Strengthening Youth Farmer Regeneration Through Knowledge Management Practices in Farmer Communities

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Abstract: This study discusses how knowledge management (KM) practices at the community level can help regenerate youth in farming communities as part of the farmers. The study is based on the KM model proposed by Probst (1998), which comprises the identification, acquisition, development, distribution, use and preservation of knowledge as interrelated processes that maintain intergenerational sustainability of the agricultural sector. By filling a major research gap, the study relates to the paucity of empirical research specifically examining farmer regeneration through a KM lens, the dearth of understanding how KM practices are lived differently by generations and the dearth of research on how Indonesian farming communities experience indigenous, formal and digital knowledge systems in sustaining agriculture across generations. These observations indicate that KM activities in the community, such as knowledge sharing through participation, intergenerational learning, mentoring, and leadership opportunities, are at the centre stage in influencing youth engagement and their motivation to join the agricultural sector. As much as structural barriers remain, such as a lack of access to land, failure to change perceptions about agricultural work, and dissimilar exposure to modern agricultural knowledge, farmer groups can entice and keep young farmers by promoting collaborative learning settings and utilising both traditional and new sources of knowledge. On the whole, this paper contributes to a clear understanding of the importance of a community-based approach to knowledge management around the area of youth unemployment in agriculture and provides conceptual and practical recommendations to policymakers, non-governmental organisations, and agricultural institutions to enhance farmer regeneration and intergenerational agricultural knowledge.

Keywords: Farmer communities, Farmer regeneration, Intergeneration knowledge sharing, Knowledge management, KM in agriculture, Youth farmer regeneration

1. Introduction

Across many regions of the world, the agricultural sector is experiencing a demographic and structural crisis. The populations involved in farming are also ageing, and fewer youths see agriculture as a desirable or viable source of livelihood. Research in different settings, such as Africa and Asia, has indicated that they tend to view agriculture as a low-status, low-paying, and physically challenging work experience, which is uncertain and risky (Giwu *et al.*, 2025). Young people also have limited access to land, capital, and infrastructure, which discourages entry or stay in farming despite agriculture being the main source of food and rural livelihoods (Boye *et al.*, 2024). Concurrently, it is increasingly acknowledged that youth participation in agriculture is highly crucial for food system resilience, innovation, and rural development. The younger farmers are often depicted as the possible agents of change that can bring new technologies, business models, and approaches to sustainability (Geza *et al.*, 2023). Their involvement can be used to curb rural-urban migration, spur local economies and work towards wider development objectives. However, in many situations, these expectations are not met since structural constraints and societal stigmas restrict the beauty of agriculture among them (Giuliani *et al.*, 2020).

Falling farmer regeneration has become a strategic concern in several countries, most notably Indonesia, in which the agricultural sector employs young rural workers even as it faces rapidly growing non-agricultural employment options (Mendoza and Garcia, 2023; Ngadi *et al.*, 2023; Ambarwati *et al.*, 2024; Tikum and Ahmad, 2024). The role of youth in national food security, as well as the sustainability of the rural labour force, is emphasised by various studies; however, problems of access to land, the absence of enough job opportunities, and insufficient social security have been tremendous obstacles (Geza *et al.*, 2023; Karahan, Abay and Ito, 2023; Pathma *et al.*, 2025). Although this is the overall trend, certain farming towns have managed to attract youth participation and achieve successful regenerations. It happened, which shows that the process of regeneration is not only determined by the structural problem, but also by the internal community processes, in terms of how the agricultural knowledge is managed, communicated, and used to address the younger generation (Effendy,

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Rohmatika and Musyarofah, 2023; Pathma *et al.*, 2025). This peculiar situation renders the context of this research interesting and worth exploring.

In this study, farmer regeneration is understood as the process of sustaining agricultural activities by involving younger generations in farming, either by inheriting family farming enterprises or by entering the agricultural sector independently (Anwarudin *et al.*, 2020). In practice, farmer regeneration is closely related to farm succession within families, in which the older generation transfers farm ownership, production responsibilities, and practical agricultural knowledge to the next generation or younger generation (Firman A *et al.*, 2018; Firman, Daud and Arief, 2023). Regeneration is seen not only as a generational shift in farming activities but also as a social process that facilitates the transfer of knowledge, skills, and farming experience from senior to younger generations. Various studies show that low rates of farmer regeneration are often associated with structural factors such as limited land access, low agricultural sector incomes, and limited social security for workers in this sector (Geza *et al.*, 2023; Pathma *et al.*, 2025). Nevertheless, several farming communities have relatively succeeded in maintaining youth involvement in agriculture (Darmawan *et al.*, 2024). It indicates that farmer regeneration is influenced by not only structural factors but also the internal dynamics of the community, including the way agricultural knowledge is managed, shared, and transmitted to the younger generation (Borec *et al.*, 2013). In this context, understanding KM practices in farming communities is essential for explaining how young people acquire skills and motivation to engage in farming activities. The processes of identifying knowledge, learning from experience, sharing farming practices, and utilising knowledge in decision-making are important elements in building the capacity of younger generations to be involved in agriculture. The knowledge management perspective provides an analytical framework for understanding these processes. Referring to the Building Blocks model of Knowledge Management developed by Probst (1998), knowledge in a social system is understood through a series of interconnected processes, such as knowledge identification, knowledge acquisition, knowledge development, knowledge sharing, knowledge utilisation, and knowledge preservation. In the context of farming communities, these processes help to explain how agricultural knowledge is learned and transmitted across generations, thus potentially supporting the continued involvement of young people in agricultural activities.

Although a number of studies have identified the limitations of farmer regeneration and the need to involve youth in the study, limited research has examined how these phenomena relate to knowledge management techniques applicable at a community level. Research on knowledge management in agriculture has always been centred on aspects of technology, institutionalised or extension schemes, with no analysis of how communities in farming-related practice autonomously locate, generate, disseminate and store knowledge as part of regeneration. Moreover, little work has been done on how intergenerational contacts, local culture (indigenous knowledge) and community social processes may become important determinants in the attraction and retention of young farmers. The fact that farming communities can sustain youth engagement, unlike the rest of the nation, provides a rich context for comprehending how KM practices that are community-based can promote farmer regeneration. It is this context that offers the possibility, empirically, of unravelling social, cultural, and knowledge processes that facilitate regeneration at a natural level.

Past studies have revealed useful information on youth involvement in agriculture and associated knowledge processes, but they have been discussed independently. Knowledge management, participatory extension, and citizen science work on the idea of farmer involvement in the co-production of locally relevant knowledge (Mourad, Hosseini and Avery, 2020; Prajapati *et al.*, 2025). Nevertheless, when combined, this literature discloses gaps that are specifically applicable to Indonesia. To begin with, there is a dearth of empirical studies that directly investigate the concept of farmer regeneration as generations of continuity as an actual farmer based on the model of KM proposed by Probst (1998). The research on youth participation lists the barriers and drivers, but it does not evaluate how certain KM building blocks in the farmer community determine whether young people continue to farm when the older ones retire or not (Saint Ville *et al.*, 2016; Ansong Omari *et al.*, 2018; Triste *et al.*, 2018). Second, despite the prevalence in the promotion of participatory approaches, there is a lack of understanding of how community KM practices are realised in dissimilar ways across generations, and how they shape the attitude of young people, perceived norms, and perceived control over farming as a long-term livelihood (Prajapati et al., 2025; Waters-Bayer et al., 2015). According to the background, the study is guided by the following research questions:

RQ1: How do farmer communities apply KM practices to support youth farmer regeneration?

RQ2: How do KM practices in farmer communities support or hinder youth farmer regeneration?

This study uniquely incorporates KM and farmer regeneration perspectives within rural farming communities. Unlike previous research, which focused on technology, extension or policy, this study promotes social interaction, community mechanisms, and youth involvement in the KM cycle as key regeneration factors. The research provides insights on the use of KM as a social process for agricultural sustainability across generations.

2. Theoretical Background

2.1 Farmer Regeneration

The regeneration of farmers refers to the process by which a new generation enters agricultural activities and ensures the continuity of agriculture across generations within a community. The term "regeneration" in agriculture carries the same meaning as succession or inheritance in farming. Farmer regeneration is the process of bringing new farmers into the agricultural business (Darmawan *et al.*, 2024). Farmer regeneration is closely related to the succession process of agricultural enterprises within families, in which the older generation transfers ownership, responsibility, and farming practices to the younger generation (Conway *et al.*, 2021). Therefore, farmer regeneration is not limited to the inheritance of family businesses; it encompasses the entry of young individuals into the agricultural sector and their involvement in production, farm management, and agricultural innovation.

This regeneration process has become crucial because many countries are facing the challenge of declining interest among the younger generation in the agricultural sector, including Indonesia (Mendoza and Garcia, 2023; Ngadi *et al.*, 2023; Ninson and Brobbey, 2023). Without adequate farmer regeneration, the sustainability of food production, rural development, and the survival of agricultural communities can be threatened (Mpanga, Schuch and Schalau, 2021). Farmer regeneration is generally reflected through several indicators, such as the involvement of young people in agricultural activities, the continuity of farming enterprises across generations within families or communities, as well as the existence of learning processes and knowledge transfer between senior farmers and the younger generation (Van Niekerk J.A, Mahlobogoane M. and Tirivanhu P., 2015; Dayat, Anwarudin and Makhmudi, 2020; Tolinggi *et al.*, 2023). These conditions indicate that regeneration is not only about land ownership or farming businesses but also about youths' acquisition of the knowledge, skills, and experience required to independently carry out agricultural activities.

In many farming communities, knowledge about cultivation practices, land management, and strategies for dealing with agricultural risks is largely tacit and is acquired through experience and social interaction among farmers (Tolinggi *et al.*, 2023). Therefore, the process of knowledge sharing, joint learning, and interaction between senior farmers and the younger generation supports the sustainability of farmer regeneration. Thus, farmer regeneration can be understood as a process of transferring and reproducing agricultural knowledge within the community. The way the community identifies, shares, develops, and maintains agricultural knowledge is an important factor influencing youths' involvement in agricultural activities. This perspective opens up space to understand farmer regeneration through a knowledge management framework, particularly how community-level knowledge management practices can support the sustainability of agricultural activities across generations.

2.2 Knowledge Management in Agricultural Communities

Knowledge management practices have evolved in their application, extending beyond corporate organisations to also encompass the agricultural sector and communities (Risidi and Abdullah, 2008; Palma-Huertas and Nova, 2025). This condition reinforces that the fundamentals of KM are not limited by the object but rather by the subject, the presence of a group of individuals (Merali, 2000). The emergence of KM practices in farming groups is inseparable from the knowledge dynamics within farming communities. Changes in agricultural practices often occur through collaborative learning, sharing of experiences among farmers, and the creation of new knowledge through field experiments (Akpo *et al.*, 2015). Therefore, the development of agriculture is influenced not only by technological or economic factors but also by how knowledge is created, shared, and utilised within the farming community.

Knowledge exchange across generations of farmers, manifested through approaches such as mentoring, apprenticeships, discussion forums, and other engagement activities, has proven beneficial and influences the motivation of young people to get involved (Dayat, Anwarudin and Makhmudi, 2020; DeMarsh, 2022). This positions the KM approach as a viable instrument for encouraging farmer engagement and supporting farmer regeneration. This is because collective knowledge sharing empowers the agricultural industry, which will be regenerated and sustainable for future generations (Saint Ville *et al.*, 2016).

2.3 Building Blocks Model of Knowledge Management by Probst

Probst's building block model is a framework for guiding KM activities. These processes include knowledge identification, acquisition, development, distribution, utilisation, and preservation, among others (Probst, Raub and Romhardt, 2000). (1) knowledge identification, which is mapping existing knowledge; (2) knowledge acquisition, which is accessing external knowledge through acquisition, collaboration, or recruitment of experts; (3) knowledge development, which focuses on creating new knowledge through creativity, problem solving, and collective learning; (4) knowledge dissemination/distribution, which is ensuring knowledge flows and can be used widely within the organization; (5) knowledge utilization, which emphasizes the effective application of knowledge in work processes; and (6) knowledge preservation, which includes storing and updating important knowledge to prevent the loss of critical experience. Although this model was originally developed in an organisational context, the basic concepts of how knowledge is identified, shared, and utilised can also be used to understand knowledge dynamics in broader social systems, including farming communities (Buitendag and Hattingh, 2024).

To clarify how the KM building blocks framework is understood in the context of agriculture, previous studies indicate that KM processes can also be observed in the practices of farming communities (Lwoga, Ngulube and Stilwell, 2010; Tandi Lwoga, 2011; Vangala, Hiremath and Banerjee, 2014; Buitendag and Hattingh, 2024). For instance, Tandi Lwoga (2011) shows that agricultural knowledge is acquired from local sources such as family, personal experience, and community interactions. In addition, knowledge sharing occurs through farmer groups and social practices within the community, while agricultural knowledge is often preserved through the experience of senior farmers and passed down to the next generation. These findings show that various processes within the KM framework—such as knowledge acquisition, sharing, utilisation, and preservation—also occur within agricultural communities. Based on these findings, the processes in Probst's model can be interpreted from the context of farming communities as summarised in the following Table 1.

Table 1: Probst's KM Model Process in Farmer Communities

KM Process by Probst's Model	Translation in the agricultural community	Practice
Knowledge Identification	The process of identifying knowledge sources available within the community	Senior farmers are recognised as sources of knowledge and references when dealing with agricultural problems
Knowledge Acquisition	The process of acquiring agricultural knowledge from various sources, both internal and external to the community	Learning from family, neighbours, personal experience, field demonstrations, and farmer groups
Knowledge Sharing/Distribution	The process of knowledge exchange among members of the farming community	Discussion among farmer groups, interaction between farmers, and informal learning within the community
Knowledge Development	The process of developing or adapting knowledge through experience and field practice	Experimentation with cultivation techniques and adaptation of agricultural practices to local conditions
Knowledge Preservation	The process of preserving and maintaining the sustainability of agricultural knowledge within the community	Transfer of knowledge from senior farmers to the younger generation through practice and experience
Knowledge Utilisation	The process of applying knowledge in everyday agricultural practices	Disease control, soil fertility management, and the application of cultivation techniques

Sources**:** Adapted from Lwoga (2011) with some elaboration

Thus, the KM framework is relevant not only in formal organisations but also in farming communities. In this study, the framework is used to analyse how KM processes within farming communities contribute to the sustainability of farmer regeneration.

3. Research Methodology

3.1 Methodology

We used a qualitative research design to answer our research questions. This method was chosen for the following reasons: (a) limited literature on KM practices that support the regeneration efforts within agricultural communities. A discovery-based approach in qualitative research is suitable for exploring phenomena that have not been explained in depth, in line with the qualitative objective of understanding complex and contextual phenomena (Ograjenšek, 2016). (b) As an effective method to find answers to the questions "how" and "why" (Rogo, 2024). The qualitative method allows us to develop a detailed and contextual understanding of KM practices implemented in farming communities and their impact on the regeneration of young farmers. (c) Because qualitative methods acknowledge the diversity of realities and the holistic, constructive nature of knowledge. They allow us to integrate the various experiences and perspectives that exist within farming communities. In doing so, we can provide a meaningful and in-depth picture of knowledge management risks and how these practices support or hinder the regeneration of young farmers.

3.2 Sampling, Data Collection, and Interview Instrument Development

3.2.1 Sampling and data collection

Considering the aim of this study, which is to investigate knowledge management practices that facilitate the regeneration of young farmers in communities, as well as establish which factors enable or inhibit this, we chose to use farmer group leaders as informants. In particular, the qualitative data required was gathered using an open-ended essay format that implies descriptive responses to a number of questions. Under this procedure, the informants are requested to respond to every question in their own language and interpretation. It has been employed in a number of earlier research studies (Dhir et al., 2024; Sithipolvanichgul et al., 2025). In this study, 13 key informants were involved, including farmer group leaders, as presented in Table 2.

Table 2: Key Informant

Farmer Group	Key Informant	Range Age	Composition of member in Farmer Group	
			Senior	Youth
Village1	Group Leader	>50	60%	40%
Village2	Group Leader	>50	70%	30%
Village3	Group Leader	>50	80%	20%
Village4	Group Leader	>50	65%	35%
Village5	Group Leader	>50	60%	40%
Village6	Group Leader	40 - 50	60%	40%
Village7	Group Leader	40 - 50	60%	40%
Village8	Group Leader	40 - 50	65%	35%
Village9	Group Leader	40 - 50	65%	35%
Village10	Group Leader	30 – 40	65%	35%
Village11	Group Leader	30 – 40	65%	35%
Village12	Group Leader	40 – 50	65%	35%
Village13	Group Leader	40 – 50	70%	30%

Source: Authors' own work

3.2.2 Interview instrument development

We developed the interview instrument as a semi-structured guide divided into three main sections: introduction, core, and closing. This three-part structure ensures that the interview is systematic, comprehensive, and participant-centred. This approach aligns with the iterative and flexible nature of qualitative research in exploring respondents' experiences and perspectives in depth (Hamblin, 2024).

The introduction section explores the respondent's background, farming experience, involvement in farmer groups/communities, and views on youth engagement in agriculture. The core section was developed based on Probst's KM Building Blocks framework, particularly its dimensions of knowledge identification, acquisition, development, sharing, preservation, and utilisation. The questions in the core section are formulated with reference to the conceptual definitions of each knowledge management dimension; this is in line with the exploratory nature of open-ended interviews to gain an initial understanding of a topic, identify relevant dimensions, and capture the terms used by respondents to describe their experiences (Schlütz and Möhring, 2015). Thus, each item is derived from KM dimensions, which serve as an analytical framework for understanding KM practices within agricultural communities. Furthermore, it explores how these practices relate to youth participation in agriculture and how they are understood to support farmer regeneration. Meanwhile, the closing section contains reflective questions regarding the challenges/support of involving the younger generation and the role of knowledge management in promoting youth participation in agriculture. It also provides respondents the opportunity to give ideas on agricultural knowledge and the sustainability of young farmers.

The conceptual definition of the KM process in the Table 3 was used as a reference for formulating core questions to identify KM practices in farming communities and explore their relationship with the regeneration of young farmers. It provided a clear basis for the data collection process and analysis of the findings. The complete guide and list of interview questions are presented in Appendix 1.

Table 3: Conceptual Definition of KM Processes

Dimension	Conceptual Definition	Exploration
Knowledge Identification	The process of identifying what knowledge is available and who the sources of knowledge are in the community. (Probst, Raub and Romhardt, 2000; Lwoga, Ngulube and Stilwell, 2010)	Identifying how knowledge and knowledge sources are recognised in farming communities, and how these processes relate to the involvement of young farmers in learning about agriculture.
Knowledge Acquisition	The process of acquiring knowledge from internal and external sources within the community (Probst, Raub and Romhardt, 2000; Lwoga, Ngulube and Stilwell, 2010)	Exploring how agricultural knowledge is acquired in farming communities, whether from group members, senior farmers, or other learning sources, and how this acquisition process is accessed and followed by young farmers in agricultural learning activities.
Knowledge Development	The process of developing or adapting knowledge through experience, learning, and experimentation. (Probst, Raub and Romhardt, 2000; Lwoga, Ngulube and Stilwell, 2010)	Explores how farming communities develop and adapt agricultural knowledge through experience, experimentation, and shared learning, and how this process creates space for young farmers to learn, innovate, and engage more actively in farming practices.
Knowledge Sharing	The process of exchanging and distributing knowledge between community members (Probst, Raub and Romhardt, 2000; Lwoga, Ngulube and Stilwell, 2010)	Explores how agricultural knowledge is shared between farmers, both through direct interactions and group activities, and how this process provides learning opportunities for young farmers and encourages their participation in agriculture.
Knowledge Preservation	The process of maintaining and preserving knowledge so that it remains available within the community. (Probst, Raub and Romhardt, 2000)	Exploring how farming communities (senior farmers) maintain and pass on agricultural knowledge between members and between generations, and how this preservation process contributes to the sustainability of learning and regeneration of young farmers.
Knowledge Use	The process of utilising knowledge in practice and decision-making. (Probst, Raub and Romhardt, 2000)	Explores how agricultural knowledge is applied in everyday practice and decision-making, and how the use of this knowledge influences young farmers' engagement, learning experiences, and confidence in agricultural activities.

Sources: (Probst et al., 2000; Lwoga et al., 2010)

3.3 Data Analysis

Our data analysis was conducted manually with an iterative coding process (Gioia, Corley and Hamilton, 2013). This process began with an in-depth reading of all interview data, which was then visualised as a data structure diagram. In constructing this data structure, the researchers first formulated first-order concepts based on the expressions, terms, and experiences conveyed by the informants. These concepts were then grouped into second-order themes through researcher interpretation, before finally being distilled into aggregate dimensions as the main thematic categories in the research findings.

Coding began with open coding, in which two authors performed it separately. First, we conducted preliminary coding using an inductive approach. The themes were then individually formulated and subsequently combined into broader dimensions. This iterative approach ensured that the developed themes shared a similar perspective. Figure 1 shows the steps of coding and data analysis.

This analysis process considered the conceptual dimensions previously used in developing the interview instrument: knowledge identification, acquisition, development, sharing, preservation, and utilisation. Thus, there was a relationship between the conceptual framework, interview items, and the analysis process. Although the analysis remained open to themes emerging from the data, these dimensions were used as initial analytical categories to trace how knowledge management practices occurred within the farming community and how they were perceived to support or hinder the regeneration of young farmers.

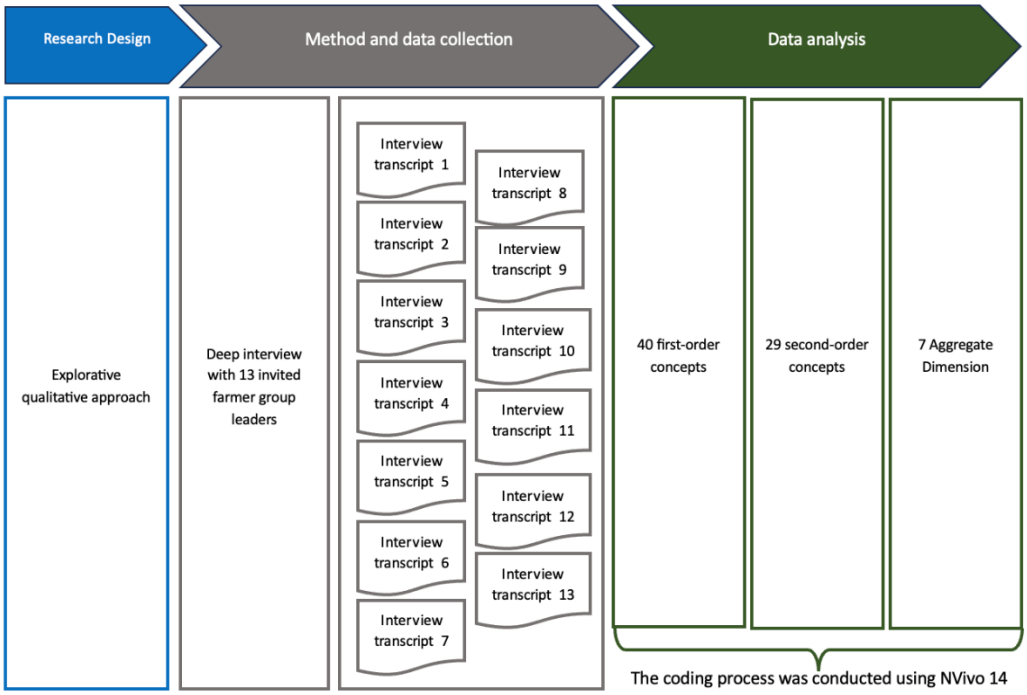

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Figure 1: Coding and Data Analysis Process

Figure 1 presents the coding and data analysis process. Through the coding process, this study identified seven aggregate dimensions that represent the main thematic structure of the findings. They are the first six dimensions reflecting KM main processes in farming communities: knowledge identification, knowledge acquisition, knowledge development, knowledge sharing, knowledge preservation, and knowledge utilisation, as they relate to supporting the participation and regeneration of young farmers. The seventh dimension summarises the conditions that support and hinder knowledge management practices in strengthening farmer regeneration.

3.4 Validity and Reliability Measurement

The credibility of this research was strengthened by developing interview instrument based on conceptual dimensions in the KM literature, specifically Probst's Building Blocks framework. By referencing the conceptual definitions of each dimension in developing core questions, this research maintained a clear link among the

theoretical framework, data collection instruments, and the analysis process. The mapping between interview sections, conceptual dimensions, exploration objectives, and the literature base is presented in Table 3.

To improve the validity and reliability of the findings, the study triangulated data from sources of information so that the findings could be compared and validated to reduce bias. Moreover, literature triangulation was used to compare the results of the research with available theories and studies, and it increased the external validity and credibility. The data coding was conducted collaboratively by different analysts, which minimised bias because all the analysts were consistent in categorising and interpreting the data. Combining data and literature triangulation strengthened the reliability of the results, and in fact, the conclusions reflected the empirical data and were consistent with the existing literature.

4. Result

The findings of the qualitative data analysis reveal how farmer groups apply KM practices in their environments towards regenerating farmers. Based on the KM process, comprising knowledge identification, knowledge acquisition, knowledge development, knowledge sharing and preservation, and knowledge utilisation, we could identify the farmer groups' practices at a given stage and analyse the types of practices geared towards the regeneration of young farmers. The most prominent processes facilitating the involvement and regeneration of young farmers are knowledge sharing, knowledge acquisition, and knowledge development. Nevertheless, there are other stages in the KM process which also have their role, but to a lesser degree. Thus, the next section elaborates on the practices developed at each stage of KM, as well as the factors that facilitate or impede the participation of young farmers. The important findings are as follows and are based on the aggregate dimension:

4.1 Youth-centred Knowledge Identification Practices Support Farmer Regeneration

Figure 2 illustrates the knowledge identification process supporting farmer regeneration. The finding show how farmer groups of 20-75 members systematically acquire knowledge through field experience and credible sources, such as parents, peers, and agricultural extension workers. Local knowledge, especially the practices – for example, *Selapanan, Pranoto Mongso* and *Titen Telaten* – is essential in this process as it helps farmers balance traditional agricultural wisdom and modern knowledge, hence enhancing their techniques in land management, fertilisation and crop care.

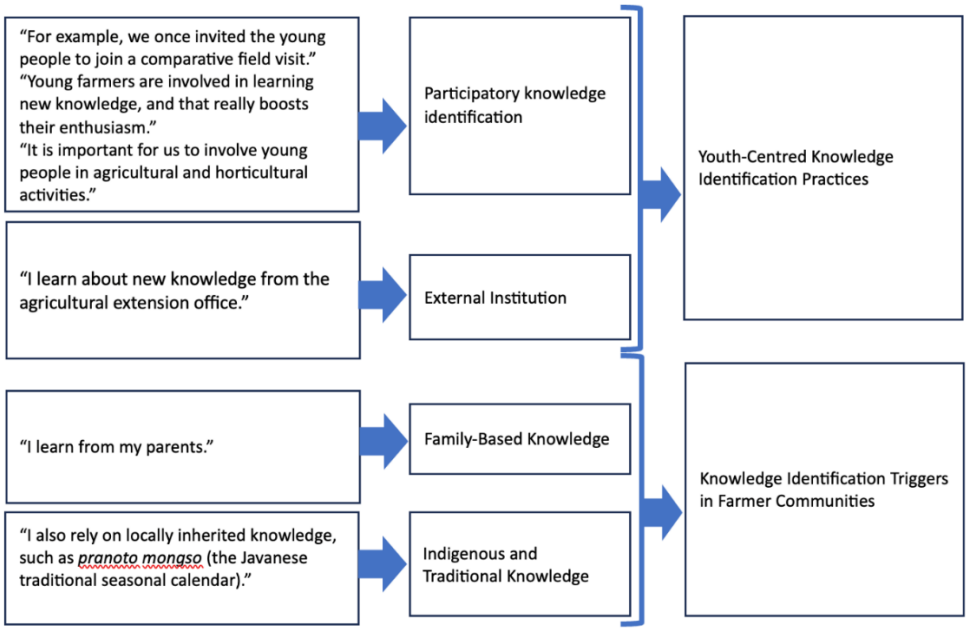

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Figure 2: Knowledge Identification Process Supporting Farmer Regeneration

The question then is, how is this practice regenerating young farmers? The analysis shows that all the identified themes are based on activities that specifically focus on the roles and engagement of young people in the village in which the farmer group is emerging. The actors have been introduced to the youths and the farmers at an early age as relevant sources or references with which knowledge can be identified. Besides, local youth were

invited and engaged in learning local agricultural knowledge, which has been passed down across generations in the village. The condition affects the delivery of knowledge applied by young generations entering agriculture. The farmer groups engage youth in awareness of issues and information that can enhance the effectiveness of agricultural activities.

4.2 Participatory Knowledge Acquisition as a Pathway to Farmer Regeneration

Figure 3 presents the modes of knowledge acquisition, showing how these modes support youth engagement in farming and contribute to farmer regeneration. The farmer cooperatives have also gained new knowledge that strengthens their farming methods through interested parties, including the government, outside farmers, the private sector, and fellow farmers. The two approaches to knowledge acquisition include group practices, such as comparative studies, training, and meetings, as well as individual questioning of senior and peer farmers. Also, technology is influential, and farmers can use such platforms as YouTube and WhatsApp as sources of information. The knowledge acquisition approach also focuses on experiential learning, using field trips to senior and peer farmers and real-world farming experiences.

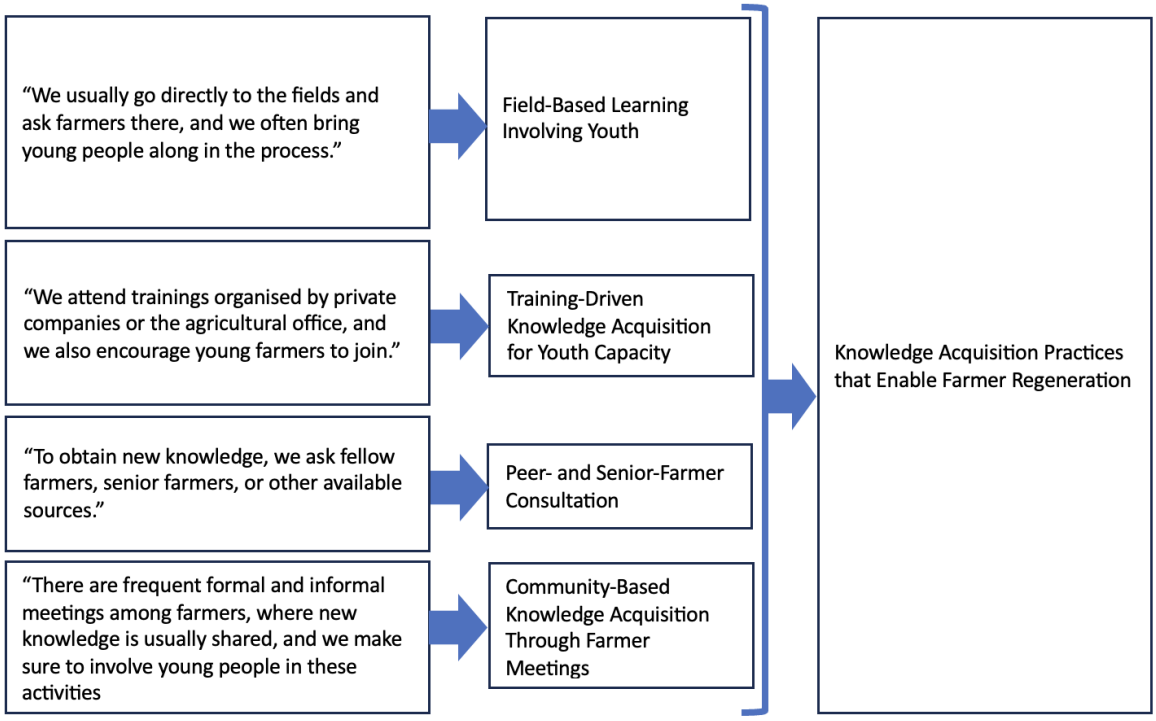

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Figure 3: Modes of Knowledge Acquisition Supporting Youth Engagement

In knowledge acquisition, young people were supported by farmer groups to facilitate regeneration by involving them in knowledge acquisition activities, including study tours. This continues in the training process, where youth participation is prioritised. The farmer group members also encourage young people to ask older farmers agricultural questions. They involve youth in these knowledge-acquisition activities during meetings.

4.3 Engaging Youth in Experimental Knowledge Development for Farmer Regeneration

Figure 4 presents the knowledge development practices that support youth engagement in farming. The findings indicate that knowledge development among horticultural farmers is mainly achieved through direct practice and experiential learning. Experimental learning is done by farmers both individually and in groups, as they test and adjust their newly learned knowledge to suit the circumstances of the area. This involves the creation of methods for fertilising, soil preparation, and planting patterns, which have been improved through applied training outcomes. Outsourcing support, including highly professional training and interaction with the government and the private sector, makes this a dynamic process in which farmers are expected to actively develop and construct knowledge in response to the needs of their community.

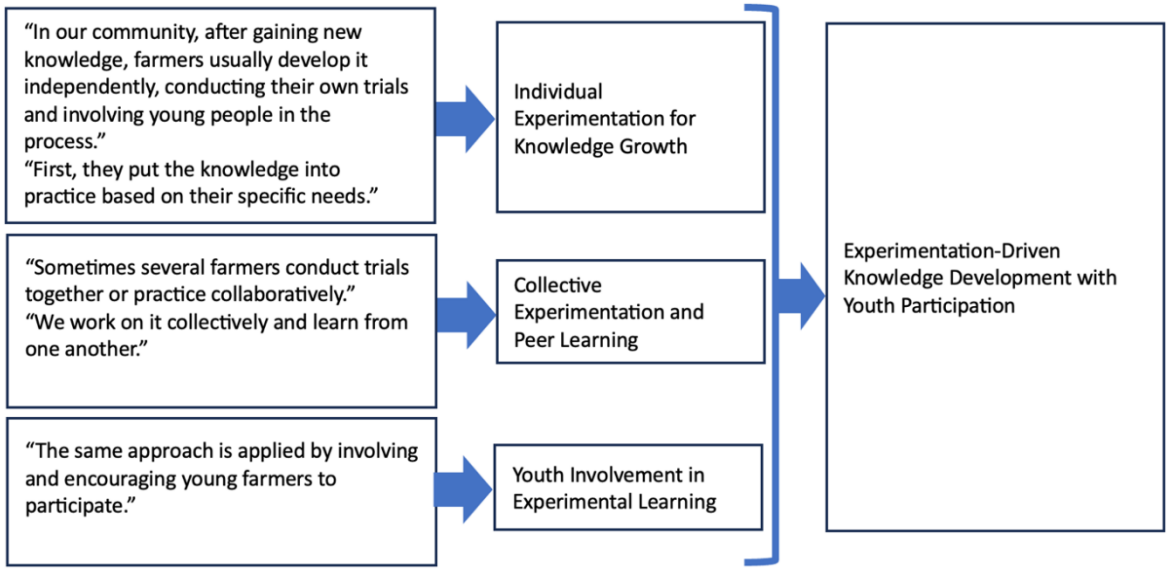

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Figure 4: Knowledge Development Practices and Their Role in Youth Engagement

The practices in the development of science acquired by the members of the farmer group are through trials and experiments with their agricultural media. The farmers did not do it in isolation, but they also included young people. In the case of parents, they will carry their children along. The participation of the youth in the trial. This was achievable due to the dedication of the farming group to retaining the zeal and spirit of youth in agriculture. Besides these activities, young people/farmers were also allowed freedom to utilise the knowledge acquired, not only to innovate but also to practice it personally. Therefore, young individuals are not restricted in their knowledge application.

4.4 Co-creating Knowledge through Youth-led Sharing Activities

Figure 5 presents the knowledge sharing practices that facilitate youth farmer regeneration by integrating young farmers into knowledge exchange withing farmer group. Farmers share knowledge in both informal and formal ways, with a focus on young farmers. Informal sharing happens on the streets, in mosques, and during home visits. Formal sharing occurs in meetings in villages or homes through joint training, group talks, and practical demonstrations. Farmers share knowledge directly with one another through informal chats and discussions. Formal sharing is commonly organised by external groups such as the government or private companies, sometimes at regular farmer meetings. Sharing knowledge works best in person, but they also use social media, for example, WhatsApp. Individuals who acquire new knowledge from training or programs are expected to share it with their peers in the group.

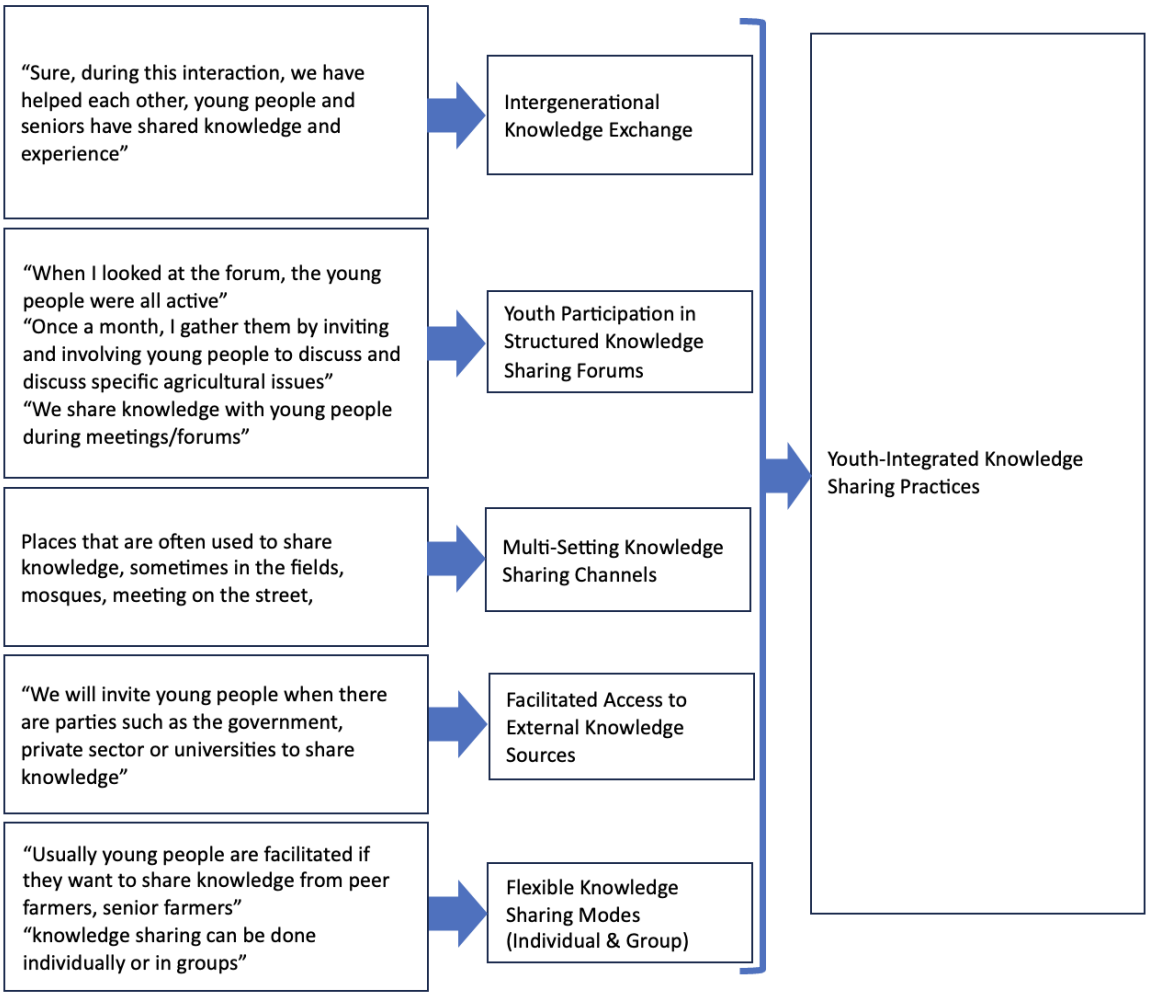

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Figure 5: Knowledge Sharing Practices Facilitating Youth Farmer Regeneration

The farming group has developed a culture of knowledge sharing through informal and formal forums. Young farmers and youth are given space to participate by group members. Peasants are invited to regular meetings and engaged in forums where youth can communicate about agriculture. In knowledge sharing and training activities, preference is given to young people's participation. Farmers prioritise youth engagement for agricultural discussions and question-answer sessions.

4.5 Intergenerational, Mentorship-Driven, and Youth Leadership Approaches to Knowledge Preservation

Figure 6 presents knowledge preservation practices that ensure youth involvement in farming through intergenerational learning, mentorship and youth leadership. Practice-based learning, intergenerational transmission, mentorship, and documentation are some of the ways of knowledge preservation among the farmer groups. The older farmers spend time with younger farmers during the soil preparation and planting process, which enables the transfer of practical skills and farming concepts, such as responsibility and perseverance, through daily interaction. This process is further reinforced through mentorship, whereby young farmers are encouraged by senior farmers to learn new methods, receive cultivation guidance and emotional support. Leadership and documentation practices are also used in engaging youth. The young members are used as section leaders in the group, which builds leadership capacity and a sense of responsibility for the sustainability of agriculture. Simultaneously, they record training outcomes and cultivation methods and establish knowledge archives that are easy to access and prevent any dependence on oral knowledge transfer. In combination, intergenerational transfer, mentorship, and youth leadership assure the preservation of agricultural knowledge and actively contribute to the regeneration of farmers.

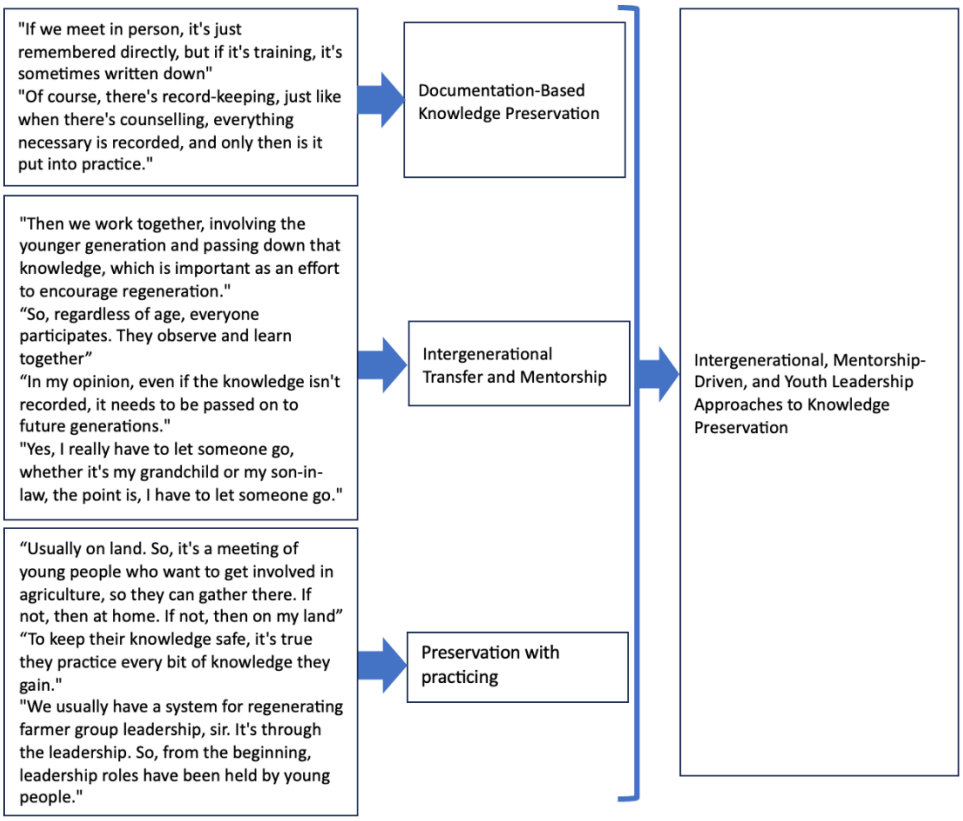

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Figure 6: Preserving Knowledge to Ensure Youth Involvement in Farming Practices

4.6 Utilising Knowledge to Inspire and Motivate Young Farmers

Figure 7 illustrates youth empowering knowledge use practices, showing how young farmers use farming knowledge to strengthen their roles and participation in agricultural activities. The information acquired by farmer groups is integrated into daily farming practices and facilitates sustainability and decision-making in problem-solving. It involves land management, crop maintenance, and other techniques. This knowledge enables farmers to be emotionally stable and confident to tackle challenges. The knowledge is practised by incorporating traditional and modern methods. When the farmers plant crops, irrigate land, and apply fertiliser, they combine proven past practices with new efficient technologies to enhance agricultural performance.

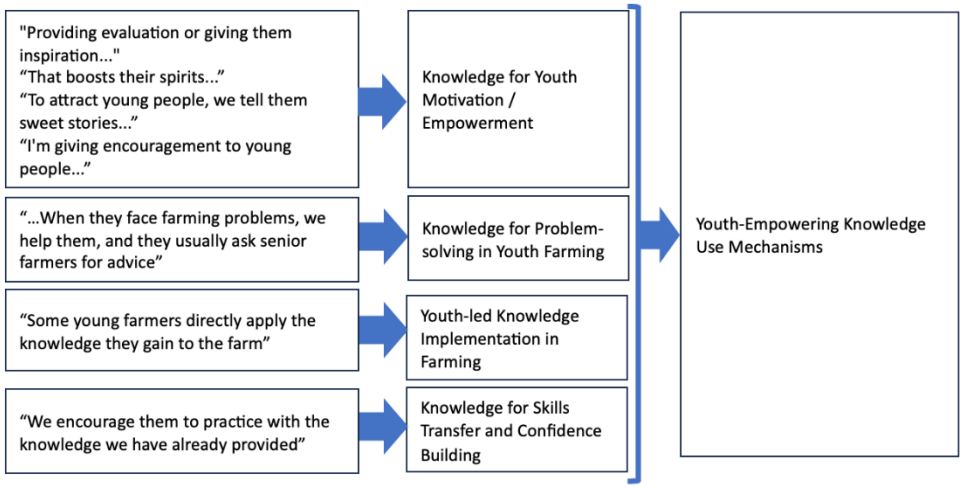

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Figure 7: Youth-empowering knowledge use practice

According to the research results, the members of the farmer group apply the knowledge they have gained to motivate and inspire the young farmers. This is not only used in farming activities but also helps impart skills and confidence among young farmers. The elder farmers educate using real-life examples, which assist young farmers in defeating technical difficulties in farming and reinforcing their commitment even in the face of failure. Moreover, the knowledge facilitates decision-making among young farmers since they can apply the knowledge in their farms. The knowledge enhances their involvement in agriculture and the sustainability of the farming profession in future. In general, the knowledge use practices are vital to aiding in the regeneration of young farmers, focusing on the transfer of skills, confidence, and the implementation of knowledge in the agricultural sector.

4.7 KM Supporting and Hindering Conditions in Strengthening Farmer Regeneration

The analysis of interviews with key informants shows what helps or hinders farmers. Creating an environment where farmers care and have places to talk, especially involving young farmers, is important. Involving young people in all aspects of knowledge management in farmer groups should be a priority. The attitude of the managers and the head of the farmer group is crucial for this atmosphere. Therefore, the main factor that supports knowledge management and brings in new farmers is the group's leadership. Another important factor is the principle of cooperation across generations, a tradition among farmer groups. This value encourages all generations to completely participate in the group's activities.

KM for helping farmers is blocked by several issues. First, there is a significant age gap between old and young farmers. It leads to differences in how they share and understand traditional knowledge. Young farmers can access new information and think that methods should change. But older farmers prefer to stick to old ways. Second, old farmers may not have the knowledge that young farmers want to learn. The biggest problem is the lack of resources, especially farmland, for young farmers to put what they learn into practice.

5. Discussion

5.1 Reconnecting KM to Farmer Regeneration

Knowledge management (KM) is a recent and lesser-known concept in agricultural settings. However, farmer groups have demonstrated aspects of KM through their activities. The KM process involves knowledge identification, acquisition, development, sharing, preservation and utilisation through various practices. As explained in the findings, KM among farmer groups includes mapping knowledge sources for identification and acquisition, developing a culture of mutual learning, and using local knowledge as a key driver (Tandi Lwoga, 2011). The mapping of pertinent knowledge sources is a crucial base of effective knowledge identification and acquisition. With the systematic listing and classification of these sources, organisations and communities can establish a catalogued storage system that allows easy access to the necessary information. This mapping can not only identify the current sources of knowledge but also show areas of deficiency and opportunities for new learning. It serves as a guide that directs the stakeholders to the most applicable and trustworthy knowledge.

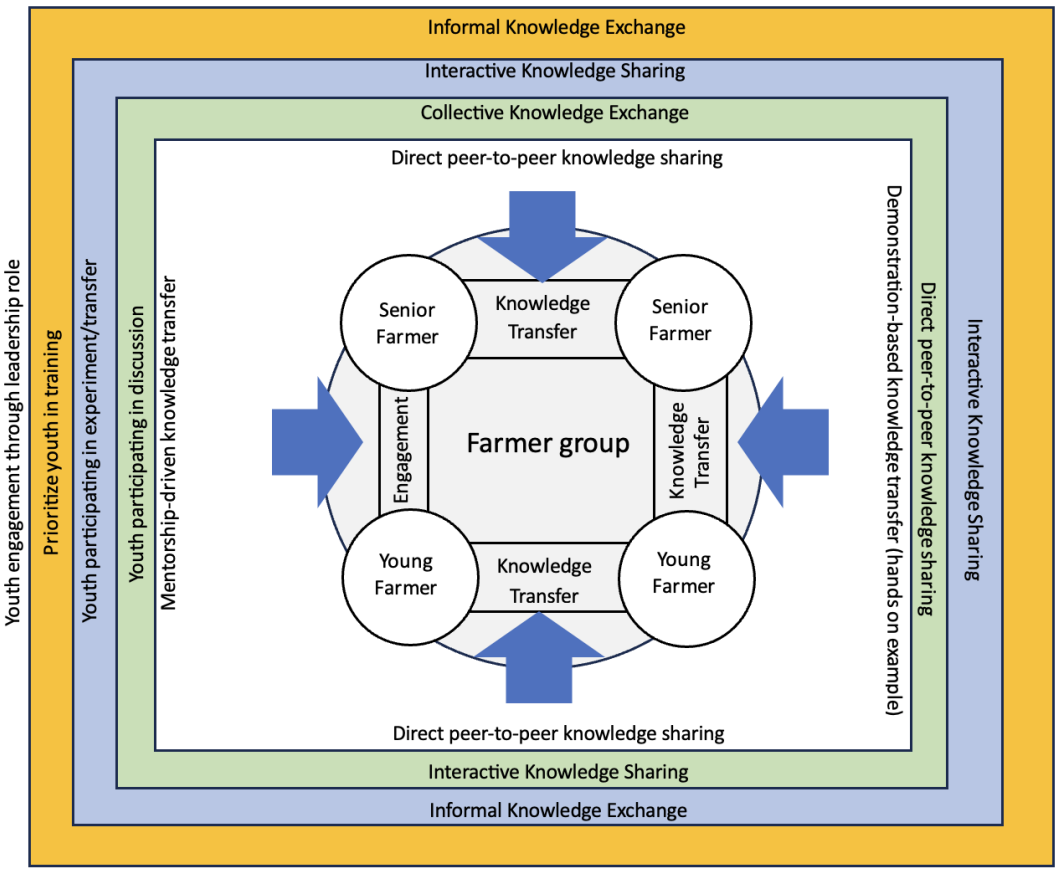
Development of a culture of mutual learning also enhances the power of knowledge identification as it promotes the ongoing interaction, communication, and cooperation between individuals and groups (Booth, 2012). This culture builds trust and openness vital for sharing tacit and explicit knowledge. Local knowledge is essential as it provides context through experiences and insights that are often lost with external sources. It forms a dynamic ecosystem that combines mapped knowledge, reciprocal learning, and local experience, where knowledge is co-constructed and improved to promote sustainable development and adaptive capacity. (Curry and Kirwan, 2014; Vičič Krabonja *et al.*, 2024). Moreover, there are various sources of knowledge, practices and experiments applied as a way of knowledge development (Hunter, 2005). The exchange of new information and knowledge among members is highlighted, as is the maintenance of knowledge through practical processes, mentorship, intergenerational transfer, and documentation. This body of knowledge is then used in their farming activity (Iniesta-Arandia *et al.*, 2015; Masenya, 2023).

The results of the data analyses indicate that the outcomes of the social system of teaching and learning between generations are represented by the members of the farmer group. This process incorporates elder farmers, young farmers, and youth from the nearby agricultural region, in collaboration to develop and share knowledge through different practical approaches. The active engagement of youth farmers and local youth in the whole knowledge lifecycle, including the process of identifying, seeking, obtaining, developing, exchanging, preserving, and application of knowledge, is a key factor that contributes to the development of ownership and enthusiasm in the community (Faithfull *et al.*, 2019). They are also armed with theoretical concepts, practical expertise and first-hand experience in the agricultural sector to maintain their agricultural activities. In addition, this

involvement could inspire young people to participate in agriculture. This observation is relevant when knowledge management within a given organisation affects career progression. Good KM practice will make knowledge available, disseminated, and used to equip potential successors sufficiently, hence impacting positively on succession planning and implementation.

With the system of knowledge sharing and management, organisations can enhance the succession processes, which will eventually lead to an increase in performance and stability (Groves, 2017). Moreover, the application of extensive career management practices, such as training and performance reviews, increases job satisfaction and decreases turnover intentions by matching career development with the goals of the organisation. This alignment is essential in succession planning because employees are highly ready to occupy various positions in the company in the future (de Oliveira, Cavazotte and Alan Dunzer, 2019). Additionally, the use of knowledge management in the virtual organisation creates significance in allowing anytime and anywhere access to organisational knowledge, which can build a virtual team and community of practice. This methodology is critical towards equipping individuals to succeed in a more digital and geographically spread workplace. In general, companies that invest in the strength of knowledge management systems have a better chance of handling succession in places where emerging leaders are prepared to assume important positions with the knowledge and skills required (Ho et al., 2012).

Community practice can also be witnessed in the activities of the farmer groups regarding knowledge sharing. We all know that COP is one of the useful means of knowledge sharing and skill improvement. When they have an excellent skill, they are prepared to be farmers. Figure 8 summaries the social learning processes within farmer groups as communities of practice, illustrating how knowledge exchange takes place among senior farmers, between senior and young farmers, and among young farmers in supporting farmer regeneration. These interactions reconnect knowledge management with farmer regeneration by enabling intergenerational learning and youth participation in farming practices.



Source: Authors' own work

Figure 8: Social Learning Processes within the Community of Practice of Farmer Groups

5.2 Linking KM Practices and Regenerative Outcomes

Youths' role in the transfer and development of knowledge positively influences the motivation, confidence, and long-term participation in agriculture. Previous research suggests that interpersonal knowledge networks, such as those seen in the Caribbean, increase farmer-to-farmer exchange, offer social services, and provide opportunities to be more innovative, which develops self-efficacy among young farmers (Saint Ville, Hickey and Phillip, 2017). The Ghana case shows that the involvement of young people in knowledge networks among farmers leads to adaptability, development of leadership qualities, and an increased sense of belonging within farming communities (Cadger *et al.*, 2016). This learning experience in the form of study tours and benchmarking exercises can also boost the eagerness of the youth, as it opens up to them the current practices and effective agricultural examples. This exposure enhances their level of awareness of the possibilities in agriculture and their determination to embrace new practices. Mentorship among the young and senior farmers also comes out as one of the most important mechanisms. Mentorship leads to curiosity, skill-building, and reciprocal learning, which are identified with the benefit of both the mentor and the mentee (Burgess, van Diggele and Mellis, 2018; Byars-Winston and Dahlberg, 2019). The interaction in an agricultural setting enhances applied learning and promotes innovation and intergenerational continuity. These three KM practices, when combined, empower young farmers, contribute to farm regeneration, and significantly influence motivation, capability, and commitment across generations.

5.3 Supporting and Hindering Factors in KM Practices for Farm Regeneration

This study outlines some of the enablers of youth farmer regeneration, such as a supportive environment that facilitates intergenerational collaboration through mentoring. Young people's confidence and skills in agriculture improve knowledge management and decision-making. Capacity and continuity in farming practices are guaranteed by leadership opportunities. *Gotong royong* is the concept that supports mutual co-operation and the transmission of culture. Also, young farmers have access to agricultural land where they can use their knowledge in practice and ensure the sustainability of their contributions to the agricultural economy. A combination of these aspects reinforces the continuity of knowledge and involvement of the youth in agricultural societies.

This study presents several measures that prevent the rejuvenation of young farmers. To begin with, there exists a lack of understanding of indigenous knowledge among younger farmers, who underestimate the traditions of the older generations. Also, elderly farmers have a poor understanding of modern agricultural challenges, including climate change and modernised pest control, which influence the mentoring of young farmers. Lastly, limited access to farmland is a major problem for young farmers, which hinders their practical learning and innovation. These aspects suggest finding strategies that combine traditional and modern knowledge and ensure that the resources are accessed without giving preference to a particular group, for sustainable regeneration.

6. Conclusion

The results show that knowledge management practices within farmer groups can regenerate young farmers when practised with local youth participation. By identifying, developing, sharing, and applying knowledge, farming communities sustain agricultural knowledge and create intergenerational learning spaces that foster enthusiasm for farming and knowledge acquisition. The research finds that a collaborative environment, youth leadership, and cooperation are key factors that promote younger generation participation. However, generational differences in perceptions of local knowledge, poor adaptation among older farmers to current agricultural problems, and land inaccessibility remain significant barriers to regeneration. Hence, this research study can be added to theoretical knowledge management and the regeneration of young farmers, as well as give practical implications for policymakers and stakeholders on how to empower the younger generation and maintain knowledge across generations as a means of resilience in agricultural systems. The theoretical and practical implications of the findings of this study are also concrete.

This work contributes to community-based KM by showing that KM processes - identification, acquisition, development, sharing, preservation and utilisation - are social systems organising youth involvement and intergenerational continuity in farming communities. Farmer regeneration emerges from thriving community KM systems, not merely from economic stimuli or policy interventions. The paper highlights indigenous, tacit, and culturally embedded knowledge (*selapanan, pranoto mongso,* and experiential learning) as strategic resources, enhancing KM theory that emphasised formal knowledge. The results demonstrate how community leadership, mentoring networks, and youth-based practices sustain collective learning and the transfer of agricultural knowledge.

These results, as a practical implication, emphasise the importance of village governments, agricultural institutions, and other stakeholders in enhancing the inclusive and accessible knowledge-dissemination systems among the younger generation. These not only guarantee the sustainability of intergenerational knowledge transfer, but they also foster active participation of youth in the agricultural sector through the provision of information, training and mentoring that are applicable to them.

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Ethics Statement: Ethics approval was not required under the applicable institutional guidelines. The study involved non-invasive qualitative data collection, participation was voluntary, participants were informed about the purpose of the study, and the confidentiality of responses was maintained.

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Appendix 1: Interview Guide and Question Items

A. Interview Section: Opening

A.1. Dimension/Focus: Respondent's Profile and Context
Interview questions/items:
May I know your name and age? Then, could you tell me how you first got involved in farming here (including in the farmers' group)?
Could you describe your daily activities in this village? (What kind of farmer are you, and how long have you been farming? What are you currently growing)
Are you a member of a farmers' group here? If so, how long have you been a member (name of the group and your role)?
How many young farmers are members of the farmers' group you belong to?
What are your views on the involvement of the younger generation in agricultural activities in this village/farmers' group? (enthusiastic/other perspectives)

B. Interview Section: Main Body

B.1. Dimension/Focus: Knowledge Identification
Interview questions/items:
Where do you or the members of the farmers' group usually gain new agricultural knowledge or skills (how do you identify and where do you get farming knowledge)?
What sources of knowledge do you consider important in daily farming practice/learning (do young farmers also make use of those sources)?
In your opinion, what can be considered as knowledge within this farmers' group? Why is it important for (members of) the group to know the expertise of its members?
In the farmers' group you are a part of, how do you usually encourage young people to learn or seek knowledge about agriculture?
If young people are invited to seek agricultural knowledge, can this make them more enthusiastic to get involved/participate in agriculture as well?

B.2. Dimension/Focus: Knowledge Acquisition
Interview questions/items:
How does the farmers' group acquire knowledge from its members?
For young farmers in the group, how do they usually gain knowledge from other members or from more senior farmers?
From where do members of the farmers' group usually learn new things about agriculture?
Are young people here usually active in learning new things in agriculture? And do they usually like to ask questions, practice directly, or just observe?
Where does new knowledge or information acquired usually come from?

B.3. Dimension/Focus: Knowledge Development
Interview questions/items:
Is there further development from the knowledge that has been obtained?
How is new or acquired knowledge developed, either individually or together?
Do young people here also try out new methods or create innovations from the knowledge they have previously acquired in agriculture? Could you share an example?
How does the farmers' group support young people so they become more skilled? Do senior farmers also help in the creation of new knowledge?
Are young people given the opportunity to participate in developing knowledge in this group? Are they free to create and find their own solutions?
B.4. Dimension/Focus: Knowledge Sharing
Interview questions/items:
Based on your experience and that of members of the farmers' group, how is agricultural knowledge usually shared among farmers in this group?

Is it through special records/documents or more through storytelling and direct conversation? Do young people here learn directly from senior farmers? And what does the interaction process usually look like? Are there special activities or meetings for exchanging knowledge among farmers in the group? And do young people usually participate? How often are these activities held? In your opinion, does the knowledge shared in the farmers' group make young people more interested in becoming farmers/participating in agricultural activities?

B.5. Dimension/Focus: Knowledge Preservation
Interview questions/items: How can agricultural knowledge from senior farmers be preserved when they are no longer actively farming? Are there specific ways for young people to learn agricultural knowledge? Could you describe the habits usually practised to ensure knowledge is maintained? In your opinion, how important is it to pass down or record agricultural knowledge for the younger generation, so they can continue the group's/local knowledge?

B.6. Dimension/Focus: Knowledge Use
Interview questions/items: What is the knowledge gained in the farmers' group usually applied/used for? Are there joint programs or activities utilising the new knowledge? Can young people here try to use that knowledge themselves? How is their enthusiasm in practising/using the knowledge from the group? To what extent does this experience help young people become more independent or innovative as farmers? What usually motivates farmers, especially young people, to want and be enthusiastic about using knowledge from the farmers' group?

C. Interview Section: Closing/Conclusion

C.1. Dimension/Focus: Reflection (closing)
Interview questions/items: In your opinion, what are the biggest challenges for encouraging young people to want to engage in farming and learn agricultural knowledge (supporting & hindering factors)? What is your opinion about the role of knowledge that has been identified, created, developed, preserved, shared, and used in encouraging youth involvement in agriculture? Is there anything else you would like to convey about agricultural knowledge and the next generation of young farmers in this village?

