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ENABLERS AND HINDRANCES TO FARMERS' PARTICIPATION IN PRODUCTION OF FARMER-LEARNING VIDEOS IN CENTRAL UGANDA: A THEMATIC ANALYSIS

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ABSTRACT

Videos can complement extension services provision by improving dissemination of agricultural information to farmers. However, for videos to be effective, they need to have relevant video content. This study assessed enablers and hindrances to farmers' participation in FLV production based on a coffee FLV. Identifying enablers and hindrances to participation of farmers in production of an FLV is essential for developing strategies that optimise their participation to produce relevant FLVs aligned to their contexts. A qualitative case study research design was employed. Data were collected through focus group discussions, key informant interviews and in-depth interviews, and analysed through thematic analysis guided by the Activity theory analytical framework. The study established that farmers' attributes especially their competencies to accomplish assigned tasks in FLV production, and motivations, were salient enablers to their participation. The other enablers were related to how the FLV process was organised, which included availability and adequacy of requisite resources, existence of clear guidelines for production of FLV, utilisation of pre-existing relationships, skilfulness of video experts and field officers, and specificity of roles. The limited interactions among actors, differing expectations, and time constraints were the major hindrances to farmers' participation in production of the FLV. Hence, video experts should provide opportunities for improving farmers' competences through training, offering technical support, and providing for rehearsals to build confidence. Mechanisms for improving interactions between and among farmers and video experts to harmonise expectations, promote mutual understanding, and foster knowledge sharing are also needed.

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INTRODUCTION

Agricultural videos are increasingly becoming important communication tools that complement agricultural extension provision by improving farmers' access to agricultural information (Bentley *et al.,* 2019; Cai and Abbort, 2013). Videos can cost-effectively reach more farmers, thereby complementing extension services to improve agricultural knowledge dissemination (Bello-Bravo *et al.,* 2020). A major concern among practitioners, however, is how to produce relevant video

content (Van Mele *et al*., 2018). Addressing that concern necessitates production of videos in consultation with intended users, the farmers (Sulaiman *et al*., 2012). Accordingly, agricultural videos should be produced through participatory processes that engage farmers, to adapt content to their needs. Videos that emphasize farmers' participation in development of content are referred to as *farmer-learning videos* (FLVs) (Bentley *et al*., 2015). Typically, production of FLVs involves diverse actors including farmers, video production experts, and agriculture content experts (e.g. extension agents and researchers) (Bentley *et al.,* 2015; Van Mele, 2006). However, the extent to which farmers participate in the various activities during pre-filming, filming, and post-filming stages of FLV production varies (Zossou *et al.,* 2009) due to several reasons.

Participatory production of agricultural videos has been widely studied; however, research has largely focused on use of FLVs in extension services provision (Bentley *et al*., 2015; Bentley *et al.*, 2019; Zossou *et al*., 2012). Besides, extant literature on participatory ICT product development largely focuses on factors that affect users' participation in Information Systems (IS) and software development (Akinnuwesi *et al*., 2013; Bano and Zowghi, 2015; Shah and Robinson, 2007; Wu *et al*., 2007). For instance, Shah and Robinson (2007) established that positive attitudes, availability, appropriate training, user characteristics, adequacy of support received, environment, and meaningful interactions with developers facilitated user participation. Further, they identified limited time, inadequate money, and unavailability of skilled labour as the barriers to user participation. Besides, Akinnuwesi *et al.* (2013) found influencers to users' participation in software projects to include; favourable users' and developers' relationships, adequate communication among users and developers, good users' information technology skills, and clear contract awarding procedures. The findings of these studies notwithstanding, factors that influence the involvement of farmers in FLV production processes are not fully explained. Understanding what enables or hinders the participation of farmers in FLV production processes provides valuable insights on how to organize the production of FLVs such that farmers' involvement is enhanced and subsequently aligning video content to their needs and contexts. This study, therefore, sought to examine enablers and hindrances to farmers' involvement in FLV production processes since they are the end-users of the FLV. This was done through retrospective scrutiny of farmers, video experts and field officers' narratives of their experiences during the production of the *Coffee: best practices* FLV hereafter referred to as the coffee FLV. Specifically, this study sought to i) explain the conditions that enabled farmers' involvement in the production of the coffee FLV, and ii) establish the perceived hindrances to the involvement of farmers in the production of the coffee FLV.

Analytical framework

This study employed Engestrom's Activity Theory (AT) as an analytical framework to assess the enablers and hindrances to farmers' involvement in the production of the coffee FLV. The AT framework analyses how the context in which an *activity* takes place shapes individual and concerted actions within a practice (Mwanza and Engeström, 2005). The framework comprises six components (Figure 1) used to describe and examine the *how* and *why* of a phenomenon when analysing a human activity (Karanasios, 2014) such as an FLV production process.

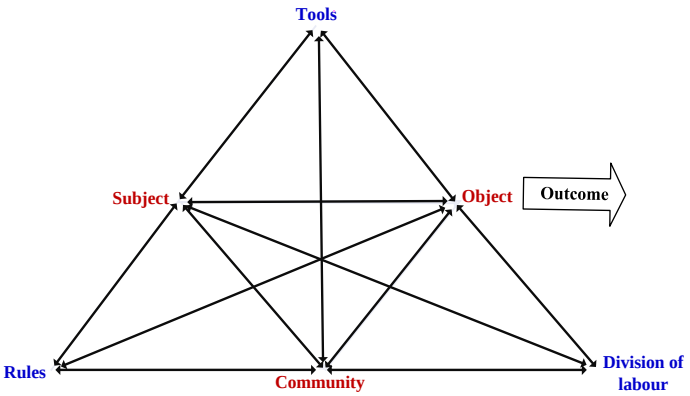

Figure 1: Engestrom's activity theory framework *Source: Engestrom (2008)*

The central tenet of AT is that *subjects*, a person or a group of people, are driven by motives or objective(s) (*object*) to undertake an activity using *tools* to produce an *outcome,* which is the actual result of the undertaken activity (Engestrom, 2008). Accordingly, farmers (subjects) had reasons that motivated them to participate in the activity (*objec*t) of production of a coffee FLV using resources (*tools*) to achieve the desired *outcome* of a relevant coffee FLV. The *rules* regulate actions and interactions between the *subjects* and the *community*. The *community* refers to people other than the subjects who are interested in the activity, interact with the subjects, and have the same objective. These were the video experts who produced the coffee FLV, and the field officers, who were agricultural extension agents who worked with coffee farmers. The *division of labour* shows how the allocation of tasks among farmers and the community determines the achievement of the shared objective(s) of that activity. Hence, the actions of farmers (*subjects*) and their interactions with video experts, and field officers (*community*) during the production of FLV were regulated by rules and guidelines. Further, the actions of farmers were also influenced by how tasks were divided amongst all individuals involved in the production of the FLV. The *outcome* was the production of the coffee FLV.

The AT emphasizes human interactions and the utilization of tools within a social system (Iyamu and Ngquam, 2017). Accordingly, the activity of coffee FLV production consisted of individual actions of farmers working with other individuals depending on their expertise and available resources. Further, farmers' actions were also influenced by the social setting in which they occurred. Thus, using AT to examine how farmers interacted, used resources, took on roles, and were supported by the community during FLV production, eased empirical analysis of the factors that enabled their participation. In addition, the framework permitted the identification of inconsistencies or problematic situations referred to as *contradictions* (Bandara, 2018).

Contradictions enabled the identification of factors that impeded farmers' participation in FLV production. Though contradictions in an activity system occur at four levels (Engestrom, 2008), this study focused on the two levels of contradictions to identify hindrances to farmers' participation since production of coffee FLV was one-off activity. These included the within components of an activity (primary contradictions) and between components of an activity (secondary contradictions).

Initially AT focused on educational psychology, however, it has evolved into a multidisciplinary theory-based analytical framework that is used to study forms of human practice where both individual and social processes are interlinked (Engestrom, 1999; Kuutti, 1996). According to the framework, human activity (what people do) represents a unit of analysis (Engestrom, 2008; Karanasios, 2014). The framework has been widely used in analysing activity systems in various contexts such as education, healthcare, information technology, corporate and industrial work, and organizational psychology. For instance, Lin *et al*. (2013) used AT to identify factors contributing to the delay in discharging patients from intensive care including conflicting goals, communication breakdowns, and teamwork issues. Dennehy and Conboy (2016) analysed software development using AT and identified the facilitating conditions in the activity system as congruencies between flow techniques and software development context, and contradictions as communication breakdown in the organization of the process. The AT framework therefore aligns well with this study as it permits the examination of farmers' competencies and motivations for participating in FLV production process and the context within which the FLV was produced to identify enablers and hindrances to farmers' participation.

The use of AT encourages FLV producers to reflect on the contradictions in the system to identify and learn new ways of organizing future FLV production processes that enhance farmer participation. Using of AT as analytical framework, however, is not without criticism. For instance, there are multiple interpretations of the object component of AT as a 'motive' or 'material' (Murphy, 2022), there is no standard method of applying AT (Nardi, 1996), and the framework is continuously evolving (Mwanza 2001). This has led to varied interpretation and application of AT. Nonetheless, AT offers an approach for studying information and communication technology for development by considering human activity as a unit of analysis to understand how and why things happen (Karanasios, 2014).

MATERIALS AND METHODS

Research design

This study employed a qualitative approach with a case study research design focusing on one case. The case was the *coffee: best practices* FLV (coffee FLV) produced by Farmers Media. The choice of the case was based on its production following the FLV production guidelines developed by Access-Agriculture, an international non-government organization, which requires that farmers are involved in the FLV production process to enhance the relevance of video content. A qualitative approach was found appropriate based on Yin (2018) recommendation of its use for studies that require gaining an in-depth understanding of the *why* and *how* underlying a phenomenon of interest.

Study area

The study was conducted in the districts of Mukono and Mityana in central Uganda where the Coffee FLV was shot. The study was conducted in the Bulera sub-county, Mityana district, and Nabbaale sub-county, Mukono district. These districts have a crop-based farming system with a majority of farmers as smallholders with coffee as one of their main cash crops (Ministry of Agriculture Animal Industry and Fisheries, 2018).

Sampling Procedure

Study respondents were selected through purposive sampling. Purposive sampling was deemed appropriate for this study as recommended by Leavy (2017) as it is suited for qualitative research where "information-rich" respondents are selected to provide details about a research question. Accordingly, the respondents for this study comprised farmers, video experts, and field officers (agricultural extension agents) who contributed to the production of the coffee FLV. Respondents were selected through a five-step process (Figure 2).

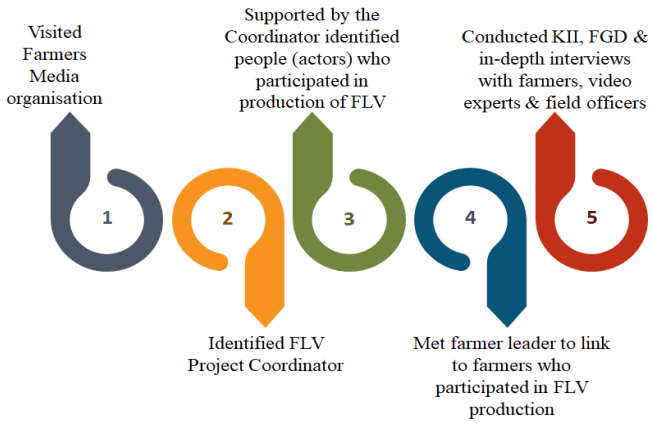

Figure 2. Steps followed in selecting respondents for the coffee FLV. *Source: Authors*

The salient characteristics of the respondents selected for this study are shown in Table 1.

Table 1. Salient characteristics of respondents.

Salient characteristics of respondents		Number	Percentage (%)
Respondents' categories	Farmers	14	78
	Video experts	2	11
	Field officers	2	11
Farmers	Male	11	79
	Female	3	21
Age of farmers	> 35 years	13	93
	< 35 years	1	7
Farmers' ownership of coffee garden	Yes	13	93
	No	1	7

The farmers selected for the study were experienced in managing their coffee gardens and most of them had their own coffee gardens. This may explain why they were selected to demonstrate the practices that were video-taped.

Data collection methods and tools

The data collection methods used comprised four Key Informant Interviews (KIIs), two Focus Group Discussions (FGDs) and 14 in-depth interviews. Each FGD consisted of four to seven farmers who were part of FLV production. In-depth interviews and FGDs were used to collect data from farmers while KIIs were used to collect data from video experts and field officers. In-depth interviews were used to obtain data on factors that enabled or impeded individual farmers from performing their roles. KIIs collected information about how the organization of the FLV production process as well as how video experts and field officers assigned and supported farmers in accomplishing assigned tasks in FLV production. Multiple data sources were used for the triangulation of data to enhance the accuracy and credibility of data (Creswell, 2014), and to get a comprehensive understanding of the phenomenon (Bogdan and Biden, 2007) of enablers and hindrances to farmers' participation in the FLV production process.

A scoping study preceded actual data collection to identify actors in FLV production and assess the feasibility of the study. The findings from the scoping study were used to inform the design of interview guides and the FGD checklist. Data validity was ensured through peer (Ph D fellows and supervisors) review of data collection instruments as well as the use of multiple data collection methods. Data collection was done after consent from respondents and giving them assurance regarding confidentiality. Interviews with farmers were conducted in their local language (Luganda) to ease sharing of their experiences and make provisions for those who were not fluent in the English language.

Data analysis

Data were analysed by first comparing transcribed interviews with field notes and audiotaped recordings to check for the accuracy of data. This was followed by a re-reading of transcripts to familiarize with the data and make sense of it to get initial impressions. This process permitted the development of transcriptions for each respondent's interview that was subjected to a step-by-step analysis to describe the activity system of the coffee FLV production process. Based on the AT framework, actions engaged by subjects to achieve a specific objective are influenced by the tools (resources) available, the rules of the communities in which the activity takes place, and the division of tasks among subjects (Engestrom, 2008).

Consequently, data on enablers and hindrances to farmers' participation in the FLV production process were analysed based on questions about each component of the AT triangle suggested by Karanasios (2014) (Figure 3).

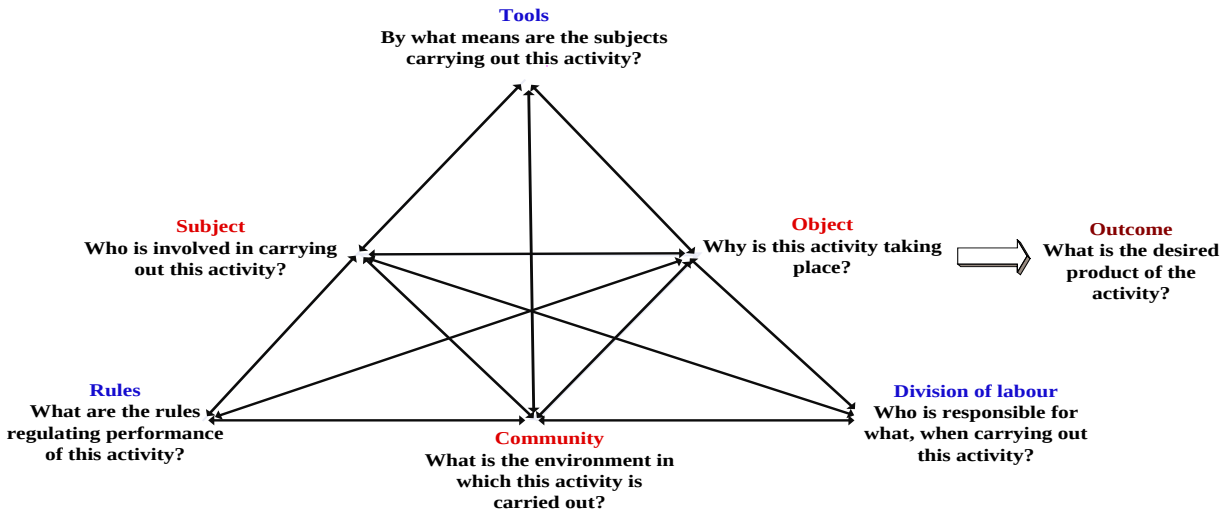

Figure 3. Analysis questions for framing an activity based on Activity Theory.
Source: Adapted from Karanasios (2014)

To identify enablers, each interview transcript was scrutinized through manual-open coding as suggested by Charmaz (2014) to extract evidence related to the AT components to develop codes. This was followed by an analysis of *how* and *why* each component facilitated farmers' participation. Then, linkages among the codes were examined to create axial codes, followed by triangulation of codes across data from FGDs and KIIs. The axial codes were examined for patterns and then aggregated to form themes related to enablers of farmers' participation. On the other hand, hindrances to farmers' participation were assessed through the identification of contradictions within (primary contradictions) and between AT components (secondary contradictions). Contradictions within and between AT components were thematically analyzed and the reasons for their occurrence were established. A summary of the analysis is presented in Table 2.

Table 2. Themes and axial codes for enablers of and hindrances to farmers' participation.

AT components	Theme	Axial codes
Subjects	Enablers of participation	– Farmers' proficiency with the tools
Object		– Farmers' motivations to participate
Tools		– Availability and adequacy of requisite resources
Rules		– Existence of clear rules/guidelines
Community		– Pre-existing relationships with the community
		– Skillfulness of video experts and field officers
Division of labour		– Specificity of roles
Contradictions	Hindrances to participation	– Limited interactions during FLV production activities
		– Differing expectations
		– Time constraint

Source: Authors

Data analysis enabled the framing of the FLV production activity system. Figure 4 shows that the upper part of the AT triangle shows how farmers' motivations and use of tangible and intangible resources to execute tasks in the production of the FLV influenced their participation. The lower part of the AT triangle illustrates the social aspects such as rules that directed the performance of tasks, division of tasks among farmers and the community (video experts and field officers), and conditions within the community that influenced farmers' participation.

The crucial nuances of participation were identified by examining how *subjects*, *objects*, *tools*, *community*, *rules* and *division of labour* facilitated the involvement of farmers in the production of the coffee FLV. Contrarily, what impeded the involvement of farmers in FLV production was derived from contradictions identified within the *subject* component of the FLV activity system (primary contradictions - limited interactions among farmers). Secondary contradictions were identified between *subjects* and *community* (limited interactions & differing expectations), *subjects* and *division of labour* (time constraint), *community* and *division of labour* (time constraint), as well as *rules* and *division of labour* (time constraint). Further, the underlying reasons for each contradiction were articulated to understand what hindered farmers' involvement in FLV production. Finally, actual quotes from respondents under different AT components were compiled to further explain the axial codes.

RESULTS AND DISCUSSION

Enablers of farmers' participation in FLV production

Guided by components of AT framework, seven factors were identified to have facilitated the participation of farmers in the FLV production process. These included farmers' proficiency with tools, farmers' motivations, availability and adequacy of requisite resources, the existence of clear rules, presence of pre-existing relationships with the community, skillfulness of video experts and field officers, and specificity of roles.

Farmers' proficiency with tools

Subjects, according to the Activity theory utilize tools when interacting with their environment to achieve an outcome that is in line with their motives (Ettema, 2017; Iyamu and Ngquam, 2017). In this study, the subjects

were the farmers who participated in the production of the coffee FLV. The skillfulness of farmers with both tangible and intangible resources required to accomplish assigned tasks influenced their participation in FLV production. Farmers demonstrated coffee management practices of picking, drying and storing coffee. Specifically, they demonstrated the right method of picking ripe coffee berries while collecting them in clean containers or tarpaulins and drying coffee on clean surfaces. They also exhibited how to check the level of dryness of coffee berries before storage using secateurs, a knife, and a moisture meter as well as the traditional methods of using teeth or shaking the dry cherries. Further, farmers demonstrated appropriate storage of coffee in bags on raised shelves in a well-ventilated leak-proof store.

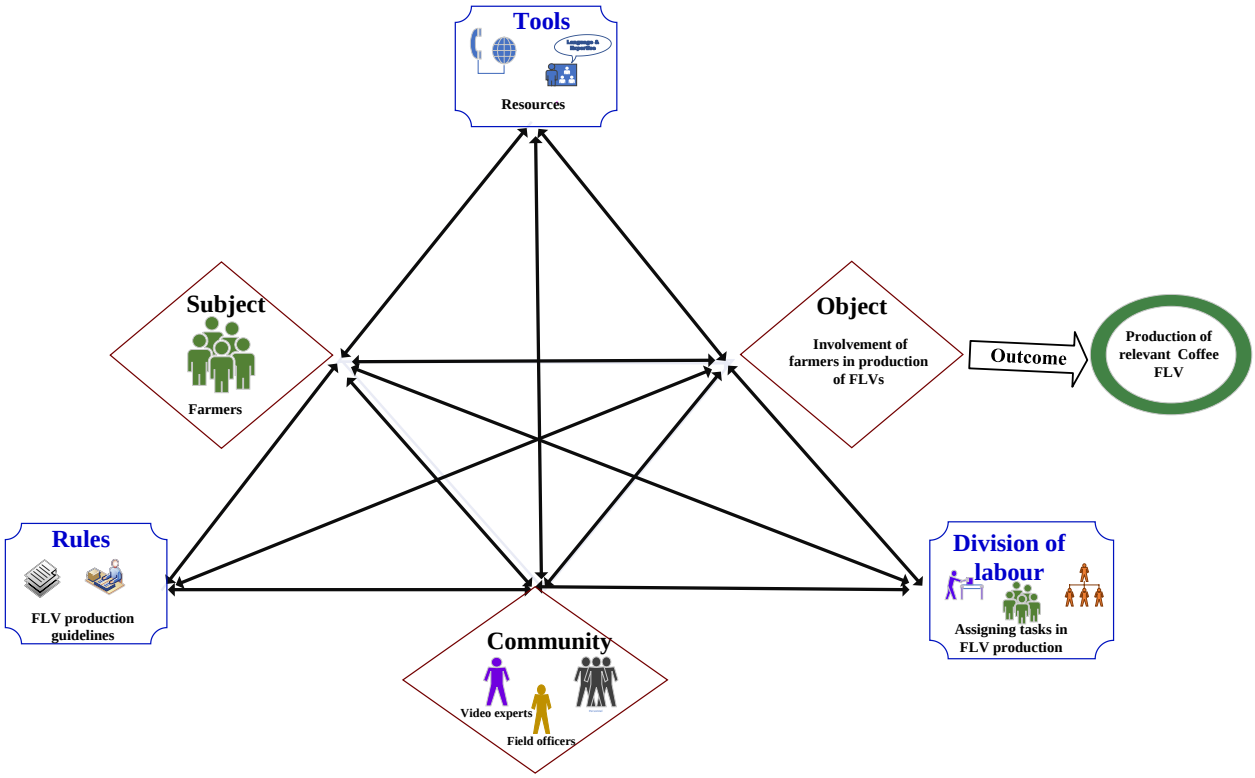

Figure 4. Farmer-learning video production activity system. *Source: Authors*

The aforementioned description demonstrated that farmers skillfully used their intangible resources of knowledge and experience as well as their tangible resources such as coffee gardens, and picking, drying and storing coffee to demonstrate the filmed coffee management practices. The following quotation from a coffee farmer further illustrates the proficiency of selected farmers: '…various organizations like Uganda Coffee Farmers' Alliance (UCFA) and Hanns R. Neumann Stiftung (HRNS) have trained us in managing coffee. The training emphasized practices like fertilizer application, pruning, proper harvesting, drying and appropriate storage…' (Female coffee farmer, 25 July 2018). Further, farmers' acquisition of skills was enhanced by the Farmer Field School approach promoted by UCFA which emphasizes the continuous participatory evaluation of farmers' practices in the management of coffee. In addition, field officers mentioned that the selection of coffee farmers was based on the possession of well-managed coffee plantation(s), and willingness to demonstrate appropriate coffee management practices for filming. The training and farmer-to-farmer support in the management of coffee could have boosted farmers' confidence and expertise in demonstrating the picking, drying, and storing of coffee, hence enhancing their ability to contribute to video content through demonstration of the practices for the production of the coffee FLV.

These findings are consistent with Bano and Zowghi (2015) who established that users' possession of requisite competencies for participation enhances their confidence to contribute to product development. Indeed, Olphert and Damodaran (2007) argue that a lack of expertise can limit the success of a participatory process even when users are committed. In the context of FLV production, farmers with experience in scientifically proven practices to which they add their innovation, demonstrate the practices that are filmed which increases the relevance of video content (Bentley *et al*., 2014; Salm *et al*., 2018). Thus, farmers' possession of knowledge and skills in coffee management practices, acquired largely through training and experience enabled their involvement in the production of the FLV.

Motivations of farmers

The principal premise of AT is that for the activity to take place a *subject* is driven by motivation(s) to use various available *tools* to achieve their objectives (Er, 2017; Iyamu and Ngquam, 2017; Karanasios and Allen, 2013). Accordingly, individual farmers were driven by certain motivation(s) to undertake assigned tasks in FLV production. The intrinsic motivations that drove farmers to be involved in FLV production were the expected intellectual benefits, and a desire to teach others while the extrinsic motivations included anticipated rewards and the commitment to their farmer organisation. Specifically, farmers mentioned that the urge to learn new skills coupled with a desire to teach others motivated them to engage in FLV production. Six out of the 14 coffee farmers said that they participated in FLV production because they were requested by farmer leaders in their farmer organisation. On the other hand, ten farmers indicated that they expected to gain more knowledge and skills through more training on managing coffee from the video experts. The following quotations illustrate some of the reasons why farmers participated in coffee FLV production: '…I like teaching farmers so I took making this video as an opportunity to spread my knowledge on good coffee management practices to others ...' (Female coffee farmer, 25 July 2018); '…Since our field officer was one of the people who filmed, I thought that he was going to teach a new practice to improve the management of my coffee…' (Female coffee farmer, 22 June 2018); and

> …I have been trained free of charge in the proper management of coffee to get high yields and good quality coffee by several people from Kaweeri farm owned by HRNS, and government extension agents. Taking part in video production provided an opportunity to at least pay back by showing other farmers appropriate ways of pruning and picking coffee … (Male coffee farmer, 11 June 2018)

Essentially, the participation of farmers in the production of the FLV was driven by heterogeneous motivations. Farmers were largely driven by external social motives concerning the reaction of significant others (members of their farmer organisations and field officers) to their participation, and rewards motives about expected benefits from participation. Further, some farmers were driven by the desire to share knowledge with other farmers while others expected to acquire knowledge and skills. The findings are in line with Habibipour *et al*. (2016) who noted that individuals often get involved in participatory processes because of perceived benefits. As an exemplar, Sseguya *et al.* (2015) established that expected material benefits and capacity-building opportunities encouraged farmers' participation in community groups. In addition, farmers participated in FLV production as a demonstration of appreciation for the support offered by field officers through training and improving farmers' access to reliable inputs and markets. Indeed, actors' motivations influence their contributions to a collective activity such as participatory ICTs design (Blazek and Hraňová, 2012), and are essential for sustaining participation (Nov *et al*., 2014). It is therefore imperative that video experts identify, and deliberate upon farmers' motivations throughout the FLV production process to enhance meaningful participation. This would ultimately improve the relevance of the FLV produced.

Availability and adequacy of requisite resources

The AT framework component of tools refers to the physical (tangible) and conceptual (intangible) resources used by subjects to perform the activity (Lu *et al*., 2018). Since tools provide a means of engaging in an activity (Ettema, 2017), farmers' participation was influenced by the availability and adequacy of the resources needed for the execution of assigned tasks during FLV production. Participating farmers had to have conceptual resources in terms of knowledge and skills in coffee management. In addition, farmers demonstrated practices for which they had physical

resources such as garden tools and equipment as well as coffee gardens to demonstrate crop management practices that were filmed. Each farmer was assigned practices to demonstrate for filming depending on the kind of resources s/he had to accomplish the task. For example, to demonstrate picking coffee, farmers were supposed to have coffee plantations with ripe coffee berries, as well as tarpaulins or containers for harvesting. Farmers who owned well-maintained stores and drying yards or tarpaulins, demonstrated either drying or storing of coffee.

The findings indicate that multiple resources (tools) were used by farmers to execute assigned tasks in the production of the coffee FLV. Generally, all farmers had the relevant knowledge, experience, and skills (practical and communication) as well as the resources that enabled them to accomplish the tasks assigned to them during FLV production. Farmers' possession of resources guided as to what coffee management practice(s) they could demonstrate for filming, and ultimately determined their involvement in FLV production. Some farmers were excluded from participation due to a lack of resources as illustrated by some of them showing a willingness to demonstrate the practices but lacking the requisite resources. These findings are similar to what Bano and Zowghi (2015) established that availability, and adequacy of resources are important in determining the extent of user participation in the development of information systems. Further, the availability of resources for all actors influences the likelihood of attaining the overall objective of the activity (Nahemia-maletzky *et al*., 2018), which in this study was the successful involvement of farmers in the FLV production process to produce a relevant coffee video. Correspondingly, farmers' participation seems to have been substantially determined by the possession of resources needed for demonstrating specific coffee-growing practices that were filmed. Past research reveals that the availability of resources, especially where users are involved, is essential for successful ICT product development (Shah and Robinson, 2007). Hence, access to and adequacy of requisite resources enabled farmers to execute the tasks assigned to them, inevitably enabling their participation.

Existence of clear guidelines on the production of FLVs

In AT framework, *rules* refer to set of conditions that guide actors' actions and interactions in an activity (Gleasure and Morgan, 2017). Accordingly, formal and informal rules guided the execution of the coffee FLV production process. The formal rules included the FLV production guidelines provided by Access-Agriculture in form of a manual given to video experts. These guidelines emphasised seeking contributions to video content from both practising farmers and agricultural experts to capture accurate and relevant information about selected topics. Hence, farmers were allowed to demonstrate the filmed coffee management practices of picking, drying, and storing coffee. The video experts only interacted with farmers during site selection and actual filming. Moreover, there were no provisions for interactions among farmers who were involved in the production of the FLV. Nevertheless, farmers had informal rules that guided their interactions such as keeping time for demonstrations, not talking during filming to avoid background sound/noise, and switching off mobile phones during filming.

Generally, the FLV production guidelines substantially influenced how farmers were involved in FLV production. Video experts provided for farmers' involvement in FLV production by assigning tasks to farmers, especially in the filming stage. Providing clear guidelines in a participatory process motivates participants to contribute (Habibipour *et al*., 2016). This suggests that the existence of well-defined FLV guidelines clarified the roles and responsibilities of each actor which facilitated the involvement of farmers in FLV production. There were no formal rules to guide video experts on how often they needed to interact with farmers and whether farmers had to interact with each other during FLV production. Thus, the extent of farmers' contributions to video content was mainly at the discretion of video experts. Further, the rules that governed farmers' interactions were largely informal and communicated by word of mouth through face-to-face meetings. Not strictly complying with the provided guidelines, undermined the magnitude of farmers' participation in FLV production activities, which consequently compromised the relevance and completeness of video content for farmers.

Presence of pre-existing relationships with the community

The *community*, according to AT, is about the social context of the environment in which the *subjects* operate when carrying out the activity (Iyamu and Ngqame, 2017). In the context of coffee FLV, the *community* included video experts, field officers and all individuals in the organizations and farming communities who played supportive roles during FLV production to enable farmers' participation. In particular, the *community* comprised two video experts, two field officers, and individuals from organizations such as Access-Agriculture, Farmers-Media, Kyagalanyi Coffee Ltd, UCFA and Nabumbugu Coffee Farmers Organization that played differing roles in supporting FLV production. Existing relationships among the organizations combined with established relationships among particular individuals within those organizations facilitated the selection of farmers who were involved in FLV production. The following statements from two key informants demonstrate this:

> …I have worked with many organizations on the Uganda National Coffee Platform such as Uganda Coffee Farmer Alliance and Café Africa, which made it easy for me to identify the right farmers to demonstrate the coffee management practices to be captured on the video… (Key informant, 4 August 2018);
>
> …I have been providing agricultural extension and advisory services to coffee farmers since 2011… Farmers that I worked with in producing the video were organized in farmer organizations and Farmer Field Schools which eased my choice of farmers who demonstrated the coffee management practices required for filming... (Key informant, 14 September 2018).

In addition, interviews with farmers revealed the existence of valuable and cordial relationships between them and the field officers. During the FGDs, it emerged that farmers willingly supported field officers as these had offered training in coffee management practices and established linkages between them and agro-input dealers, as well as reliable coffee buyers.

Experts from Access-Agriculture played an oversight role in ensuring that the FLV produced involved farmers in different activities of FLV production. Notably, the Farmers Media organization was not acquainted with the coffee farmers, however, it was able to organize farmers for production of the FLV through working with other organizations such as UCFA that had working relationships with the coffee farmers. Though this lengthened the process of identifying and selecting farmers, it enabled the selection of competent farmers to demonstrate the practices that were filmed.

Pre-existing relationships facilitated the identification of farmers that were involved in the production of the FLV. Further, the mobilization of farmers for FLV production was simplified by their being organized in farmer organizations and Farmer Field Schools. These already established relationships simplified the selection of farmers, thereby easing the assignment of roles to them in FLV production.

Moreover, some selected farmers were acquaintances with the field officers before FLV production, which eased their working together in the various FLV production activities. These findings conform to results from previous studies, which established that existing relationships enhanced the effectiveness of collaborations and improved participation in participatory video production (Blazek and Hraňová, 2012; Harris, 2009). Furthermore, it was evident that farmers greatly valued their relationships with field officers and farmer leaders, this made convincing them to participate in FLV production less challenging. Such social capital is known to promote actor participation in participatory video production processes (Harris, 2009; van Mele, 2006). Generally, already existing relationships lessened the effort needed to organize various farmers to participate in the FLV production process.

Skillfulness of video experts and field officers

Video experts and field officers as members of the community in the coffee FLV activity system closely worked with farmers to successfully produce the FLV. The video experts competently used their knowledge, skills, and experience to capture the practices demonstrated by the farmers. The following quotation demonstrates that video experts possessed the required competencies:

> …I attended a two-week hands-on training in FLV production organized by Access-Agriculture. The experience I got from the training greatly improved my ability to engage farmers in the production of agricultural videos … Although initially, it was a bit challenging since I had limited experience in producing videos with farmers, it gradually became easier

> and more enjoyable... (Key informant, 4 May 2018)

The skillfulness of video experts notwithstanding, they expressed challenges in managing farmers during the filming of the coffee FLV, since many farmers were interested in being filmed though they did not own some of the necessary resources. In addition, farmers showed a strong preference to communicate using the local language, which necessitated engaging one of the field officers as an interpreter.

Field officers on the other hand used their knowledge and skills in coffee management, and experience of working with farmers to successfully mobilize and guide farmers during the production of the coffee FLV. This was possible because of their professional training in agriculture and a wealth of experience in offering agricultural extension and advisory services to coffee farmers. Field officers, however, indicated that though the financial resources given by video experts were adequate for mobilizing and organizing farmers for FLV production, the time given to mobilize farmers was limited. This necessitated field officers working long hours and foregoing routine activities in their respective organizations to organize farmers and make them ready for the production of the FLV. It also limited the amount of time they spent discussing with farmers concerning their contribution to video content.

The competencies exhibited by video experts and field officers during FLV production were important in determining how farmers participated. Specifically, video experts wrote the script for the coffee FLV that specified how farmers were to be involved. On the other hand, field officers were able to select and organize farmers for the production of the FLV because they had extensive knowledge about the community, and were experienced in working with farmers. Further, their fluency in both the local language and English facilitated their translation of instructions during filming and interviewing which enabled even farmers that were not fluent in the English language to participate in the production of the coffee FLV. Generally, involving video experts who were skilled in the production of a professional quality FLV, and field officers with expertise in working with farmers when providing agricultural extension and advisory services, enhanced farmers' participation and subsequently, the quality of the FLV. These findings are in agreement with recommendations by van Mele *et al.* (2018) that the production of quality FLVs requires the involvement of actors with diverse specialized skills in agriculture and video production.

Specificity of roles

The AT posits that *division of labour* is the distribution of roles and tasks among *subjects* and *community* in the activity (Chizhik and Chizhik, 2018; Gleasure and Morgan, 2017). The division of labour during FLV production was following the FLV guidelines that specified roles to be played by each actor category especially farmers. FLV guidelines required the involvement of farmers who were experienced in the practices to be filmed. Further, the guidelines required that individuals with technical agricultural knowledge and video production skills contribute to FLV production to enhance the quality of FLVs.

Assignment of roles to the various farmers and other actors in the production of the FLV was determined by their capacity to mobilize requisite resources to execute the allocated tasks. Specifically, video experts oversaw the assignment of tasks to farmers and field officers, and organized financial, physical, and human resources. On the other hand, field officers mobilized farmers to be videotaped and selected filming sites while farmers demonstrated coffee management practices that were filmed. It is worth noting that task allocation among some actors was under their positions within the organizations. In particular, one video expert was a member of top management in Farmers Media while the other was a founder member of Access-Agriculture. Hence, the video experts' positions within their organizations facilitated their ability to offer support to farmers during FLV production. Similarly, the positions of field officers as agricultural advisory agents eased their ability to persuade farmers to take part in FLV production. For instance, in Mityana district, the field officer worked with farmer leaders to select and allocate tasks among farmers. Similarly, farmer leaders used their positions to persuade fellow farmers to get involved in FLV production. For example, during FGDs it emerged that some farmers participated in FLV production out of respect for the chairperson of their farmer organization as illustrated by the following quotations: '…as a member of the farmers' organization, I felt that I had to carry out the tasks assigned to me by our chairman...' (Female coffee farmer, 25 July 2018), and '…the Chairman has been organizing several trainings on managing coffee to help us get better yields

…therefore, when he requested me to demonstrate how to pick coffee, I could not refuse …' (Male coffee farmer, 25 July 2018).

The specificity of roles for each actor notwithstanding, some actors expressed discontent with how their contributions to FLV production were underappreciated as exemplified by the following quotations:

> … I expected the producers of the video to give me a certificate of recognition for my contribution to the video… since that failed, they would have at least given me a call to appreciate my contribution… Imagine I did not even get a copy of the video to which I contributed… (Female coffee farmer, 27 May 2018)
>
> … I was disappointed with the people I worked with to make the video. I worked tirelessly to ensure that farmers were prepared for demonstrating the coffee practices that were required. Surprisingly, after shooting the video I never heard from them at all… (Key informant, 14 September 2018)

Generally, farmers' involvement in the production of the coffee FLV was largely determined by video experts supported by field officers and farmer leaders. The video experts being part of top management in their organizations eased their acquisition of resources to support farmers' participation in FLV production. Besides, the field officers were acquainted with the farmers, which expedited the identification of farmers to demonstrate the practices. Farmers mainly accepted to demonstrate coffee management practices for which they had adequate resources and were confident to showcase.

FLV guidelines clearly defined specific roles to be played by the different actors when producing FLVs, therefore it was easy for video experts to assign roles to farmers during the production of the FLV. According to Yadav and Kumar (2017), specifying actors' roles enables them to assess whether their proficiency could be used to perform specified tasks. Given this, farmers were able to identify tasks they could perform given their competencies and resources. Moreover, video experts being part of top management, easily allocated resources, and provided a supportive work environment that enabled the involvement of farmers in the production of the FLV. Certainly, top management's commitment to participatory projects ensures the provision of resources and strengthens relationships among participants (Amoako-gyampah *et al*., 2018; Hussain *et al*., 2012).

Hindrances to actors' participation in FLV production

The contradictions from AT perspective often demonstrate the existence of inconsistencies, problematic situations in, or hindrances to the smooth execution of an activity (Bandara, 2018). In the context of this study, such contradictions affected the meaningful participation of farmers in FLV production. The findings revealed the existence of both primary and secondary contradictions to farmers' participation in FLV production. Accordingly, three hindrances were identified including limited interactions among actors, differing expectations, and time constraints.

Limited interactions

The limited physical interactions and communication among farmers were a primary contradiction. On the other hand, the limited physical interactions and communication between farmers, video experts and field officers were a secondary contradiction. Farmers were not given the opportunity to discuss among themselves their roles, expectations and fears of being involved in FLV production.

Video experts, on the other hand, did not involve farmers in FLV production to the extent provided for in the FLV guidelines. This was further evidenced by farmers' expression of dissatisfaction with the extent of their involvement in FLV production. For instance, farmers felt that there was a need to have a forum where they discussed with video experts concerns about video content and their involvement in FLV production. This is illustrated by the quotation below:

> …We were informed about shooting the video in our Farmer Field School monthly meeting. Shortly after that, the video was shot with some of the members…It was done hurriedly so that there was no chance to ask questions regarding our involvement in the production of the video… (Female coffee farmer, 22 July 2018).

One of the video experts confirmed what farmers had reported by stating that although the experience of working with farmers was gratifying, there was limited time to jointly discuss each step of the FLV production process. It emerged that there were no clear arrangements for video experts to adequately engage farmers, and deliberate on issues concerning coffee FLV production to create a common vision and purpose of the process. Farmers only interacted with video experts at the time of site verification and shooting of the video. The video experts did not interact with farmers in the post-filming stage yet this would be useful in assessing the suitability of video content.

Farmers' expressions confirm that there were inadequate interactions between them and the video experts before and after the shooting of the FLV. Accordingly, farmers' failure to discuss their involvement in the FLV production process limited their involvement in determining video content. Further, the limited physical interactions and communication undermined mentoring and sharing of experiences and knowledge among farmers themselves, and with video experts and field officers which would have enhanced farmers' contributions to video production. Shim *et al*. (2010) argue that ineffective communication among actors in co-production projects affects how expertise is coordinated to generate collective knowledge. Besides, communication gaps usually result in actors being discouraged from participation due to inadequate knowledge about; the whole participation process, reasons why they are participating, and the likely benefits of participation (Habibipour *et al*., 2016; Ley *et al*., 2015). This may explain why farmers were displeased with the extent to which they were involved in the FLV production process.

Meaningful participation in participatory processes requires effective interactions among actors to provide opportunities for knowledge sharing, deliberation on expected benefits, and synchronization of various actors' activities (Iden and Bygstad, 2018). Furthermore, effective interactions stimulate actors' interest in the process (Disterheft *et al*., 2015. For that reason, communication especially at the pre-filming stage is essential to ensure that farmers and other actors have realistic expectations before involving them in producing a video (Salm *et al*., 2018).

Differing expectations

The differing expectations manifested as a secondary contradiction at the AT components of the *subject* and *community*. There were discrepancies between farmers' expectations, and what video experts offered. For instance, some farmers expected to be rewarded for their contributions while video experts expected farmers to freely contribute to FLV production. In one of the FGDs farmers mentioned that although they expected to be trained and acknowledged for their contributions, neither of these expectations was met. This is exemplified in the following quotation:

> …in the video that was shot concerning gender issues in the production of coffee, we were first trained, and then filming was done… in this video, we were just asked to show how we pick and dry coffee… it would have been good if the video experts gave some training on how to improve management of our coffee before shooting the video… (Male farmer, 22 July 2018)

The differing expectations resulted in some farmers being disappointed with the level of involvement in the production of the FLV. This demonstrates that farmers had limited influence on the coffee video content which reduces the relevance of a video and subsequently undermines its use in agricultural extension provision. It could also discourage such farmers from engaging in similar agricultural video production activities in future.

The inadequate synchronization of expectations of farmers, video experts, and field officers arose from video experts not putting in place clear mechanisms for effective communication among actors in the production of the FLV. According to Doherty and Hoye (2011), when actor expectations are ambiguous, task performance is undermined. Yet Salm *et al*. (2018) assert that building trust and maintaining effective communication with farmers is crucial for harmonizing their expectations from the beginning. The evidence suggests that failure to consider the diverse expectations of farmers could have impaired their participation in FLV production.

Time constraint: Time constraint was a secondary contradiction observed between the *community* and the *division of labour* as well as between the *subject* and the *division of labour* components of the AT. Time constraints became manifest when video experts partially complied with FLV guidelines in the division of labour by restricting farmers' participation to a few activities to fit in the time allotted for finalising production of the FLV. For instance, during topic

identification video experts involved key actors (largely processors and exporters) in the coffee value chain rather than farmers. Besides, video experts noted that farmers' involvement in the FLV process was largely informal, so it demanded a lot of time to build rapport before involving them in the FLV production. Such a participatory approach was according to the video experts, time-consuming yet FLV production had to be completed within a specified timeframe. The concerns of one of the video experts are illustrated by the following quotation:

> …I continued with my routine activities within my organization yet I was expected to produce the video on time. To achieve this, I had to put in extra working hours and limit the number of farmers I worked with… (Key informant, 14 September 2018)

Another secondary contradiction between the *subject* and *division of labour* component was that farmers were not involved in video editing as stipulated in the FLV guidelines. This according to one of the video experts was due to the limited time available to produce the FLV. Farmers ought to participate in the editing the FLV so that their views are incorporated and video content is aligned with their information needs. Production of the FLV had to be accomplished within a specified timeframe, therefore video experts had to devise means of ensuring that all activities were performed following FLV guidelines as closely as possible. This compelled video experts to restrict the involvement of farmers in the pre- and post-filming stages of FLV production to save time.

Video experts expressed that they did not adequately involve farmers in FLV production because of excessive workload since they retained their work-related responsibilities alongside managing the FLV production process. This may have heightened the pressure to deliver the FLV within the specified time frame. This predicament was worsened by the participatory nature of the FLV production process, which just like other participatory processes is time-consuming as affirmed by Hussain *et al.* (2012). Besides, shooting a video with a script, as was the case for the coffee FLV, is lengthy and time demanding (Chowdhury *et al.*, 2010). Arguably, farmers' involvement in the production of FLV was to some extent limited by the pressure of time.

CONCLUSIONS AND RECOMMENDATIONS

This study purposed to identify enablers and hindrances to farmers' participation in the production of a coffee FLV since the involvement of end-users in the development of agricultural videos enhances their relevance. Empirical themes from this study based on the Activity theory revealed enablers related to farmers' attributes and others to how the FLV process was organized. Farmers' attributes especially their competencies to accomplish assigned tasks in FLV production, and motivations, were salient enablers to their participation. The enablers related to how the FLV process was organized included availability and adequacy of requisite resources, the existence of clear guidelines for the production of FLV, utilization of pre-existing relationships, skillfulness of video experts and field officers, and specificity of roles. The hindrances to farmers' participation identified in this study arose from how the FLV production process was organized. Specifically, limited physical interactions and communication among actors, differing expectations, and time constraints emerged as the major hindrances to farmers' participation in FLV production.

The involvement of farmers in FLV production does not guarantee that they substantially contribute to video content since the extent of their participation is determined by various factors. Hence, identifying enablers and hindrances to farmers' participation is essential for optimizing their participation to produce relevant FLVs aligned to their contexts. This would be consistent with the recommendation by Steinke *et al.* (2021) that the successful development of digital media for extension provision must emphasize user-centeredness. To improve farmers' participation in FLV production, practitioners of FLV production need to focus efforts on reducing the identified hindrances whilst enhancing enablers. This could be through measures such as establishing mechanisms for improving interactions between and among farmers and video experts to harmonize expectations, promote mutual understanding, and foster knowledge sharing. Further, video experts need to provide opportunities for learning and polishing up farmers' competencies through training, offering technical support, and providing for rehearsals to build confidence, which consequently improves farmers' participation.

The main limitation of this study is that the findings are unique to the one FLV case and the amount of information respondents were able to give. To that end,

the findings of this study are not generalizable. That notwithstanding, the findings are indicative of conditions that influence the involvement of farmers in the production of FLVs and contribute to knowledge on participatory ICTs product development. Further research needs to be conducted using multiple case studies to provide substantial reliable information that may enhance farmers' participation in FLV production. In addition, alternative analytical frameworks that factor in the time, and space factors could be used to improve understanding of the factors that influence the involvement of farmers in the production of FLV.

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REFERENCES

Akinnuwesi, B. A., Uzoka, F. M., Olabiyisi, S. O., Omidiora, E. O. and Fiddi, P. 2013. An empirical analysis of end-user participation in software development projects in a developing country context. The Electronic Journal on Information Systems in Developing Countries, 58(6):1–25.

Amoako-gyampah, K., Meredith, J. and Loyd, K. W. 2018. Using a social capital lens to identify the mechanisms of top management commitment: A case study of a technology project. Project Management Journal, 49(1): 79–95.

Bandara, S. 2018. Activity Theory is an effective framework on qualitative analysis in social sciences studies. International Journal of Research Granthaalayah, 6(7): 85–95.

Bano, M., and Zowghi, D. 2015. A systematic review on the relationship between user involvement and system success. Information and Software Technology, 58:148–169.

Bello-Bravo, J., Abbott, E., Mocumbe, S., Ricardo, M., Mazur, R. and Pittendrigh R. B. 2020. An 89% solution adoption rate at a two-year follow-up: evaluating the effectiveness of an animated agricultural video approach. Information Technology for Development, 26(3): 577-590.

Bentley, J. W., Chowdhury, A. and David, S. 2015. Videos for Agricultural Extension. Note 6. Global Forum for Rural Advisory Services good practice note for extension and advisory services.

Blazek, M., and Hraňová, P. 2012. Emerging relationships and diverse motivations and benefits in participatory video with young people. Children's Geographies, 10(2): 151–168.

Charmaz, K. 2014. Constructing grounded theory (2nd ed.). SAGE Publications Ltd.

Chizhik, E. W. and Chizhik, A. W. 2018. Using activity theory to examine how teachers' lesson plans meet students' learning needs. The Teacher Educator, 53(1): 67–85.

Chowdhury, A. H., Odame, H. H. and Hauser, M. 2010. With or without a script? Comparing two styles of participatory video on enhancing local seed innovation system in Bangladesh. Journal of Agricultural Education and Extension, 16(4): 355–371.

Dennehy, D., and Conboy, K. 2016. Going with the flow: An activity theory analysis of flow techniques in software development. The Journal of Systems & Software, 0, 1–14.

Disterheft, A., Caeiro, S., Asenso-Okyere, K. and Filho, W. L. 2015. Sustainable universities - A study of critical success factors for participatory approaches. Journal of Cleaner Production, 106: 11–21.

Doherty, A. and Hoye, R. 2011. Role ambiguity and volunteer board member performance in non-profit sport organisations. Non-profit Management & Leadership, 22(1): 107–128.

Engestrom, Y. 2008. Enriching activity theory without shortcuts. Interacting with Computers, 20, 256–259.

Engestrom, Y. 1999. Activity theory as individual and social transformation. In Y. Engestrom, R. Miettinen, & R. L. Punamaki (Eds.), Perspectives on activity theory (pp. 19-38). Cambridge University Press.

Gleasure, R. and Morgan, L. 2017. The pastoral crowd: Exploring self-hosted crowdfunding using activity theory and social capital. Information systems Journal, 1-27.

Habibipour, A., Bergvall-Kåreborn, B., and Ståhlbröst, A. 2016. How to sustain user engagement over time: A research agenda [Paper presentation]. AMCIS 2016: Surfing the IT Innovation Wave, 22nd Americas Conference on Information Systems, San Diego, United States

Harris, U. S. 2009. Transforming images: Reimagining

women's work through participatory video. Development in Practice, 19(4–5): 538–549.

He, J., and King, W. R. 2014. The role of user participation in information systems development: Implications from a meta- analysis. Journal of Management Information Systems, 25(1): 301–331.

Hussain, S., Sanders, E. B.-N. and Steinert, M. 2012. Participatory design with marginalized people in developing countries: Challenges and opportunities experienced in a field study in Cambodia. International Journal of Design, 6(2): 91–109.

Iden, J. and Bygstad, B. 2018. The social interaction of developers and IT operations staff in software development projects. International Journal of Project Management, 36(3): 485–497.

Iyamu, T. and Ngqame, Y. 2017. Towards a conceptual framework for protection of personal information from the perspective of activity theory. South African Journal of Information Management, 19(1): 1-7.

Karanasios, S. 2014. Framing ICT4D Research Using Activity Theory: A Match between the ICT4D Field and Theory? Information Technologies & International Development, 10(2): 1–17.

Kuutti, K. 1996. Activity theory as a potential framework for human-computer interaction research. Context and consciousness: Activity theory and human-computer interaction, 1744, 9-22.

Leavy, P. 2017. Research Design: Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-based Participatory Research Approaches. The Guilford Press.

Lin, F., Chaboyer, W., Wallis, M. and Miller, A. 2013. Factors contributing to the process of intensive care patient discharge: An ethnographic study informed by activity theory. International Journal of Nursing Studies, 50(8): 1054–1066.

Lu, Q., Chen, L., Lee, S. and Zhao, X. 2018. Activity theory-based analysis of BIM implementation in building O & M and first response. Automation in Construction, 85: 317-332.

Ministry of Agriculture Animal Industry and Fisheries. (2016, April). Agriculture Sector Strategic Plan 2015/16-2019/20.

Murphy, T. 2022. Exposing the uncomfortable: Activity theory and the limitations of the academic in the world of TEL and programme development. Studies in Technology Enhanced Learning, 3(1).

Mwanza, D. 2001. Where Theory meets Practice: A Case for an Activity Theory based Methodology to guide Computer System Design. In: Proceedings of INTERACT' 2001: Eighth IFIP TC 13 Conference on Human Computer Interaction, 9-13 Jul 2001, Tokyo, Japan. https://www.researchgate.net/publication/42795931_Where_Theory_meets_Practice_A_Case_for_an_Activity_Theory_based_Methodology_to_guide_Computer_System_Design

Mwanza, D. and Engeström, Y. 2005. Managing content in e-learning environments. British Journal of Educational Technology, 36(3): 453–463.

Nardi, B. A. 1996. Studying context: A comparison of activity theory, situated action models, and distributed cognition. Context and consciousness: Activity theory and human-computer interaction, 69102; 35-52.

Nov, O., Arazy, O. and Anderson, D. 2014. Scientists@Home: What drives the quantity and quality of online citizen science participation? PLoS ONE, 9(4): 0090375

Olphert, W. and Damodaran, L. 2007. Citizen participation and engagement in the design of e-government services: The missing link in effective ICT design and delivery. Journal of the Association for Information Systems, 8(9): 491–507.

Salm, M., Bentley, J. and Okry, F. 2018. Learning through the eyes of others: Access Agriculture's experiences with farmer-training videos in agricultural extension and education. Access Agriculture, CTA, & ICRA.

Shah, S. G. S., & Robinson, I. 2007. Benefits of and barriers to involving users in medical device technology development and evaluation. International Journal of Technology Assessment in Health Care, 23(1): 131–137.

Sseguya, H., Mazur, R. E., Wells, B. and Matsiko, F. 2015. Quality of participation in community groups in Kamuli District, Uganda: Implications for policy and practice. Community Development, 46(1): 37–41.

Sulaiman, V. R., Hall, A., Kalaivani, N. J., Kumuda, D. and Reddy, T. S. V. 2012. Necessary, but not sufficient: Critiquing the role of information and communication technology in putting knowledge into use. The Journal of Agricultural Education and

Extension, 18(4): 37–41.

Steinke, J., van Etten, J., Müller, A., Ortiz-Crespo, B., van de Gevel, J., Silvestri, S. & Priebe, J. (2021). Tapping the full potential of the digital revolution for agricultural extension: an emerging innovation agenda. International Journal of Agricultural Sustainability, 19 (5-6): 549-565.

van Mele, P. 2011. Zooming-in zooming-out: A novel method to scale up local innovations and sustainable technologies. International Journal of Agricultural Sustainability, 4(2): 131–142.

van Mele, P., Okry, F., Wanvoeke, J., Barres, F. N., Malone, P., Rodgers, J., Rahman, E., Salahuddin, A. 2018. Quality farmer training videos to support South–South learning. CSI Transactions on ICT, 6(3), 245-255.

Wu, C., Gerlach, J. H., and Young, C. E. 2007. An empirical analysis of open-source software developers' motivations and continuance intentions. Information & Management, 44: 253–262.

Yadav, M. and Kumar, A. 2017. An Indian outlook on role clarity, organizational citizenship behavior, and gender relationship: Multiple Group Confirmatory Factor Analysis (MGCFA) Approach. Jindal Journal of Business Research, 6(1): 63–75.

Yin, R. K. 2011. Qualitative Research from Start to Finish. The Guilford Press.

Zossou, E., Van Mele, P., Vodouhe, S. D., & Wanvoeke, J. 2009. The power of video to trigger innovation: Rice processing in central Benin. International Journal of Agricultural Sustainability, 7(2): 119–129.