offer pulping machines to farmers in form of loans. Also, farmers obtain machines in form of loans and free offers from their networks.

I borrow pulping machines from my neighbors and in return, I give them some coffee in exchange for example. In exchange for 100 kg of pulped coffee, I give them 1 kg of pulped coffee. In monetary terms, pulping 100 kg of coffee can cost up to 2000/=. **(Interview 031, female, Bukhofu coffee IP)**

Furthermore, the inadequate storage facilities challenge was tackled through joint construction of warehouses like Bukusu ACE for storage. For thieves, family members guard coffee gardens, hire guards, fence gardens, harvest near ripe coffee, and sell immediately after harvest.

My family members sleep in the garden in turns until coffee harvesting is completed [...] **(Interview 002, female, Kabeywa Coffee IP)**. I sell immediately after harvest so that thieves don't break into my house. Also, I stay home to keep an eye on the drying coffee. **(Interview 015, female, Mt. Elgon women in coffee IP)**

4.2.3. Marketing

Finally, as for *marketing*, by reflecting on information obtained through training and interactions with IP actors, coffee farmers obtained market information e.g. coffee demand. Regarding the challenge of few, unreliable and untrustworthy coffee buyers, farmers resorted to collective bulk parchment and selling as an IP. Such coffee is usually sold in January at about 6,500/= per kilogram. The first-grade coffee is bulked while the second grade is sold to other buyers. Secondly, farmers sought alternative buyers that readily purchase coffee at a fair price-1,400 shillings per kilogram of cherries, timely and if possible, offer bonuses e.g. about 20 shillings per kilogram per farmer. As one of the farmers mentioned: *Middlemen buy coffee at very low prices. As a result, I started looking for alternative coffee markets e.g. Kawacom at 1,450/= and 5,200/= per*

kg for cherries and parchment respectively. (*Interview 001, female, Kabeywa coffee IP*). Third coffee farmers worked with IP-affiliated networks to created new markets including wash stations, IPs for cherries, and local companies.

Turning to the challenge of low and fluctuating coffee prices, farmers produced high-quality coffee and market collectively as a remedy. For instance: *We formed sub-groups within the IPs to collectively sell coffee.* (*Interview 018, female, Busyula coffee IP*). As well, most farmers registered their coffee business – a strategy to negotiate better terms viz. prices and attain quantities required by buyers along with signing contracts with buyers.

There's an organization called Coffee a Cup that promised to give a good price to whoever supplies good quality coffee and so some of us registered as suppliers. (*Interview 030, male, Bumbo coffee IP*)

4.3. Learning outcomes

Based on their past experiences and activities of reflection through social interactions, evidence of how farmers learn and thus adapt their production, harvest, postharvest handling, processing, and marketing stages was found (Appendix 3b).

4.3.1: Production

Referring to Section 4.2, IPs enhance communication and knowledge dissemination through training, exchange visits, look and learn, experimentation leading to pest and disease management knowledge generation. Also, in Appendix 3a and 5, IPs generated pest and management knowledge through supporting farmers' access to value chain relationships by stimulating new relationships amongst actors as well as link farmers to other support networks. For instance, coffee farmers learned the private and public sector organizations and family members provide advice, knowledge on assorted aspects as follows:

I edlearned to produce coffee from my father. I observed him manage his coffee(pruning, stump). (*Interview 017, male, Bukhoho coffee IP*)

Again, farmers through their networks obtain offer emotional support-inspirations & encouragement:

My brother, a group member, influential farmer encouraged me to start growing coffee, gave me free seedlings in addition to coffee production advice while my aunt, gave guidance on nursery bed establishment. (*Interview 021*)

Likewise, these networks encouraged farmers to organize themselves into groups to produce more coffee.

International women coffee alliance encouraged us to register our group with UCDA so that we are recognized and to solve the issue of delayed payments for coffee seedlings supplied to the OWC program. (*Interview 048*)

Furthermore, the IP serves as a point(collateral) to lobby inputs inform of loans from coffee buyers. Correspondingly, farmers pool resources as a group e.g. labor, agro-chemicals, equipment, and seedlings. Not on that, IPs serving as collateral to borrow money from other sources e.g. SACCOs and Commercial Banks to purchase agro-inputs.

Similarly, through networks, coffee farmers learned about farming practices i.e. first, obtained knowledge and expanded their coffee acreages in addition to certifying their coffee nursery sites.

In addition to regular coffee maintainance, I established a commercial coffee tree seedlings nursery site after training, certification, and obtaining parent seeds from UCDA. After, I signed a contract to supply seedling directly to farmers or through UCDA. (**Interview 046, male, Bukhokho coffee IP**)

The other aspect coffee farmers learned about networks is how to manage relationships. For instance, **interview 012, female, Arokwo coffee IP**, said ... Managing IP relations involves; respecting each other, working together, being exemplary, humility and jointly working hard to achieve my goals.

Zooming into a deeper level, throughout this process farmers learned about their selves. For example, they learned about their weaknesses, including limited information on pest and disease control and that problems are stepping stones to success. Moreover, some realized they have been conservative as unexposed to modern coffee production methods. **Interview 007** said: *I was conservative and needed to be exposed to modern methods, organize myself well to be known and recognized by different value chain actors on the market. I realized that everything starts with me.* Also, the ability to carry out self-evaluation and critical thinking is deficient among farmers. **Interview 001** said *I was not good at self-evaluation and critical thinking, an art I have developed as a result of facing coffee farming challenges over time.* Others include mindset and attitude change towards coffee management, patience and proactive (search for coffee management information), and self-belief.

I learnt to be a persistent and determined coffee farmer. [...], coffee farming takes a lot of commitment to make good profits. (**Interview 042, male, Bukhokho Coffee IP**).[...] have the self-belief that I can perform the entire coffee value chain activities if resources allow. (**Interview 027**)

4.3.2. Harvest, post-harvest, and processing

Like production, farmers learned that networks are the source of knowledge e.g. picking only red ripe cherries, cleaning, sorting, floating, pulping, drying on a raised platform.

In terms of practices, through the above networks, coffee farmers now perform activities leading to high-quality coffee e.g. pick red ripe cherries, process.

I now pick only red ripe cherries leaving the green ones for the next harvest making me pick more times as compared to the past when I harvested everything. Moreover, I use skilled and trained pickers. Hence, my cherries fetch 1450/= per kg at Chesiyo mixed farm buyers at, a better price compared to 800/= I earlier sold. (**Interview 006, male, Chema coffee IP**)

I observed my father's processing methods e.g. he washes, pulps, dries, roasts, pounds coffee in a motor, and grinds with a stone into coffee powder/beverage. He also roasts coffee, mixes it with ground nuts. (**Interview 017**)

Likewise, farmers learned that red ripe coffee berries weigh more than the unsorted ones while the unsorted ones weigh more than green and sorted cherries.

Red ripe coffee berries are usually heavier compared to mixed and so are unsorted. (**Interview 015**)

Additionally, these networks offered inputs such as pulping machines and inputs purchase financing. Besides, family members mainly provide labor for cleaning, washing, sorting. Regarding self, successful coffee farming requires patience as waiting to selectively pick uniformly ripe coffee. As stated by a farmer:

I learned to be patient and to involve skilled labor in the coffee process like sorting and picking. Additionally, coffee being my source of income means paying workers well for better returns. (**Interview 022**)

Moreover, others learned to perform additional value chain roles. For instance:

My new role is as a professional coffee picker. Before the training I hadn't understood the importance of coffee quality compared to quantity hence I used to pick anyhow but now I only pick ripe cherries. (**Interview 002**)

Also, producing quality coffee requires a total change of attitude. My perception of picking has now changed. I only pick red cherries. (**Interview 008, female, Chema Coffee IP**)

4.3.3. Marketing

Relating to the above phases, with the support obtained from networks coffee farmers learned to focus on activities relevant to the market. Similarly, the demand for high-quality coffee cherries led to improved coffee quality and bulk coffee as stated by **Interview 029, male, Butta coffee IP ...** *I have learned to store my coffee when prices are low and sell when prices scale up. I now appreciate coffee farming as a business, and to me, coffee is black gold.* Moreover, competition among buyers led to price rise i.e. 4000–6500/= and 1200–1800/= per kg of cherries and parchment respectively as stated by **FGD Kapchorwa participants**, *higher coffee cherry prices per kilogram offered specifically 1800/= by Kyagalanyi, KOCAFE, and Great lakes forced Kawacom to increase theirs from 1200 to 1400/=.*

In the same vein, farmers learned that unreliable competitors and buyers of coffee on credit are an opportunity for farmers to engage in coffee trader by purchasing coffee within their IPs and untrustworthy middlemen are an opportunity to find alternative markets that give bonuses inform of finances and production, pulping drying machines. Then, the re-negotiation of terms with buyers led to better terms. Furthermore, these farmers learned coffee to properly weigh after being cheated by coffee buyers. Also succeeding in coffee farming means taking time to identify and choose partners, keep clear records, sell several bi-products for coffee including coffee husks, roasted and ground coffee. Additionally, obtaining coffee income requires persistence, courage, investing capital, and a positive attitude to challenges. As stated by a farmer:

The challenges I face in coffee farming opened my eyes to hard work and keeping busy hence challenges are a foundation to my success. (**Interview 025**)

Finally, coffee farming requires capital investment, self-belief, good knowledge-seeking, and sharing attitude. In terms of self, coffee farmers learned to perform multiple roles

such as coffee picking, processing, trading, etc. For instance: *I wasn't getting a lot from just being a farmer so when I joined the IP, I learned to add value to coffee, buy more coffee from other farmers and share my experiences with other farmers and traders. (Interview 049 participant)*

5. Discussion and conclusion

This paper sought to shed light on four interdependent elements of farmers' EL processes in the context of the Ugandan coffee sector, and namely: the challenging experiences triggering farmers' EL; farmers' exemplary learning activities and outcomes; and, IP's role in farmers' EL. As discussed, this study adds to the existing literature on farmers' learning processes in IPs by zooming into farmers' experiential learning processes and on the moderated mediation of IPs on different stages of this experiential process (Appendix 4).

Unlike previous IP literature that tackled fragmented challenges especially low crop yields and poor market access (Teno and Cadilhon 2016; Njingulula et al. 2014), this study disentangles each step of the experiential process occurring in IPs from farmers' challenging experiences to their learning activities and knowledge development and across multiple value chain stages. About figure 4, the study explicitly links value chain challenges faced by farmers to specific learning activities and knowledge in three value chain domains. Thus, first, this study found that challenges like pests and diseases at production, poor quality and quantity at HPHCP, low and fluctuating coffee prices at marketing triggered farmers' EL. For example, the White Coffee Stem borer and Coffee-berry disease were responsible for coffee yield loss (Cerdeira et al. 2017) and poor quality. Furthermore, most farmers dry coffee naturally under the sun on bare soil, and other surfaces exposing them to dust, microbe contamination, unexpected rain showers, and high temperatures ($> 28^{\circ}\text{C}$) (UCDA 2019c). Finally, low and fluctuating coffee prices were caused by poor coffee quality, which was a result of all pre-and postharvest activities. All these challenging experiences stemmed from the following: (1) farmers' limited access to necessary inputs; (2) poor production, postharvest handling, and marketing practices; (3) personal weaknesses; (4) negative attitude towards coffee; (5) market dynamics like few coffee buyers; and (6) the coffee policy gap.

Undeniably, IP farmers access value chain knowledge and skills (Mulema and Mazur 2016; Nyikahadzoi et al. 2012) through attending IP supported/conducted training, meetings, workshops, inter IP information sharing, demonstrations, and extension materials. Besides linking specific value chain challenges to learning activities, to learn from these challenging experiences, coffee farmers learn through interaction, pondering solutions through in-depth reflective dialogue. This finding confirms what is known about outside IP literature on how actors, including farmers, learn in social (Murphy, Wilson, and Greenberg 2017) and reflexive (Glowacki-Dudka et al. 2017) environments.

Visibly, IPs play an important role for farmers to reflect, in a socially interactive space, about their past experiences, thus generating outcomes throughout IP learning activities. Unlike previous IP literature that captured knowledge and skills at production, postharvest, and marketing practices as the most important learning outcome for farmers (Brouwer et al. 2015; Kilelu et al. 2011), these findings shed light on two new aspects. First, this study does not only capture coffee value chain practices and technologies, but zooms into the knowledge domains that farmers developed along the EL process,

such as knowledge about networks, and farmers' strengths and weaknesses. Second, the findings show how the IPs support and manage relationships among farmers and other stakeholders, which are at times conflictual. Thus, IPs facilitate farmers' interaction, communication, as well as providing space for farmers to build trust as a necessary component of managing their interpersonal relationships. Furthermore, farmers improved their patience, humility, self-expression, advocacy competencies, the formation of realistic expectations, time management, leadership based on example, motivation to work hard, and team-playing spirit as a result of participating in IPs.

In addition to previous work on IPs and learning (Lamers et al. 2017) the empirical findings highlight how farmers learn through their social interactions. Coffee farmers engage a diversity of actors to gain access to a wide range of value chain experiential knowledge to address ill-structured challenges they face. Implying that farmers who are interested in learning and implementing new technologies and practices across the value chain are not limited in the network types to interact with.

6. Implications

Based on the study findings, this paper suggests that – from a theoretical standpoint – learning models based on social interactions, e.g. IPs, have the potential to trigger higher-order learning from reflective analysis of challenging experiences. The current study emphasizes that EL fully unfolds when learners gauge lessons and draw conclusions through identifying the challenges, root causes, solutions, propose methods of action as well as the actual implementation of solutions and proposed methods of action. The study of coffee farmer learning makes a significant contribution to transformative learning theory (Schnepfleitner and Ferreira 2021; Chang 2021) by clarifying how farmers develop problem-solving knowledge by performing learning activities. In particular, the study shows that farmers use two skills i.e. reflective analysis and active experimentation to solve their problems/challenges. Therefore coffee farmer's transformative learning is accomplished through three collaborative phases: recognizing value chain problems, taking action(reflecting and testing out options), and generating problem-solving knowledge. Directly, this study contributes two things to Kolb's theory of experiential learning: First, this research unpacks the theory's core concepts, in response to (Morris 2019) who calls for clarification on what key words in Kolb's model, such as concrete experience, mean. This gap is addressed in the current study by capturing farmers' challenging experiences along the value chain in three key value chain domains, transformation strategies, and experiential knowledge types. Second, this research fills in the gap of Kolb's experiential learning model being less widely applied in empirical contexts (Bergsteiner, Avery, and Neumann 2010; Jarvis 2012), by applying it not only to the rural value chain but also to institutional settings, such as IPs.

In order to learn, one must reflect on what happened and how it happened (Di Stefano et al. 2014). However, reflective learning does not happen by accident. Reflectivity must be deliberately elicited by learning interventions (Ajjawi and Boud 2018). Hence, in managerial terms these findings suggest that coffee farmers engaging in learning activities must rely on their networks and stimulate commitment and participation in IPs to strengthen their learning outcomes. Second, IPs should emphasize awareness on the

importance of sharing experiences, critical reflection, and the role of external sources, while also enabling each person to access useful information for analysis, reflection in tandem with the collective objectives. Third, IPs should encourage members to exchange information, grant freedom to express opinions to stimulate collective thinking, ensure personal development, and allow people to feel part of the ongoing IP activities.

In terms of policy implications, IPs will boost farmers' experiential learning, according to the current study. In order to avoid repeating the shortcomings of earlier learning methods such as farmer field schools, policymakers must carefully consider aspects of sustainability in the design and implementation of learning programs. Since IPs in the study site depend on donor support (Ragasa et al. 2016; Dabire et al. 2017; Schut et al. 2018), the following lessons may be used by policymakers while designing and implementing learning programs: To begin with, IPs such as Mt.Elgon women in coffee developed and are enforcing bi-laws to control fake inputs and coffee products in collaboration with the local government. Joint development and implementation of bi-laws is an opportunity that can be drawn and used to help farmers learn more effectively. Moreover, several IPs, such as Arokwo, Chesiyo, and Bukusu, serve as cooperatives, wash stations, coffee processors, and collection centers, as well as funding their own learning activities. Village savings and loans schemes, joint projects, and assets are among the income pooling practices that these IPs have established internally. Policymakers could use this lesson to assist other IPs in obtaining legal status in order to improve their capacity for demand-driven learning. This policy recommendation is similar to that of (Chilundo et al. 2020; Mdemu et al. 2020) who suggested that self-sustaining irrigation systems can be used as a measure of IP sustainability. Finally, most of the services, such as advisors, are provided by fellow farmers in the study IPs. A farmer-to-farmer approach, in which farmers learn from one another inside and through IPs, can be a good long-term learning mechanism.

Finally, despite these promising results, questions remain as follows. Firstly, the current study emphasizes solving challenging experiences, other studies could include emotions associated with challenging experiences and positive experiences. Additionally, moderated mediation effect of social factors (e.g. IP processes) and learning activities on the experiences and learning outcomes relationship remains unclear. Given the EL theory's shortage of sound empirical foundation and coffee's position in the global market, future research to address these questions is encouraged.

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No potential conflict of interest was reported by the authors.

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References

- Adjei-Nsiah, Samuel, and Laurens Klerkx. 2016. "Innovation Platforms and Institutional Change: The Case of Small-Scale Palm Oil Processing in Ghana." *Cahiers Agricultures* 25 (6): 1–9.
- Ajjawi, Rola, and David Boud. 2018. "Examining the Nature and Effects of Feedback Dialogue." *Assessment & Evaluation in Higher Education* 43 (7): 1106–1119.
- Akpo, Essegbemon, Todd A Crane, Pierre V Vissoh, and Rigobert C Tossou. 2015. "Co-production of Knowledge in Multi-Stakeholder Processes: Analyzing Joint Experimentation as Social Learning." *The Journal of Agricultural Education and Extension* 21 (4): 369–388.
- Akpo, Essegbemon, Chris O Ojiewo, Issoufou Kapran, Lucky O Omoigui, Agathe Diamo, and Rajeev K Varshney. 2020. *Enhancing Smallholder Farmers' Access to Seed of Improved Legume Varieties Through Multi-Stakeholder Platforms: Learning from the TLIII Project Experiences in sub-Saharan Africa and South Asia*. Singapore: Springer Nature: Singapore.
- Amankwah, Kwadwo, Anastasiya Shtaltovna, Girma Kelboro, and Anna-Katharina Hornidge. 2015. "A Critical Review of the Follow-the-Innovation Approach: Stakeholder Collaboration and Agricultural Innovation Development." ZEF Working Paper Series.
- Ampadu-Ameyaw, R., R. Omari, O. G. Essegbey, and S. Dry. 2016. *Status of Agricultural Innovations, Innovation Platforms and Innovation Investment*. 2015 PARI Project Country Report. Paper presented at the Forum for Agricultural Research in Africa.
- Asfeldt, Morten, and Simon Beames. 2017. "Trusting the Journey: Embracing the Unpredictable and Difficult to Measure Nature of Wilderness Educational Expeditions." *Journal of Experiential Education* 40 (1): 72–86.
- Asfeldt, Morten, Glen Hvenegaard, and Rebecca Purc-Stephenson. 2018. "Group Writing, Reflection, and Discovery: A Model for Enhancing Learning on Wilderness Educational Expeditions." *Journal of Experiential Education* 41 (3): 241–260.
- Bergsteiner, Harald, Gayle C Avery, and Ruth Neumann. 2010. "Kolb's Experiential Learning Model: Critique from a Modelling Perspective." *Studies in Continuing Education* 32 (1): 29–46.
- Blair, Denice J. 2016. "Experiential Learning for Teacher Professional Development at Historic Sites." *Journal of Experiential Education* 39 (2): 130–144.
- Bose, Ranjit. 2004. "Knowledge Management Metrics." *Industrial Management & Data Systems* 104 (6): 457–468.
- Brouwer, J. H., A. J. Woodhill, Minu Hemmati, K. S. Verhoosel, and S. M. van Vugt. 2015. *The MSP Guide: How to Design and Facilitate Multi-Stakeholder Partnerships*. Centre for Development Innovation. Wageningen UR, Wageningen.
- Bryman, Alan. 2016. *Social Research Methods*. Oxford university press. United Kingdom.
- Cadilhon, Joseph J. 2013. "A Conceptual Framework to Evaluate the Impact of Innovation Platforms on Agrifood Value Chains Development."
- Camacho-Villa, Tania Carolina, Conny Almekinders, Jon Hellin, Tania Eulalia Martinez-Cruz, Roberto Rendon-Medel, Francisco Guevara-Hernández, Tina D Beuchelt, and Bram Govaerts. 2016. "The Evolution of the MasAgro Hubs: Responsiveness and Serendipity as Drivers of Agricultural Innovation in a Dynamic and Heterogeneous Context." *The Journal of Agricultural Education and Extension* 22 (5): 455–470.

- Cerda, Rolando, Jacques Avelino, Christian Gary, Philippe Tixier, Esther Lechevallier, and Clémentine Allinne. 2017. "Primary and Secondary Yield Losses Caused by Pests and Diseases: Assessment and Modeling in Coffee." *PloS One* 12 (1): 1–17.
- Chang, Ching-Wen. 2021. "The Mandala Model of Transformative Learning." *Journal of Transformative Education*, 1541344620986541.
- Chilundo, M., W. de Sousa, E. W. Christen, J. Faduco, H. Bjornlund, E. Cheveia, P. Munguambe, F. Jorge, R. Stirzaker, and A. F. van Rooyen. 2020. "Do Agricultural Innovation Platforms and Soil Moisture and Nutrient Monitoring Tools Improve the Production and Livelihood of Smallholder Irrigators in Mozambique?" *International Journal of Water Resources Development* 36 (sup1): S127–SS47. doi:10.1080/07900627.2020.1760799.
- Collins, Rachel H, Jim Sibthorp, and John Gookin. 2016. "Developing Ill-Structured Problem-Solving Skills Through Wilderness Education." *Journal of Experiential Education* 39 (2): 179–195.
- Dabire, Der, Nadine Andrieu, Patrice Djamien, Kalifa Coulibaly, Helena Posthumus, Amadou Mohamadoun Diallo, Medina Karambiri, Jean-Marie Douzet, and Bernard Triomphe. 2017. "Operationalizing an Innovation Platform Approach for Community-Based Participatory Research on Conservation Agriculture in Burkina Faso." *Experimental Agriculture* 53 (3): 460.
- Davies, Jocelyn, Yiheyis Maru, Andy Hall, Issoufou Kollo Abdourhamane, Anselme Adegbedi, Peter Carberry, Kumuda Dorai, Stella Ama Ennin, Prince Maxwell Etwire, and Larelle McMillan. 2018. "Understanding Innovation Platform Effectiveness Through Experiences from West and Central Africa." *Agricultural Systems* 165: 321–334.
- Davis, Kristin, Steven Franzel, and David J Spielman. 2019. "Extension Options for Better Livelihoods and Poverty Reduction: A Selected Review 2012-2015." *Gates Open Res* 33(386), 386.
- Di Stefano, Giada, Francesca Gino, Gary P Pisano, Bradley Staats, and Giada Di-Stefano. 2014. *Learning by Thinking: How Reflection Aids Performance*. Boston, MA: Harvard Business School.
- Fatunbi, A. O. A., A. Youdeowei, S. I. Ohiomoba, A. A. Adekunle, and O. O. Akinbanijo. 2016. "Agricultural Innovation Platforms: Framework for Improving Sustainable Livelihoods in Africa Accra Ghana".
- Faysse, Nicolas. 2006. "Troubles on the Way: An Analysis of the Challenges Faced by Multi-Stakeholder Platforms." Paper presented at the Natural Resources Forum.
- Flor, Rica Joy, Cees Leeuwis, Harro Maat, and Martin Gummert. 2016. "Rice Postharvest Learning Alliance in Cambodia: Comparison of Assumptions and Implementation of a Network Approach." *Journal of Development Effectiveness* 8 (4): 489–507.
- Gioia, Dennis A., G. Kevin, Aimee L. Corley. 2013. "Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology." *Organizational Research Methods* 16 (1): 15–31.
- Glowacki-Dudka, Michelle, Cathy Mullett, Wendy Griswold, Amy Baize-Ward, Crissy Vetor-Suits, Susan Cole Londt, and Maria Williams-Hawkins. 2017. "Walking the Talk: Expectations and Intentions of a Popular Education Workshop." *Journal of Experiential Education* 40 (4): 377–393.
- Gorman, Monica. 2019. "Becoming an Agricultural Advisor—the Rationale, the Plan and the Implementation of a Model of Reflective Practice in Extension Higher Education." *The Journal of Agricultural Education and Extension* 25 (2): 179–191.
- Grant, Adam M. 2007. "Relational Job Design and the Motivation to Make a Prosocial Difference." *Academy of Management Review* 32 (2): 393–417.
- Harper, Nevin J. 2018. "Locating Self in Place During a Study Abroad Experience: Emerging Adults, Global Awareness, and the Andes." *Journal of Experiential Education* 41 (3): 295–311.
- Hinnou, Léonard Cossi, Roch Lambert Mongbo, Josey Kamanda, and Sidi Sanyang. 2018. "Innovation Platform and Governance of Local Rice Value Chains in Benin: Between Game of Power and Internal Democracy?" *Cogent Food & Agriculture* 4 (1): 1433346.
- Hoang, Quoc Dinh, Thomas Bernhard Dufhues, and Gertrud Buchenrieder. 2016. "Individual Social Capital and Access to Rural Services in Northern Vietnam." *International Journal of Social Economics* 43 (4): 363–381.

- Holstein, James A, and Jaber F Gubrium. 2016. "Narrative Practice and the Active Interview." *Qualitative Research* 67–82.
- Ipe, Minu. 2003. "Knowledge Sharing in Organizations: A Conceptual Framework." *Human Resource Development Review* 2 (4): 337–359.
- Jarvis, Peter. 2012. *Adult Learning in the Social Context*. London: Routledge.
- Johanson, Jan, and Jan-Erik Vahlne. 1977. "The Internationalization Process of the Firm – a Model of Knowledge Development and Increasing Foreign Market Commitments." *Journal of International Business Studies* 8 (1): 23–32.
- Kabambe, V. H., A. D. C. Chilimba, A. Ngwira, M. Mbawe, G. Kambauwa, and P. Mapfumo. 2012. "Using Innovation Platforms to Scale Out Soil Acidity-Ameliorating Technologies in Dedza District in Central Malawi." *African Journal of Biotechnology* 11 (3): 561–569.
- Kayes, Anna B, D. Christopher Kayes, and David A Kolb. 2005. "Experiential Learning in Teams." *Simulation & Gaming* 36 (3): 330–354.
- Kelly, Nick, John McLean Bennett, and Ann Starasts. 2017. "Networked Learning for Agricultural Extension: A Framework for Analysis and two Cases." *The Journal of Agricultural Education and Extension* 23 (5): 399–414.
- Kilelu, Catherine W, Laurens Klerkx, and Cees Leeuwis. 2014. "How Dynamics of Learning are Linked to Innovation Support Services: Insights from a Smallholder Commercialization Project in Kenya." *The Journal of Agricultural Education and Extension* 20 (2): 213–232.
- Kilelu, Catherine W, Laurens Klerkx, Cees Leeuwis, and Andy Hall. 2011. "Beyond Knowledge Brokering: An Exploratory Study on Innovation Intermediaries in an Evolving Smallholder Agricultural System in Kenya." *Knowledge Management for Development Journal* 7 (1): 84–108.
- Kisfalvi, Veronika, and David Oliver. 2015. "Creating and Maintaining a Safe Space in Experiential Learning." *Journal of Management Education* 39 (6): 713–740.
- Klerkx, Laurens, Andy Hall, and Cees Leeuwis. 2009. "Strengthening Agricultural Innovation Capacity: Are Innovation Brokers the Answer?" *International Journal of Agricultural Resources, Governance and Ecology* 8 (5–6): 409–438.
- Klerkx, Laurens, and Amy Proctor. 2013. "Beyond Fragmentation and Disconnect: Networks for Knowledge Exchange in the English Land Management Advisory System." *Land Use Policy* 30 (1): 13–24.
- Kolb, David A. 2015. *Experiential Learning: Experience as the Source of Learning and Development*. Upper Saddle River, NJ: Pearson Education.
- Kolb, Alice, and David Kolb. 2005. "Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education." *Academy of Management Learning & Education* 4 (2): 193–212.
- Kolb, Alice, and David Kolb. 2009. "Experiential Learning Theory: A Dynamic, Holistic Approach to Management Learning, Education and Development." *The SAGE Handbook of Management Learning, Education and Development* 42: 68.
- Korthagen, Fred AJ. 2005. "The Organization in Balance: Reflection and Intuition as Complementary Processes." *Management Learning* 36 (3): 371–387.
- Krumboltz, John D. 2009. "The Happenstance Learning Theory." *Journal of Career Assessment* 17 (2): 135–154.
- Kusters, Koen, Louise Buck, Maartje de Graaf, Peter Minang, Cora van Oosten, and Roderick Zagt. 2018. "Participatory Planning, Monitoring and Evaluation of Multi-Stakeholder Platforms in Integrated Landscape Initiatives." *Environmental Management* 62 (1): 170–181.
- Lamers, Dieuwke, Marc Schut, Laurens Klerkx, and Piet van Asten. 2017. "Compositional Dynamics of Multilevel Innovation Platforms in Agricultural Research for Development." *Science and Public Policy* 44 (6): 739–752. doi:10.1093/scipol/scx009.
- Lindh, Ida, and Sara Thorgren. 2016. "Critical Event Recognition: An Extended View of Reflective Learning." *Management Learning* 47 (5): 525–542.
- MAAIF. 2013. *The National Coffee Policy*. Entebbe: MAAIF.
- Magala, Damalie Babirye, Margaret Najjingo Mangheni, and Richard Fred Miiro. 2019. "Actor Social Networks as Knowledge Sharing Mechanisms in Multi-Stakeholder Processes: A Case of Coffee Innovation Platforms of Uganda." *The Journal of Agricultural Education and Extension* 25 (4): 323–336. doi:10.1080/1389224X.2019.1629971.

- Mahiya, Innocent T. 2020. "An Empirical Chronicling of How Agricultural Innovation Platforms Were Established in Hwedza, Zimbabwe." *Journal of Asian and African Studies* 56 (4): 789–803.
- Manolis, Chris, David J Burns, Rashmi Assudani, and Ravi Chinta. 2013. "Assessing Experiential Learning Styles: A Methodological Reconstruction and Validation of the Kolb Learning Style Inventory." *Learning and Individual Differences* 23: 44–52.
- Martey, Edward, Prince M Etwire, Alexander N Wiredu, and Wilson Dogbe. 2014. "Factors Influencing Willingness to Participate in Multi-Stakeholder Platform by Smallholder Farmers in Northern Ghana: Implication for Research and Development." *Agricultural and Food Economics* 2 (1): 11.
- Martín-de Castro, Gregorio, Pedro López-Sáez, Miriam Delgado-Verde, Tatiana Andreeva, and Aino Kianto. 2011. "Knowledge Processes, Knowledge-Intensity and Innovation: A Moderated Mediation Analysis." *Journal of Knowledge Management* 15 (6): 1016–1034.
- Matsuo, Makoto, and Masaki Nagata. 2020. "A Revised Model of Experiential Learning with a Debriefing Checklist." *International Journal of Training and Development* 24 (2): 144–153.
- Mdemu, M., L. Kissoly, H. Bjornlund, E. Kimaro, E. W. Christen, A. van Rooyen, R. Stirzaker, and P. Ramshaw. 2020. "The Role of Soil Water Monitoring Tools and Agricultural Innovation Platforms in Improving Food Security and Income of Farmers in Smallholder Irrigation Schemes in Tanzania." *International Journal of Water Resources Development* 36 (sup1): S148–SS70. doi:10.1080/07900627.2020.1765746.
- Miettinen, Reijo. 2000. "The Concept of Experiential Learning and John Dewey's Theory of Reflective Thought and Action." *International Journal of Lifelong Education* 19 (1): 54–72.
- Miles, Matthew B., A. Michael Huberman, and Johnny Saldana. 2013. *Qualitative Data Analysis*. Thousand Oaks: Sage.
- Miller, Richard J, and Rosemary Maellaro. 2016. "Getting to the Root of the Problem in Experiential Learning: Using Problem Solving and Collective Reflection to Improve Learning Outcomes." *Journal of Management Education* 40 (2): 170–193.
- Morris, Thomas Howard. 2019. "Experiential Learning—a Systematic Review and Revision of Kolb's Model." *Interactive Learning Environments* 28 (8): 1064–1077.
- Mulema, Annet Abenakyo, and Robert Edward Mazur. 2016. "Motivation and Participation in Multi-Stakeholder Innovation Platforms in the Great Lakes Region of Africa." *Community Development Journal* 51 (2): 212–228.
- Murphy, Lynne, Jacqueline Wilson, and Stacey Greenberg. 2017. "Equine-assisted Experiential Learning in Occupational Therapy Education." *Journal of Experiential Education* 40 (4): 366–376.
- Newman, Brian D, and Kurt W Conrad. 2000. "A Framework for Characterizing Knowledge Management Methods, Practices, and Technologies." Paper presented at the PAKM.
- Njingulula, Paulin, P. Wimba, K. F. Masuki, M. Katafire, M. Ugen, and E. Birachi. 2014. "Strengthening Local Seed Systems Within the Bean Value Chain: Experience of Agricultural Innovation Platforms in the Democratic Republic of Congo." *African Crop Science Journal* 22: 1003–1012.
- Nonaka, Ikujiro, and Ryoko Toyama. 2015. "The Knowledge-Creating Theory Revisited: Knowledge Creation as a Synthesizing Process." In *The Essentials of Knowledge Management* 95–110. London: Palgrave Macmillan.
- Nyikahadzoi, Kefasi, P. Pali, A. O. Fatunbi, L. O. Olarinde, Jemimah Njuki, and A. O. Adekunle. 2012. "Stakeholder Participation in Innovation Platform and Implications for Integrated Agricultural Research for Development (IAR4D)." *International Journal of Agriculture and Forestry* 2 (3): 92–100.
- Pali, Pamela N, and Kees Swaans. 2013. *Guidelines for Innovation Platforms: Facilitation, Monitoring and Evaluation*. ILRI Manual 8. Nairobi, Kenya: ILRI.
- Pant, Laxmi Prasad. 2012. "Learning and Innovation Competence in Agricultural and Rural Development." *The Journal of Agricultural Education and Extension* 18 (3): 205–230.
- Probst, L., H. T. Ndah, P. Rodrigues, G. Basch, K. Coulibaly, and J. Schuler. 2019. "From Adoption Potential to Transformative Learning Around Conservation Agriculture." *The Journal of Agricultural Education and Extension* 25 (1): 25–45.

- Ragasa, Catherine, John Ulimwengu, Josee Randriamamonjy, and Thaddee Badibanga. 2016. "Factors Affecting Performance of Agricultural Extension: Evidence from Democratic Republic of Congo." *The Journal of Agricultural Education and Extension* 22 (2): 113–143.
- Roberts, Jay. 2018. *From the Editor: The Possibilities and Limitations of Experiential Learning Research in Higher Education*. Los Angeles, CA: SAGE.
- Saint Ville, Arlette S, Gordon M Hickey, Uli Locher, and Leroy E Phillip. 2016. "Exploring the Role of Social Capital in Influencing Knowledge Flows and Innovation in Smallholder Farming Communities in the Caribbean." *Food Security* 8 (3): 535–549.
- Sanyang, Sidi, Rhiannon Pyburn, Remco Mur, and Geneviève Audet-Bélanger. 2014. *Against the Grain and to the Roots: Maize and Cassava Innovation Platforms in West and Central Africa*. Arnhem: LM Publishers.
- Schnepfleitner, Frances Maureen, and Marco Paulo Ferreira. 2021. "Transformative Learning Theory – Is It Time to Add A Fourth Core Element?" *Journal of Educational Studies and Multidisciplinary Approaches* 1 (1): 40–49.
- Schreier, Margrit. 2012. *Qualitative Content Analysis in Practice*. London: Sage.
- Schut, Marc. 2017. "The Sustainability and Success of Innovation Platforms".
- Schut, Marc, Jean-Joseph Cadilhon, Michael Misiko, and Iddo Dror. 2018. "Do Mature Innovation Platforms Make a Difference in Agricultural Research for Development? A Meta-Analysis of Case Studies." *Experimental Agriculture* 54 (1): 96–119.
- Schut, Marc, Josey Kamanda, Andreas Gramzow, Thomas Dubois, Dietmar Stoian, Jens A Andersson, Iddo Dror, Murat Sartas, Remco Mur, and Shinan Kassam. 2019. "Innovation Platforms in Agricultural Research for Development: Ex-Ante Appraisal of the Purposes and Conditions Under Which Innovation Platforms Can Contribute to Agricultural Development Outcomes." *Experimental Agriculture* 55 (4): 575–596.
- Seaman, Jayson, Mike Brown, and John Quay. 2017. "The Evolution of Experiential Learning Theory: Tracing Lines of Research in the JEE." *Journal of Experiential Education* 40 (4): NP1–NP21.
- Simpson, Brent M, Steven Franzel, Ann Degrande, Godfrey Kundhlande, and Sygnola Tsafack. 2015. Farmer-to-farmer Extension: Issues in Planning and Implementation." *University of Illinois, Modernizing Extension and Advisory Services (MEAS) Technical Note, USA*.
- Smith, Heidi A, and Teresa Segbers. 2018. "The Impact of Transculturality on Student Experience of Higher Education." *Journal of Experiential Education* 41 (1): 75–89.
- Takahashi, Kazushi, Rie Muraoka, and Keijiro Otsuka. 2020. "Technology Adoption, Impact, and Extension in Developing Countries' Agriculture: A Review of the Recent Literature." *Agricultural Economics* 51 (1): 31–45.
- Teno, Gabriel, and Jean-Joseph Cadilhon. 2016. "Innovation Platforms as a Tool for Improving Agricultural Production: The Case of Yatenga Province, Northern Burkina Faso." *Field Actions Science Reports. The Journal of Field Actions* (9): 1–13.
- Thiele, Graham, André Devaux, Iván Reinoso, Hernán Pico, Fabián Montesdeoca, Manuel Pumisacho, Jorge Andrade-Piedra, Claudio Velasco, Paola Flores, and Raúl Esprella. 2011. "Multi-stakeholder Platforms for Linking Small Farmers to Value Chains: Evidence from the Andes." *International Journal of Agricultural Sustainability* 9 (3): 423–433.
- Tomkins, Leah, and Eda Ulus. 2016. "Oh, was That "Experiential Learning?!" Spaces, Synergies and Surprises with Kolb's Learning Cycle." *Management Learning* 47 (2): 158–178.
- Tui, S. Homann-Kee, Adewale Adekunle, Mark Lundy, J. Tucker, E. Birachi, M. Schut, and L. W. A. Klerkx. 2013. *What are Innovation Platforms?* Innovation platforms practice brief 1, 1–7. Nairobi, Kenya: ILRI.
- UBOS. 2017. "Statistical Abstract, 2015." Kampala: Uganda Bureau of Statistics.
- UCDA. 2014. "Uganda National Coffee Strategy 2040 Plan for 2014/15–2019/20." Kampala.
- UCDA. 2019b. Fact Sheet.
- UCDA. 2019c. "Primary Processing".
- van Paassen, Annemarie, Laurens Klerkx, Richard Adu-Acheampong, Samuel Adjei-Nsiah, and Elisabeth Zannoue. 2014. "Agricultural Innovation Platforms in West Africa: How Does Strategic Institutional Entrepreneurship Unfold in Different Value Chain Contexts?" *Outlook on Agriculture* 43 (3): 193–200.

- van Rooyen, André F, Peter Ramshaw, Martin Moyo, Richard Stirzaker, and Henning Bjornlund. 2017. "Theory and Application of Agricultural Innovation Platforms for Improved Irrigation Scheme Management in Southern Africa." *International Journal of Water Resources Development* 33 (5): 804–823.
- Vasilaky, Kathryn N, and Kenneth L Leonard. 2018. "As Good as the Networks They Keep? Improving Outcomes Through Weak Ties in Rural Uganda." *Economic Development and Cultural Change* 66 (4): 755–792.
- Vellema, Sietze, Giel Ton, Nina de Roo, and Jeroen van Wijk. 2013. "Value Chains, Partnerships and Development: Using Case Studies to Refine Programme Theories." *Evaluation* 19 (3): 304–320.
- Vince, Russ. 2010. "Anxiety, Politics and Critical Management Education." *British Journal of Management* 21: s26–s39.
- Warner, Jeroen. 2005. "Multi-stakeholder Platforms: Integrating Society in Water Resource Management?" *Ambiente & Sociedade* 8 (2): 4–28.
- Welch, Deborah, Karen Grossaint, Katherine Reid, and Cindy Walker. 2014. "Strengths-based Leadership Development: Insights from Expert Coaches." *Consulting Psychology Journal: Practice and Research* 66 (1): 20.
- Wilson, John P, and Colin Beard. 2013. *Experiential Learning: A Handbook for Education, Training and Coaching*. Great Britain: Kogan Page.
- Yin, R. K. 2003. *Case Study Research: Design and Methods*. Thousand Oaks, CA: Sage. Politics of Education Association Bulletin.

Appendices

Appendix 1: Core questions in the experiences, learning activities, and learning outcome components of EL

Farmer's responsibility in learning – 3 P model clustering	Cross-reference Kolb's (2015) model as well as reviews by (Matsuo and Nagata 2020; Morris 2019)	Questions asked		
		Key informant interviews	Focus group discussions	Individual interviews
Experiences	-Expected experiences arise from practical active experimentation- Unexpected experiences	1. What challenges did farmers in your IP face at coffee production, harvesting, post-harvest handling, coffee processing, and marketing in the past five years (2014–2018)	1a. What challenges did you face at coffee production, harvesting, post-harvest handling, coffee processing, and marketing in the past five years (2014–2018)1b: What happened before 2014?1c: What were your expectations?	1. What challenges did you face at coffee production, harvesting, post-harvest handling, coffee processing, and marketing in the past – five years (2014–2018)
Learning activities	Reflective analysis and active experimentation	Reflecting on the challenges above, 2a. What major learning activities did they carry out to solve such challenges after joining IPs?2b. Did anybody in the IP and/or through the IP give any insights on how to solve such challenges?2c. Who gave in the IP and/or through the IP gave insights?2d. How they (2a and b) helped in performing activities related to solving challenges?	Reflecting on the challenges above,2a. What major learning activities did you carry out to solve such challenges before organizing yourselves into innovation platforms?2b. What major learning activities did you carry out to solve such challenges after organizing yourselves into innovation platforms?2c. Did anybody in the IP and/or through the IP give you insights about how to solve such challenges?2d. Who in the IP and/or through the IP gave you insights? How?	Reflecting on the challenges above,2a. What major learning activities did you carry out to solve such challenges after joining the IP?2b. Did anybody in the IP and/or through the IP give you any insights about how to solve such challenges?2c. Who in the IP and/or through the IP gave you insights and, 2d.how?
Learning outcomes	Abstract conceptualization	Through engaging in the learning activities mentioned in 2 above,3a. Which people and organizations have they gotten to know (Include both new and existing)3b. What is the role of the above (3a) in farmer learning to solve their harvest, postharvest handling, processing, and marketing challenges3c. What	Through engaging in the learning activities mentioned in 2 above,3a. Which people and organizations have you gotten to know (Include both new and existing)3b. What is the role of the above (3a) in your learning to solve their harvest, postharvest handling, processing, and marketing challenges3c. What	Through engaging in the learning activities mentioned in 2 above,3a. Which people and organizations have you gotten to know (Include both new and existing)3b. What is the role of the above (3a) in your learning to solve their harvest, postharvest handling, processing, and marketing challenges3c. What

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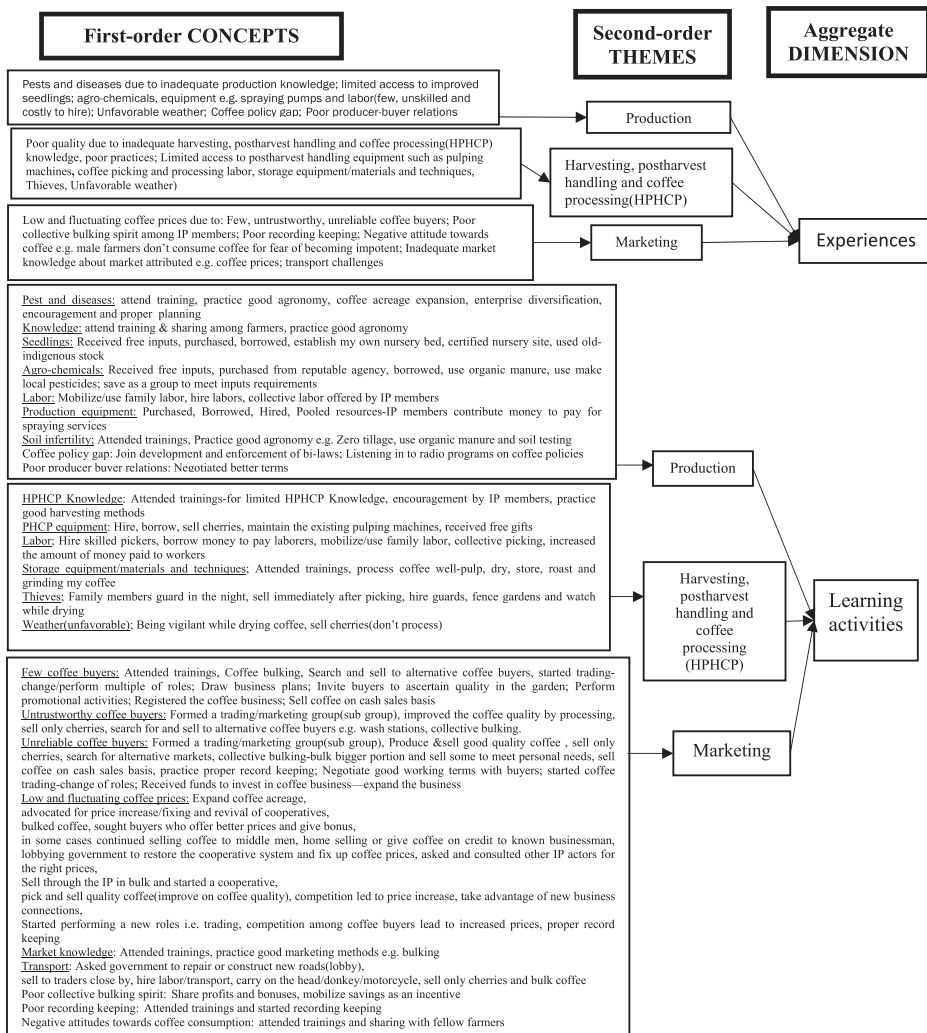
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Farmer's responsibility in learning – 3 P model clustering	Cross-reference Kolb's (2015) model as well as reviews by (Matsuo and Nagata 2020; Morris 2019)	Questions asked		
		Key informant interviews	Focus group discussions	Individual interviews
		new production, harvest, postharvest handling, processing, and marketing practices have farmers known about?3d. What personal strengths and weaknesses have farmers realized at production, harvest, postharvest handling, processing, and marketing stages?	new production, harvest, postharvest handling, processing, and marketing practices have you known about?3d. What personal strengths and weaknesses have you realized at production, harvest, postharvest handling, processing, and marketing stages?	new production, harvest, postharvest handling, processing, and marketing practices have you known about?3d. What personal strengths and weaknesses have you realized at production, harvest, postharvest handling, processing, and marketing stages?

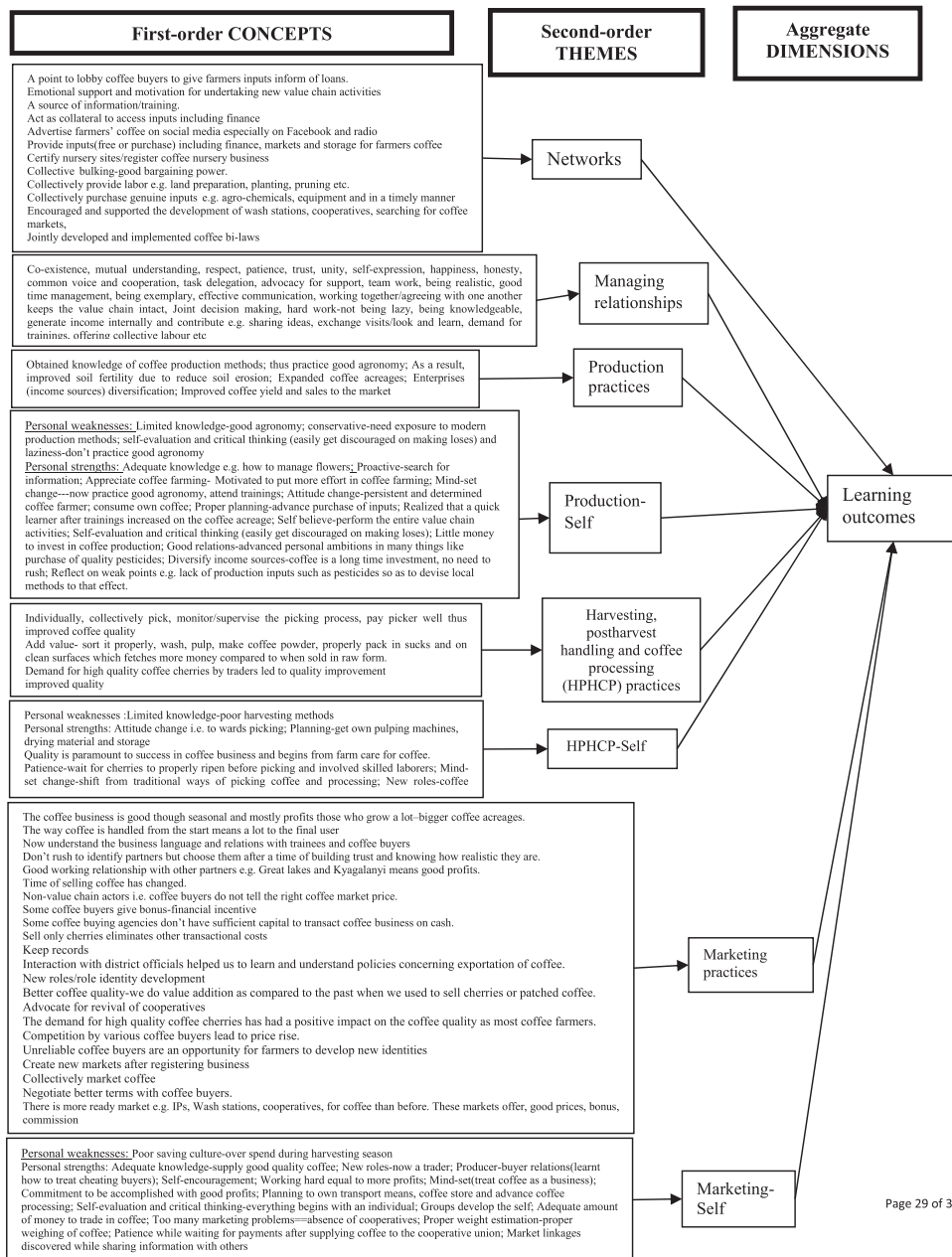
Appendix 2: Respondents interviewed

District	Sub County	#Innovation Platforms	#Interviewed	Type of interview		
				Key informant interview	Focus group discussion	Individual interviews
Kapchorwa	Municipality-Western Division	Arokwo Coffee IP	11	1	6	4
		Chema Coffee IP	4	0	0	4
	Kabeywa Municipality-East and Central Divisions	Kabeywa Coffee IP	10	1	5	4
		Mt.Elgon women in Coffee IP	10	1	5	4
Manafwa	Butta	Butta Coffee IP	11	1	7	4
	Bukhofu	Bukhofu Coffee IP	8	0	4	4
	Nalondo	Busyula Coffee IP	6	0	2	4
	Bukhofu	Bukusu Coffee IP	6	0	2	4
Namisindwa	Bukhoho	Bukhoho Coffee IP	12	0	4	8
	Mukoto	Mukoto Coffee IP	8	0	4	4
	Bumbo	Bumbo Coffee IP	9	1	4	4
VIP4FS project staff			1	1	0	0
3 Districts	12 Sub Counties	11 Innovation Platforms	97	6	43	48

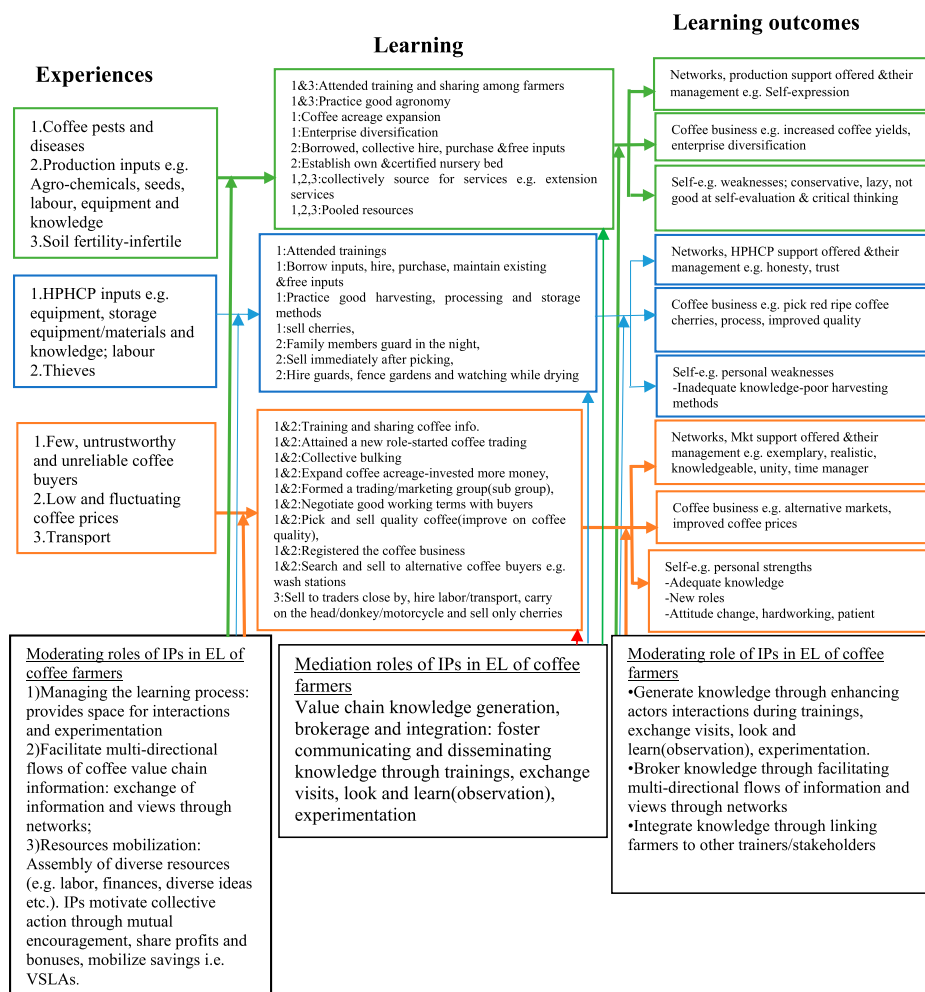
Appendix 3a: Data structure



Appendix 3b: Data structure



Appendix 4: The role of IPs in EL of coffee farmers



Appendix 5: Network type and support provided to coffee IP farmers.

Network type	Actors	Support provided
Bonding	Family members e.g. spouses, children, parents, cousins, brother-in-law and grandfather, etc.	<ul style="list-style-type: none"> -Support in the VC activities-advice, knowledge, finance, labor (production, harvesting, processing, and marketing), emotional support i.e. encouragement, inspiration, motivation to start or continue coffee farming, training, and business connections -Market information e.g. prices and advice on the coffee quality demanded by coffee buyers (well-dried coffee on a raised platform) -Time/grant women permission to attend training meetings,
	Friends and peers-fellow farmers, IP/group members, neighbors	<ul style="list-style-type: none"> the family is a source of network connections -Share experience, training, technical advice across the value chain and business connections -Emotional support(encouragement) and motivation for undertaking new VC activities, starting new businesses -Share inputs-farmers borrowed or share agro-inputs amongst themselves as well as hire. -Pool resources e.g. labor, funds, and collateral for finances as a group helps in searching for coffee markets,
Bridging	Farmworkers mostly coffee pickers	<ul style="list-style-type: none"> -Provide labor
	Extension workers, politicians, local council committee members, and contact/model/influential farmers	<ul style="list-style-type: none"> -Knowledge of new VC technologies and practices and source of new ideas e.g. market information and potential coffee markets to sell and at what prices. -Connections with other agricultural networks and coffee buyers worldwide -Serve as an encouragement to grow coffee, market and work hard -sell farmers' coffee -A source of business financing, labor, information/ trainings and business connection. -Collective bulking-good bargaining power. -Policy development and advocacy-In conjunction with LG drafted bi-laws to curb down fake agro-inputs in the market along with coffee quality improvement
	CBOS, Local NGOs, Associations, e.g. KOCAFE, KIFANGO, KABUM, BUACE, KFCU, Kayombe coffee corporative-Butilu, Wash stations, etc.	<ul style="list-style-type: none"> -Trains farmers on working as a team, coffee agronomy, coffee marketing strategies including good prices and other marketing aspects including collective bulking/group selling and linked farmers to other markets -Provide inputs (free or purchase) including finance, markets, and storage for farmers coffee, information, a platform to share and exchange ideas -Linkage to external trainers as well as markets -Support the performance of new roles e.g. start to trader in coffee - cater for coffee transport as well as give a commission of 30/= per kg of coffee delivered to them and bonuses of 150/= per kg to all registered members -Collective action (and collateral)-purchase genuine inputs and lobby for inputs from other agencies e.g. agrochemicals, equipment (pruning saws,

(Continued)

Continued.

Network type	Actors	Support provided
Linking	<p>Coffee buyers – the private sector, Kawacom, Grate Lakes Limited, Kyagalanyi, Uganda Cooperative Alliance, Private sector Mbale and Mbale farmers' association, Gumutindo, UCDA, Gumutindo</p> <p>Banks (Centenary), MFI (BRAC), SACCOS (Chechomiye) and VSLAs</p> <p>Research centres-VIP4FS project (ICRAF, MUK, and Adelaide University), NARO, VECO</p> <p>Governmental agencies e.g. The District Local Government (DLG) through its arms such as the Sub country extension services, Operation Wealth Creation (OWC)/The National Agricultural Advisory Services (NAADS), Uganda Coffee Development Authority (UCDA), and Community Development Office (CDO)</p>	<p>Secutures), finance, and promptly. Joint development and implementation of coffee bi-laws</p> <ul style="list-style-type: none"> -Provide technical advice on coffee VC aspects e.g. pest and disease management aspects including spraying, pruning, stumping, and soil amendments e.g. use of organic manure in coffee production, mulching, use of bands, trenches, and agro-forestry. Sponsor study tours, visits, look and learn sessions -Encouraged farmers to organize themselves into groups/collective action. -Give free inputs e.g. seedlings, agro-chemicals, funding, and material support to farmers across the VC -Encouraged and supported the development of wash stations, cooperatives, purchase farmers coffee (Seedlings and ready coffee) as well as market linkages -Advertise coffee markets on social media especially on Facebook and radio -Certify coffee nurseries. -Support in the implementation of value chain investments e.g. establishment of nursery sites -Funding to undertake production, coffee processing and marketing-purchase inputs, transport coffee, etc. -Knowledge of new agricultural technologies and practices -Production services (soil analysis) -Encourage farmers to continue planting coffee in large quantities, offered free coffee seedlings, compliments the private sector as well as allowing the private sector to operate in the area. CDO registers farmers groups -Sensitization on coffee policies -Certify nursery sites/register coffee nursery business -Advertise farmers coffee products on social media, radio, and the internet