

Strategies for Knowledge Sharing Among Rice Farmers: A Ghanaian Perspective

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Abstract: *Purpose:* This article investigates knowledge sharing practices amongst rice farmers in Ghana and suggests a strategy for improving knowledge sharing in rice farming communities in Ghana. *Design/methodology/approach:* This study is underpinned by the pragmatic paradigm where concurrent triangulation mixed-method design was used for the study. Data was gathered with survey and interviews. A total sample of 110 was used, involving 101 survey respondents and 9 interview participants. The survey data was analysed descriptively using Statistical Package for the Social Sciences (SPSS), version 26. The interview finding was analysed using thematic analysis. The findings revealed informal knowledge sharing practices among the rice farmers and suggests a strategy for knowledge sharing that involve partnerships between stakeholders in different sectors, such as government agencies, rice-farming communities; rice production-based NGOs, and researchers. Successful implementation of knowledge sharing would depend on finding and connecting the tools, technologies, and techniques practices. *Limitations:* The results could not be generalised to knowledge sharing practices among rice farmers in Ghana because only three regions were targeted. There is a need for a quantitative comparative study of knowledge sharing by rice farmers in all regions where rice is produced in Ghana. *Practical Implications:* Rice is an agricultural cereal crop in Ghana and an important source of livelihood for rural poor households. It is consumed and cultivated by many people in the country. When rice farmers engage in efficient knowledge sharing practices knowledge will spread easily among rice farming communities resulting in sustainable agricultural practices that may eradicate hunger and poverty. Effective knowledge sharing, offers great potential for addressing the challenges of rice production in Ghana. It will increase rice production, improve the quality of rice yield and safeguard the quality of the natural environment simultaneously. *Originality/Value:* This article adds to the body of knowledge on knowledge sharing from an agricultural perspective with specific reference to rice farming. Effective knowledge sharing will enhance food security, alleviate climate change challenges, improve nutrition, and promote sustainable agriculture, thus contributing toward the realisation of Goal 2 of the United Nations 2030 Sustainable Development Goals. The findings of this article form part of the finding of the doctoral studies.

Keywords: Ghana, Knowledge, Knowledge management, Knowledge sharing, Strategy, Agriculture, Rice, Rice farmers

1. Introduction

Knowledge sharing is becoming important in the drive towards sustainable agriculture in farming communities in Africa, as well as in low and middle-income countries elsewhere where agriculture is less mechanised (Adetimehin, Ounlola, and Owolabi, 2018; Buendía, Garcés and Aceros, 2023; Qureshi, Sutter and Bhatt, 2017; Wijitdechakul, 2018). Knowledge sharing amongst rice farmers ensures that farmers get access to relevant and timely knowledge to improve their farming practices. It is a critical pathway to bringing innovation and modernization into rice farming in developing countries (Laforge and McLachlan, 2018).

Rice is one of the most widely consumed food commodities, which can be harnessed for addressing food insecurity in Africa (Nimoh, Tham-Agyekum and Nyarko, 2012). It is an agricultural cereal product belonging to the *Oryza sativa* or *Oryza glaberrima* grass species (Tariq et al., 2018). The parent species of rice (i.e., *Oryza sativa*) is native to Asia and certain parts of Africa, but, due to centuries of trade and exportation, rice has become commonplace in many countries worldwide, directly feeding more people than any other food crop (Tippe et al., 2017:94). As a cereal grain, rice is the most widely consumed staple food for the largest part of the world's human population, and the third-highest agricultural commodity with worldwide production, coming after sugarcane and maize (Buendía, Garcés and Aceros 2023; Moglia et al., 2018:86). Sustainable farming practices offer opportunity for improving the livelihoods of individuals, households and communities involved in agriculture, especially smallholder farmers in sub-Saharan African countries (Qureshi, Sutter and Bhatt, 2017:18; Wijitdechakul, 2018:11).

Rice production has a significant impact on addressing poverty and food security. This is in line with agenda 2030 of Sustainable Development Goals (SDGs), signed in 2015 by the United Nations member countries, of which Ghana is a signatory. Goal 1 seeks to end poverty, goal 2 seeks to ensure food security. Ortolani et al (2015:22) noted that knowledge sharing is linked to sustainable agricultural practices. Knowledge sharing provides social and economic opportunities and therefore serves as a pathway out of poverty and social exclusion (Qureshi., Sutter and Bhatt, 2017:20). The different types of rice farmers are subsistence, small holder rice farmers, and commercial rice farmers (Andre et al., 2017:888). The subsistence rice farmers mostly grow rice on a microscale, mainly to feed their family or households. In low and middle-income countries, subsistence farmers are mainly found in deprived villages. Smallholder farmers, on the other hand, grow rice on a small scale for the purposes of both selling some and feeding their households from the farm (Buendía, Garces, and Aceros, 2023; Tippe et al., 2017:94).

Ghana is a lower-middle-income West African country where rice holds growing relevance as a food staple and where the rice sector plays a crucial role in the national economy (Braitham, and Rosenberg, 2022; Nimoh, Tham-Agyekum and Nyarko, 2012). The reason for this lies in increased dietary shifts from traditional Ghanaian foods (such as *fufu*, *kenkey*, and *gari*) to rice foods, particularly in urban areas. Rice is currently the second most important staple food in Ghana after maize, and its consumption is forecast to continue to rise because of population growth, urbanisation, and the associated changes in dietary patterns and habits (Cadger et al., 2016). Rice has permeated the socio-cultural fabric of Ghana's food space, now being more common than any of Ghana's traditional foods (Nimoh, Tham-Agyekum, and Nyarko., 2012). It is eaten by all Ghana's ethnic groups and tops the list of foods served during various cultural activities, including funeral ceremonies, marriage ceremonies, naming ceremonies, and other social gatherings.

The agricultural sector in Ghana contributes between 35-40% of Ghana's Gross Domestic Product (GDP) and provides livelihoods for an estimated 57% of the total labour force (Cadger, et al., 2016:32). The agricultural sector, in general, is dominated by smallholder farmers mainly in rural areas. Among the three regions where rice is predominantly produced in Ghana, are the Eastern Region, Northern Region and Ashanti Region (Cadger et al., 2016:35; Muhammed, Tela, and Wahab, 2022). The study was conducted in the Eastern Region of Ghana because rice farmers in this region are estimated to contribute more than half of all rice produced in Ghana for local consumption (Braitham, and Rosenberg, 2022; Donkor, Matthews and Ogundeji, 2018:157). The three rice-farming communities that dominate rice production in this region are: *Akuse*, *Asutsuare*, and *Kpong*. The Eastern Region also shares regional boundaries with Ashanti, Greater Accra, Western, and Volta regions.

Despite, the critical importance of rice farming, rice yield has been slowing down, especially among smallholder farmers in Ghana (Braitham, and Rosenberg, 2022; Moglia et al., 2018:85). For instance, the average rice yields potential is 10t/ha; however, the global average rice yield has hovered around 7-8 t/ha, with average yield from developing countries hovering around 4-5t/ha (Moglia et al., 2018:86). The rice production in Ghana has not paralleled the growing preference for rice meals, necessitating importation from other countries to augment rice consumption (Muhammed, Tela and Ab Wahab, 2022; Tinsley, 2009:14). Part of the problems contributing to low rice yield, especially in developing countries including Ghana, include lack of technology and efficient knowledge sharing practices and knowledge management in general among smallholder farmers (Tariq et al., 2018:73).

Several studies on rice farming and knowledge sharing have been on high income countries. There are no studies on how knowledge is shared among rice farmers in Ghana. Knowledge sharing can help to improve rice production by improving farming practices, developing collaboration and innovation among rice farmers and preventing loss of critical know-how in rice farming (Tariq et al., 2018:73). This article, therefore, focuses on understanding knowledge sharing in rice farming communities in Ghana, drawing on two theories, the Socialisation, Externalisation, Combination, and Internalisation (SECI) model by Nonaka (1991:6) and social exchange theory (SET) by Homans (1958) as a framework.

1.1 Problem Statement

Knowledge sharing is an important part of rice farming. Knowledge sharing among rice farmers ensures access to timely and relevant knowledge on best practices in improving rice productivity (Wijitdechakul, 2018:4). Knowledge sharing is even more critical in countries where the mechanization of agriculture still evolves (Qureshi, Sutter and Bhatt, 2017:12). In many rice farming communities in Africa, knowledge sharing among rice farmers constitutes a critical pathway for boosting rice production, ensuring collaboration and preserving critical know-how (Mashavave, et al., 2013:6). Farmer-led extensions are increasingly focused on improving agricultural practices and productivity in especially rural areas (Kiptot, et al, 2016:169).

However, rice farmers in Ghana, face severe challenges in their rice production. The challenges include pest infestation, less quality of rice grains and difficulties in proper fertilizers application (Tinsley 2009:7). These challenges faced by rice farmers have been attributed to the fact that there are limited knowledge sharing on best rice farming practices, even in rice farming communities where usable knowledge exists (Muhammed,, Tela and and Ab Wahab, 2022; Tsinigo and Behrman, 2017:49). The challenges of knowledge sharing practices among rice farmers, is a crucial factor accounting for the low rice productivity in Ghana (Donkor, Matthews and Ogundeji 2018:155). The limited knowledge sharing impedes the productivity of rice, undermines collaboration among rice farmers and preservation of critical know-how in rice farming in Ghana (Nimoh Tham-Agyekum. and Nyarko, 2012:36). For instance, several attempts by the Ministry of Agriculture to bring innovation into rice farming in Ghana were unsuccessful due to limited understanding of knowledge flow among smallholder farmers in Ghana (Tsinigo and Behrman, 2017:49). Against this backdrop this study investigates knowledge sharing amongst rice farmers in Ghana.

2. Literature Review

Knowledge sharing is an integral part of the broader knowledge management process (Balaji, Meera and Dixit, 2007:11; Clappison et al., 2013:60). It is through knowledge sharing that knowledge gets exchanged among individuals within an organisation. Knowledge sharing is defined as the exchange of knowledge between individuals (Kaewchur and Phusavat, 2013:181; Kim, Yagi and Kiminami, 2023.). Knowledge sharing is also defined by Prins et al. (2015:18) as the activities of transferring or disseminating knowledge from one person, group, or organisation to another. Knowledge transfer refers to the sharing or dissemination of knowledge or expertise from one part of an organisation to another (Andre et al., 2017:896; Kim, Yagi and Kiminami, 2023). The terms knowledge sharing, and “knowledge transfer” have been used interchangeably in the literature. In this study knowledge sharing is defined as the practices involved in how critical information resources are communicated or exchanged among the rice farmers and other stakeholders involved in rice farming in the Region.

2.1 Knowledge Sharing Practices

Knowledge sharing practices are all the activities that are intended to improve the internal flow and use of knowledge within a team in an organisation. It includes enablers, barriers and strategies adopted by individuals in exchanging knowledge among themselves which will be discussed in the subsequent sections. The factors that enable knowledge sharing have been categorised as individual-level factors, social and cultural factors organisational factors and technological factors (Cadger et al., 2016:42). Individual factors are qualities of individuals that make them more willing to share knowledge with others (Escobar, et al., 2022; Rosenberry and Vicker, 2017:28). Amongst these individual factors that enable knowledge sharing are self-efficacy, effective communication skills, personal relationships and interpersonal trust, and motivation (Ortolani et al., 2015:25).

Social and cultural factors create safe social spaces and opportunities that make individuals feel comfortable about sharing knowledge (Chhim, Somers and Chinnam. 2017:753; Escobar, et al., 2022). Socio-cultural factors involve high sense of trust, frequent interaction between individuals and workers and integration of knowledge sharing in work processes (Chhim., Somers and Chinnam, 2017:751). Other socio-cultural factors are collectivism, high sense of dependence and communality (Garcia, Galeon and Palaoag, 2018:32; Ortolani et al., 2015:22).

Some of the organisational factors that can act as facilitators to knowledge sharing among individuals in organisation or Communities of Practice are reward systems, leadership and management support, social networking, participation and democratic involvement and learning communities (Hislop, Bosua and Heims, 2018:15; Kim, Yagi and Kiminami, 2023; Nadason, Saad and Ahmi, 2017:34).

Some of the technologies that enable knowledge sharing are internet, intranet, e-mails, skype, blogs, social media, video conferencing and instant messaging (Yeşil and Hırlak, 2019:22). Other knowledge sharing systems include expertise locator systems, best practice databases, knowledge repositories and incident report databases, electronic performance support systems, digital learning repositories and digital object repositories (Assem and Pabbi, 2016; Taskin and Van Bunnem, 2015:159). Digital knowledge repositories have several key features that make them very effective. First, there is centralisation feature which allows wide varieties of digital contents curated from multiple sources to be housed in a central location, where the content can be shared

The different factors that undermine knowledge sharing among individuals in organisations may be grouped as individual, social, cultural, organisational barriers and technological barriers. Some of the personal factors identified include trust and perceived power (Cadger et al., 2016:35; Kim, Yagi and Kiminami, 2023). Others

include knowledge hoarding, mistrust, and dominance of sharing, explicit over tacit knowledge, individual differences, poor communication skills and time constraints (Rosenberry and Vicker, 2017:28).

Social and cultural factors create the atmosphere within organisations or communities of practice that influence how individuals behave (Navarro and Hautea, 2014:66). Within the context of work, for instance, the socio-cultural factors include factors within the cultural and social fabric of life that act as disincentives to the workers to share information. Family ties constitute the major cultural factor and social network cohesion constitutes the major social factor that affects knowledge sharing among workers (Siziba et al., 2012:16). Other factors included elements of mistrust, suspicion, and animosity, among others (Feng and Xue, 2014:11).

Organisational barriers constitute the factors at the level of organisations (in more formal sense) or communities of practice (in less formal sense) that impede or inhibit how individuals within the organisations share knowledge (Feng and Xue, 2014:11). Some of the organisational factors that act as barriers of knowledge sharing are financial constraints, lack of leadership and managerial support, hierarchy of work and organisational culture.

Several studies have identified potential technological barriers to knowledge sharing (Yeşil and Hırlak 2019:22; Ganguly, Talukdar and Chatterjee, 2019) The lack of technical support and lack of integration of information technology systems and processes impedes the way people do things and constitutes a critical technological barrier to knowledge sharing among smallholder farmers. Other technological barriers include lack of compatibility between diverse IT systems and processes (Adamides and Stylianou, 2013:6) and lack of training regarding workers' familiarisation with new IT systems and processes (Assem and Pabbi, 2016:482).

Amongst the strategies of knowledge sharing are Communities of Practice (CoP) mentoring and tutoring, expertise location, job rotation and SharePoint Communities of practice. Communities of Practice are a group of individuals or people who share a profession or craft (Boateng and Agyemang, 2016:218). Communities of Practice can be created deliberately, through the process of sharing knowledge or from experiences within a group of workers (Chen, et al 2015:1435).

Tutoring and mentoring as strategy for knowledge sharing is defined as a semi-structured forms of guidance in which individuals share their skills, knowledge and experience to assist other individuals to progress in their careers (Escobar et al., 2022; Garcia, Galeon and Palaoag, 2018:287). Expertise location provides organisations with support needed in achieving organisational learning goals (Dzandu, Boateng and Tang, 2014:349). Job rotation is a strategy used by organisations to rotate their employees' assigned jobs throughout their employment. Employers practice this technique for several reasons (Hislop, Bosua and Helms, 2018:46). Job rotation is usually designed to promote flexibility of employees and to keep employees interested in staying with the company/organisation, which employs them (Gava, et al., 2017:108).

2.2 Knowledge Sharing Amongst Rice Farmers

The basic goal of knowledge sharing among farmers is to leverage the available knowledge that may help rice farmers carry out their tasks efficiently and effectively. Knowledge sharing amongst rice farmers is even more critical in countries like Ghana where the mechanisation of agriculture is still evolving (Escobar et al., 2022; Qureshi, Sutter and Bhatt, 2017). In low and middle-income countries where agriculture is less mechanised (Mashavave, et al., 2013), knowledge sharing among rice farmers constitutes a critical pathway for boosting rice production (Donkor, Matthews and Ogundeji, 2018).

Farmers-led extensions are becoming increasingly important for improving agricultural practises and productivity, particularly in rural areas (Kiptot, et al.,2016). Several studies have examined the types of knowledge shared among farmers (Gava, et al., 2017; Kim, Yagi, et al 2023; Mwesigwa et al. 2016; Meijer, et al., 2015 and Siziba et al. 2012). Rice farmers share knowledge on various rice harvesting, processes and marketing approaches (Guo, et al., 2015).

Knowledge sharing on climate change is critical for farmers because climate change has had and continues to have a catastrophic impact on human settlements and livelihoods (Clappison, et al., 2013). Climate change adaptability is therefore seen as a case of risk management, aimed at securing food, water, timber and other means of livelihoods (Balaji, et al 2007). Studies by Chen, Shanthikumar and Sheb. 2015, Feng and Xue 2014, Garcia, Galeon and Palaoag, 2018, Ortolani et al. 2015, Tariq et al. 2018 and Wood et al. 2014 also provide insight into the potential of knowledge sharing practises among farmers that can impact on climate change.

Kamarudin et al., 2015 noted that farmers willingly shared farming knowledge among themselves and were working cooperatively and closely in undertaking their farming activities. The culture of cooperation and collective interest among these rice farmers improved knowledge sharing. Tariq et al. 2018 also examined

knowledge sharing in the assessment of mitigation practises for the dissemination of climate-friendly rice production systems in Vietnam. The findings showed that involving rice farmers in decision-making processes in a participatory manner enhances knowledge sharing practises among them Tariq et al., 2018.

Guo, et al., 2015 randomised controlled trial (RCT) to examine how Farmer Field Schools (FFS) affect knowledge acquisition among rice farmers in China (Escobar et al., 2022; Guo et al. 2015), observed that participatory involvement of rice farmers improves both knowledge acquisition and knowledge sharing in China. Notwithstanding the importance of knowledge sharing, sharing constitute a major challenge, among farmers in general and rice farmers for several reasons, including the fact that some farmers tend to resist sharing their knowledge with others (Assem and Pabbi., 2016:480). This situation leads to knowledge hoarding in rice farming communities (Prins et al., 2015:18). Amongst the reasons why rice farmers fail to share knowledge with their colleagues are protecting their competitive edge, lack of trust among rice farmers, lack of rewards of sharing of knowledge and personal characteristics, among others (Adamides and Stylianou, 2013:6; Escobar et al., 2022). It is therefore imperative that these issues are adequately addressed among rice farmers to improve knowledge sharing between and among them.

2.3 Theories on Knowledge Sharing

This study uses the Socialisation, Externalisation, Combination, and Internalisation (SECI) model and the Social Exchange Theory (SET) as a framework for understanding knowledge sharing strategies in rice farming communities in Ghana. The SECI model was proposed by Nonaka and Takeuchi (1996), and has become an integral framework of knowledge creation, knowledge sharing and knowledge transfer (Hislop, Bosua and Helms 2018).

The SECI model is based on the two main types of knowledge: tacit knowledge and explicit knowledge. According to the SECI model, there are four modes through which organisational knowledge is created and shared: socialisation, externalisation, combination and internalisation (Hislop, Bosua and Helms, 2018; Nonaka, Toyama and Konno, 2000). Socialisation is defined as the processes involved in the transfer of tacit knowledge between and among individuals within an organisation through observations when working with more skilled and knowledgeable workers (Nonaka and Takeuchi, 1996). Externalisation encompasses the entire process involved in turning or converting tacit knowledge into explicit knowledge through documentation and verbalisation (Hislop, Bosua and Helms, 2018). Externalisation is, however, deemed a particularly important, yet difficult knowledge conversion mechanism (Karadsheh et al. 2009). Tacit knowledge is defined as the type of knowledge that is codified into documents (e.g., manuals and web pages) so that it can be circulated easily throughout an organisation. Examples of tacit knowledge creation are face-to-face interactions or meetings, and video and teleconferences. In this sense, knowledge is therefore passed on from experienced to less experienced workers through guidance, practice, imitation, and observation. In applying the socialization to the current study, rice farmers gain new knowledge from outside its boundaries, such as through interacting with customers, suppliers and stakeholders. The externalisation process helps to examine the processes by which the rice farmers convert tacit rice farming knowledge into explicit knowledge to guide their rice farming activities.

Combination is the mode of knowledge conversion involving the combination of different types of explicit knowledge (Nonaka and Takeuchi, 1996) and it is the simplest form of knowledge sharing. In applying combination to this study, codified knowledge sources (such as documents) are merged to create new knowledge for rice farmers in Eastern Region of Ghana. This was intended to help discover how the rice farmers of the Eastern Region sort and categorise explicit knowledge, thus allowing it to become a more valuable source for planning and decision-making purposes.

Internalization refers to the processes by which people internalise explicit knowledge in order to develop tacit knowledge (Sanchez, Arroyo and Moreno, 2018; Singh, 2018). The internalisation process occurs as the user's existing tacit knowledge is modified through the use and learning of explicit sources (Hislop, Bosua, Helms. 2018). This means that when rice farmers are exposed to new rice farming knowledge, they internalise it by forming mental representations of the new knowledge (Sanchez, 2018). Internalisation helps to examine how new knowledge become internalised among the rice farmers (Singh, 2018).

The Social Exchange Theory (SET) was incorporated into the SECI model to explain social exchange as negotiation processes among rice farmers. The SET proposes that human exchanges are guided by subjective cost-benefit analysis, where individuals consider what they will lose or gain by exchanging something (Cropanzo et al., 2017).

The SET was chosen to help form an understanding of the motivations (cost-benefit analysis) of knowledge sharing among the rice farmers. Knowledge sharing, fundamentally, encompasses individuals who have access

to knowledge and who therefore decide to make that knowledge available to others. In the case of rice farmers, knowledge sharing becomes an exchange of relevant information about best rice farming practises with their colleague farmers. Therefore, using the SET, it is assumed that farmers who hold critical rice farming knowledge or information will engage in subjective cost-benefit analysis before deciding whether to share their knowledge or not. Using the SET to examine knowledge sharing among rice farmers therefore provides deeper understanding into the motivating factors underlying knowledge sharing practises among the farmers.

Integrating the SECI model, the SET helped in exploring the different dynamics associated with how tacit and explicit knowledge are shared among the farmers. This, in turn, assists in uncovering the nuances in knowledge sharing and the challenges faced with the various different kinds of knowledge among the farmers.

3. Methodology

This study adopted the pragmatic paradigm and triangulation of quantitative and qualitative methods of data collection and analysis from three rice farming communities from the Eastern region of Ghana namely Akuse, Asutuare and Kpong. A survey research design was adopted for the quantitative part of the study. A census of all the rice farmers and other stakeholders whose activities directly influence rice farming within the communities involved was undertaken. The other stakeholders included agricultural and extension officers, as well as some farm managers.

The quantitative data was gathered through a survey, by administering questionnaire to the respondents used to examine benefits of knowledge sharing, inhibitors of knowledge sharing, enablers of knowledge sharing and strategies for enhancing knowledge sharing among the rice farmers.

The questions were adapted from the previous studies of authors such as Adetimehin et al (2018), Donkor et al (2018), Nimoh et al (2012), Tsingo, and Behrman (2017), Boateng and Agyeman (2016) as well as Kodua-Ntim and Fombad (2020). The others are Dei and van der walt (2020), Kommey (2020) and Fombad (2008)

The questions proved valid in the previous studies and therefore appropriate for the current. After formulating the questions, the researcher had two rice farming experts review all the questions and made suggestions. After that, the subject matter expert on knowledge sharing, who is a professor reviewed and approved the questionnaire for data gathering. This was also reviewed and approved by the supervisor who is also an expert in the subject under discussion. The questions were modified for the study. The data was part of a larger PhD thesis conducted in 2020 titled 'Knowledge Sharing Practices among Rice Farmers in the Eastern Region of Ghana. See Tables 1 and 2.

Table 1: Adapted Questions Items and Authors for Improving Knowledge Sharing

Adapted Questions Items	Source(S)
Use of appropriate technology	Donkor, Matthews and Ogundeji, (2018), Tsingo and Behrman (2017).
Leadership and management support	Tsingo and Behrman (2017).
Integration of knowledge sharing initiatives in goals and strategies	Adetimehin, Okunlola and Owolsbi (2018), Donkor, Tham-Agyekum and Nyarko, (2018)
Provide space and opportunities for knowledge sharing	Donkor, Tham-Agyekum and Nyarko, , (2018), Tsingo and Behrman (2017).
Various forms of knowledge sharing and farming systems are encouraged among rice farmers here	Nimoh, Tham-Agyekum and Nyarko, (2012)
Constant training and retraining of the rice farmers	Nimoh, Tham-Agyekum and Nyarko, (2012)

Adapted Questions Items	Source(S)
Build trust	Adetimehin Okunlola and Owolsbi (2018), Tsingo and Behrman (2017).
There are reward systems for rice farmers who willingly share their knowledge on rice farming with their colleagues	Adetimehin Okunlola and Owolsbi (2018)
We set aside time for face-to-face collaborations and knowledge sharing	Nimoh, Tham-Agyekum and Nyarko, (2012)
Investment and financial support	Tsingo and Behrman (2017).
Opinions and inputs are sought from new rice farmers on all issues	Donkor et al (2018), Nimoh, Tham-Agyekum and Nyarko, (2012)
Familiarisation of other categories of knowledge	Nimoh, Tham-Agyekum and Nyarko, (2012)
All individuals who enter rice farming are given mentors	Nimoh, Tham-Agyekum and Nyarko, (2012)

Table 2: Adapted Questions Items and Authors for Improving Knowledge Sharing Practices

What Strategies do you use to enhance knowledge sharing among rice farmers in this region	Boateng and Agyeman. (2016)
Do you have leadership and Management support for the rice farm enhancement-	Tsinigo and Behrman (2017)
Do rice farmers get investment and financial support in rice farming	Cadger et al., 2016 and Chhim Somers and Chinnam, (2017)

The responses were determined using a Likert scale ranged as follows; 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Neutral (N), 4 = Agree (A), 5 = Strongly Agree (SA). The Yes-No responses were also used. A ‘somehow’ option was provided in the case that respondents were not so sure of their response. The quantitative data was a survey of 101 respondents amongst who were 75 rice farmers, 21 agriculture and extension officers and 5 farmer managers. The response rate was 100% for all three groups. Data was analysed by descriptive statistics using the Statistical Package for Social Sciences (SPSS) version 26.0.

To obtain in-depth information about the experiences of the rice farmers in knowledge sharing so as to complement the findings from the quantitative data, the qualitative data was analysed using semi-structured interviews from the three communities. An interview guide was developed to guide the interview process. The interview guide opened conversations into issues addressing knowledge sharing practices and strategies among the farmers. The interview guide served as an entry into the conversation, and after that, several probing questions are asked based on responses from the respondents. The probing questions helped to delve deeper into contextual issues relating to knowledge sharing in rice farming within the communities where the study was conducted. Qualitative data was drawn from the open-ended questions and the semi-structured interviews. The interviews were audio recorded, transcribed, and analysed. Participants were coded as R in respect of the

qualitative findings from the open-ended questionnaire and as P in respect of the qualitative findings of the interviews.

The instruments for data collection were pre-tested in Asuogyaman District. This area was chosen because the Asuogyaman District also had the most rice production in the Eastern Region. Asuogyaman District is one of the thirty-three districts of the Eastern Region of Ghana. The sample for the pretesting was thirty-three (33) for both questionnaires and interviews. Twenty (20) rice farmers, five (5) managers, and five (5) extension/agricultural officers were selected for the quantitative phase. However, for the qualitative phase, one (1) farmer, one (1) manager and one (1) extension officer were also interviewed for the qualitative phase. The point of the pre-test was to check the questionnaire or interview questions for consistency, accuracy, and whether they could be used.

Cronbach's Alpha was used to determine the internal consistency of items in the survey questionnaire to gauge its reliability. The instrument's overall internal consistency yielded an alpha level of = 0.822, indicating that it was reliable. The trustworthiness of the qualitative component was ensured using dependability, confirmability, credibility, and transferability (Lincoln and Guba, 1985:13; Silverman, 2015:28).

4. Findings

The purpose of this article was to explore the knowledge sharing practices amongst rice farmers in the Eastern Region of Ghana to suggest a strategy to enhance knowledge sharing. The demographic findings from the quantitative data revealed that majority of the respondents (70.9%) were males while 29.1% were females. Their ages ranged between 19 and 64 years, with 38% aged between 51 and 60 years, 27.3 between 31 and 40 years and 8.2% between 21 and 30 years. Educational levels were generally low, which is characteristic of farming communities in Ghana. Majority of the respondents constituting 68.2 had worked for between 6 and 10 years, with 15.5 of them having been involved in farming activities for between 11 and 15 years. For the qualitative data, the nine participants were represented by the identity with a serial number based on their location and titles. For instance, Interviewee Farmer Manager from the Akuse District was coded as (IFMAD-1). Again, Interviewee Farmer Manager from the Kpong District (IFMKD-2). Most of the participants were males.

4.1 Knowledge Sharing Practices

The qualitative findings revealed the different knowledge sharing practice used amongst farmers as forum discussions, workshops, training, peer assistance or advice, storytelling or film shows, action reviews by experts, communities of practice, mentoring and coaching.

For instance, IFKD-5 commented that;

The extension officer organises workshop for farmers normally in the first and last quarter of the year. This programme has helped us to know our colleagues in different districts who are in rice production”.

Manager, Asutsuare farms-IFMAD-3 also indicated that

On our farms, knowledge is shared mainly through the meeting. Rice farmers are allowed to share their experiences and difficulties encountered on the farms. It improves learning by doing on the farms. It also provides opportunities for rice farmers to share their expertise and skills.”

On the issue of workshop organisation, IFMAD-1 also supported that workshops and training are organised for farmers. *The interviewer asked, “How are such workshops and training organised?” IFMAD-1 said that farmers in each district are grouped in zones based on the type of crop they produce. Venues are announced to them either through their WhatsApp platform or community radio available in that district.*

IFKD-5 claimed that they had just ended their workshop for the first quarter which was held at the district assembly hall. *On the contrary, IAOAD-9 said that they already had existing groups, so the extension officers come to talk to them. The interviewer asked if there was a specific time for meetings. IAOAD-9 responded that there was not because the extension officers are always with them, educating and guiding them from land preparation to harvesting and the marketing stage.*

Other interviewees (IFMAD-1) and (IFMKD-2) shared a similar comment, saying that co-operative organisations or NGOs who are into farming activities also organise discussions or meetings with farmers. *IFMKD-2 further said that this normally happens in the form of visits to check if the farmers are implementing the right mechanisms that they were taught during their public forums. IFMAD-3 added that most municipal or district assembly agricultural directors or officers normally or most often organise meetings for farmers not solely for*

rice farmers but all farmers. Probing, the interviewer asked where they held the meetings and what was the purpose of such meetings. IFMAD-3 said that they were held at the assembly premises/hall or at one zonal community centre. This is normally done as a form of follow-up or in the form of re-educating farmers on pesticide application or other mechanisms of farming.

To make an in-depth assessment, the interviewer asked the farmers, “What is the procedure used in sharing knowledge among yourselves?”. Leaders were chosen from each group and a new farmer who was yet to start a rice production area to mentor them (IFAD-4). Normally, with peer assistance, farmers share knowledge with their colleagues (IFAD-6). Contrary to what IFAD-4) and IFAD-6) stated IFKD-5 cited that farmers are asked to share their story on the previously implemented mechanism on how they are benefiting from such an innovation.

Within the groups’, experienced farmers are chosen as coaches or team leaders (IFMKD-2). Probing, the interviewer asked, “What is the work of coaches and team leaders?” New farmers are asked to understudy the experienced ones (IFMKD-2). IFMAD-1 explained that:

“Before I started my rice farming, I studied previous rice on land preparation, planting and how to prevent birds from coming into contact with your farms. The skills acquired from my mentor has made me gain knowledge on harvesting, pesticides control and marketing.”

IFMAD-3 added:

“As a beginner to any profession, mentorship is very important? Because the key knowledge to succeed in such a profession lie on professional knowledge/development from people who have been in such occupation for a long time.”

4.2 Strategies to Improve Knowledge Sharing Among the Rice Farmers

The respondents in the quantitative findings were provided with a Likert scale consisting of several possible strategies to improve knowledge sharing amongst rice farmers. The responses of the participants are provided on Table 3.

Table 3: Strategies for Improving Knowledge Sharing

Strategies for improving knowledge sharing among the rice farmers	Strongly agree %	Agree %	Somewhat %	Disagree %	Strongly disagree %
Use of appropriate technology	87.3	1.8	3.6	-	7.3
Leadership and management support	82.7	1.8	-	-	15.5
Integration of knowledge sharing initiatives in goals and strategies	78.2	4.5	-	9.1	8.2
Provide space and opportunities for knowledge sharing	74.5	13.6	-	4.5	7.3
Various forms of knowledge sharing and farming systems are encouraged among rice farmers here	72.7	11.8	1.8	-	13.6
Constant training and retraining of the rice farmers	74.5	7.3	-	10.0	8.2
Build trust	72.7	10.0	-	7.3	10.0
There are reward systems for rice farmers who willingly share their knowledge on rice farming with their colleagues	76.4	6.4	-	-	17.3
We set aside time for face-to-face collaborations and knowledge sharing	70.0	13.6	-	-	16.4
Investment and financial support	72.7	1.8	8.2	1.8	15.5

Strategies for improving knowledge sharing among the rice farmers	Strongly agree %	Agree %	Somewhat %	Disagree %	Strongly disagree %
Opinions and inputs are sought from new rice farmers on all issues	68.2	17.3	-	7.3	7.3
Familiarisation of other categories of knowledge	67.3	8.2	-	7.3	17.3
All individuals who enter rice farming are given mentors	68.2	1.8	-	13.6	16.4

The most frequently used strategies were "use of appropriate technology" (87.3% strongly agree), leadership, and management support (82.7% strongly agree). These were followed by giving space and opportunities for sharing knowledge (88.1% strongly agree), encouraging different ways of sharing knowledge (84.5% strongly agree), building trust (82.7% strongly agree), and making time for face-to-face collaborations and sharing knowledge (83.6% strongly agree).

Findings from the open-ended questionnaire indicated. Other strategies of sharing knowledge that were not already captured in the questionnaire. For instance, an Agric Extension Officer admonished their leaders

"Do away with favouritism among the rice farmers." A farm manager also indicated that "knowledge should be provided in videos and pictures so everybody can understand and share."

The rice farmers themselves also indicated other strategies of improving knowledge sharing. For instance, a male rice farmer also indicated that *"some of the knowledge should be translated into the local language so we can all understand."* A female rice farmer also entreated their leaders to *"promote the culture of knowledge sharing."* Other suggestions that emerged also included:

"Rice farmers should be rewarded financially" (male rice farmers);

"Let us nurture a learning culture" (male rice farmers);

"Leaders should initiate knowledge sharing and knowledge transfer policy" (Agric/extension officers)

Complementary findings from the qualitative data also added impetus to the quantitative findings. The participants in the qualitative finding suggested that the strategies needed to improve knowledge sharing within the rice farming communities included leadership and management support, financial support, building trust, integration of knowledge-sharing initiatives, the use of appropriate technology, and continuous training and re-training. The narratives from the participants mainly focused on leadership roles in improving knowledge sharing. For instance, some of the participants indicated that

Leadership factors are very essential strategies to enhance knowledge sharing (Male Agricultural Officer).

"To have high or low production in a farming season mostly depends on leadership training and an extension officer's frequent visitation to the farms." (Male farm manager)

A leader could be good or bad. If you are lucky to have good extension officer, he/she will always assemble farmers to give pep talks about how to increase yields or pest control, but others will come as normal visitation (Male Farm Manager).

A good leader must be a person with a high level of intelligence and must possess certain qualities like a good human relationship, different ideas, methods and systems to help farmers in solving their problems" (Male Agriculture Officer).

Other views from farmers that echoed enablers to knowledge sharing are leadership, personal relationship, training, conferences and trust

Management support could be a strategy to help enhance knowledge sharing among rice farmers. Good management can provide efficient and effective services to their farmers. Management can do this through the organizing of workshops, upgrading of farmers knowledge or skills

to make them know the modern tools and practise available. Management should always seek the interest of their farmers and help them to achieve high production (Female Rice Farmer)

If the leadership of the farmer's associations create an enabling environment or good personal relationship, farmers would be willing to share knowledge among themselves (Male Rice Farmer)

Farmers need to the knowledge shared about investors, good financial support and where to purchase agrochemicals for their farm product (Female Rice Farmer)

Others also commented that financial support and other support services must be known to them, such as educational scholarships for their children. However, 50-year-old male farm manager highlighted that “*farmer cooperative unions should share appropriate financial knowledge to help the farmers on how to access funds. Again, knowledge of business advisory services should be shared to them on how to get access to an already established market for their farm products*”.

Other participants also indicated the relevance of practice, training and conferences in promoting knowledge sharing among smallholder farmers. For instance,

Constant practice makes one perfect. There should be intensive training for farmers on the practises that can help in sustaining and making them productive. As time fades, so are new methods and instruments that come out.” (Female Rice Farmer)

On a regular basis, seminars and conferences should be organized so as to inform and train them on climate changes and their effect on farming.” (Male Rice Farmer)

She also said that knowledge sharing from experts would help them in their production. As time goes on, does knowledge and other methods of farming fade out. Corporative organization and farmers association should establish training programmes to enhance the knowledge sharing among expertise in rice farmers.

Building trust among farmers is a fundamental concept for knowledge sharing procedure. When farmers trust their superiors, who is giving the information, how would they know, understand and believe in their knowledge shared to them.

5. Discussion

5.1 Leveraging Knowledge Sharing Strategies Among Rice Farmers

Drawing from the findings from the qualitative and quantitative study it is evident that knowledge sharing amongst rice farmers is practiced at an elementary level. Amongst the strategies suggested: use of appropriate technology, leadership and management support, integration of knowledge sharing in goals and strategies, providing spaces and opportunities for knowledge sharing, training and retraining, and using reward systems.

Other strategies suggested were building trust, setting time aside for face-to-face meetings, financial support, seeking opinions and inputs from new rice farmers and mentorship to new rice farmers, reducing favouritism among leaders, translating knowledge into the local language, promoting a knowledge sharing culture, using videos and pictures, and rewarding knowledge sharing.

Ensuring that knowledge sharing becomes effective requires the implementation of these strategies within the rice farming communities. However, their implementation has not been sustainable and successful. Still, in order to use these strategies, it is important to have a critical understanding of the strategies that have already been used (André et al., 2017). On the operational level, strategies for improving knowledge sharing were defined in terms of specific context-relevant approaches used to overcome knowledge sharing challenges (Boateng and Agyemang, 2016:218)

The results of this study concur with previous studies that suggest strategies for improving knowledge sharing to revolve around leadership and management support (Tsinigo and Behrman, 2017), the use of appropriate technology (Garcia, Galeon and Palaoag., 2018; Ortolani et al., 2017), investment and financial support (Cadger et al., 2016; Chhim Somers and Chinnam, (2017)), building trust (Holten et al., 2018).

It was evident that participants had an understanding into the strategies that must be put in place to improve knowledge sharing among the rice farmers in the study communities, although no practiced amongst them. Some of the strategies would require a long-term approach, while others would be addressed over a shorter period. For instance, when it comes to investment and financial support and the provision of technological

infrastructures, these will require long-term investments, particularly at the national level, as well as investment in expanding internet connectivity and telecommunication within the rice farming communities in the Eastern Region and, by extension, other similar rice farming communities.

Organisational, social and individual level enablers; it can be addressed within the short-to-medium term. For instance, there is a need to create leadership support for knowledge sharing among the rice farmers. Strategies such as building trust, integrating knowledge sharing in goals and strategies, training, tutoring, mentoring, and providing space and opportunities for knowledge sharing can be implemented without waiting to address the technological issues. These strategies fall within the capacity of the individual rice farmers and the Communities of Practice that exist within the rice farming communities.

5.2 Strategies for Improving Knowledge Sharing Amongst Rice Farmers

The article draws from the qualitative and quantitative findings to suggest a strategy for improving knowledge sharing among farming communities in Ghana. The researcher recommends that successful implementation of knowledge sharing would depend on identifying and linking knowledge sharing enablers to tools and technologies, as well as to strategies.

It is hoped that this strategy, if well implemented, will lead to sustainable improvement in knowledge sharing among rice farmers in Ghana, as well as among other rice farming communities in other African countries whose contexts are like Ghana. The strategy targets barriers at the structural, community and interpersonal levels that undermine knowledge sharing. Implementation of the strategy would involve partnership between stakeholders in different sectors such as government agencies, rice-farming communities; rice production-based NGOs and researchers. The researcher recommends that a successful implementation of knowledge sharing would depend on identifying and linking knowledge sharing enablers to tools and technologies, as well as to strategies, as presented in Figure 1. What is important are strategies to address the short-term challenges while advocating to have structural inhibitors addressed.

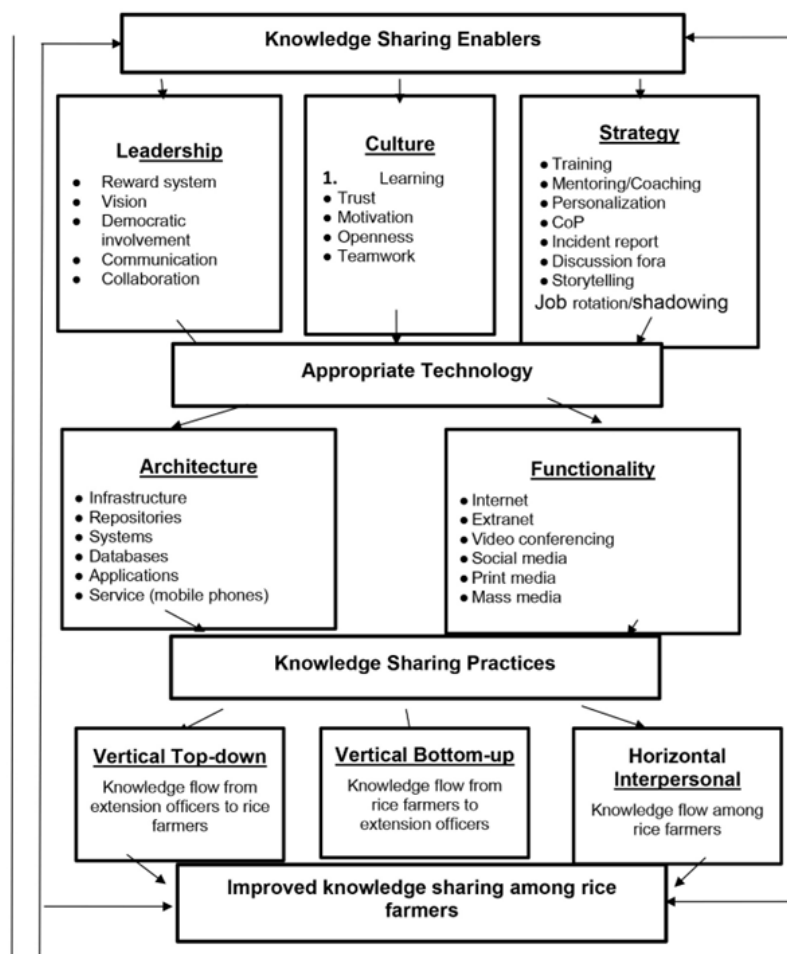


Figure 1: Strategies for Improving KS in Rice Farming Communities

As shown in Figure 1, a leadership, culture, strategy and technology are crucial for knowledge sharing amongst rice farmers. Leadership would ensure that the right conditions are created for knowledge sharing, through the development of a culture that promotes knowledge sharing. As emphasised by the Social Exchange theory, when leadership creates a compelling vision and a strong reward system, as well as ensuring democratic involvement, collaboration and communication a culture that enables knowledge sharing will emerge, built on critical factors such as mutual trust, openness and teamwork.

Drawing on the SECI model, strategies such as training, mentoring, CoPs, job rotation and discussion fora can be leveraged to create and share knowledge that are pertinent to rice farming. Appropriate technology is also essential, and that is where leadership once again becomes critical. Leadership is needed to provide the necessary technological infrastructures, in terms of architecture and functionality, to facilitate knowledge sharing practises among the rice farmers. This would help to tackle the bottlenecks in knowledge sharing, thus ensuring an easy flow of knowledge, both vertically and horizontally.

- Based on the strategy described above, the following specific suggestions are made to help rice farming communities share knowledge better: In developing appropriate strategies to improve knowledge sharing in rice farming communities, there is the need to link knowledge sharing enablers to appropriate technology and knowledge sharing practises.
- In the rice farming communities, leadership, culture and strategy are critical enablers. Leadership is needed to create reward systems, vision, democratic involvement, communication and collaboration among the rice farmers.
- There is also a strong need to establish a culture of learning, the trust through participation, motivation to share, openness to new knowledge, and teamwork among the farmers.
- Training (in the form of seminars and workshops), mentoring, coaching, personalisation, communities of practice, meetings and discussion forums and storytelling all need to be well implemented.
- Technology is a major inhibitor of knowledge sharing among rice farmers. There is a need for technology that is appropriate in terms of its architecture and functionality. Providing such architecture would involve putting in place the needed technological infrastructures, such as services for mobile phones, applications, repositories, systems and databases.
- Knowledge sharing functionality would involve implementing technological tools that function within technological infrastructures. These would involve internet services (e.g., for email service), extranet, video conferencing, social media (e.g., Facebook, Twitter, Instagram, etc.), print media (e.g., magazines and brochures), and mass media (particularly community-based, such as community knowledge centres).

6. Conclusion

The article explored the knowledge sharing practices among rice farmers in Ghana and suggests a strategy to improve knowledge sharing in rice farming communities that will also strengthen knowledge sharing amongst smallholder farming communities in Ghana. It reveals that knowledge sharing strategy amongst rice farmers depend on identifying and linking knowledge sharing enablers to tools and technologies. It suggests the need to improve knowledge sharing practises on the following three levels; vertical top-down (where knowledge flows from leadership and extension officers to rice farmers), vertical bottom-up (where knowledge originates and flows from rice farmers to leaders and extension officers) and horizontal or interpersonal (where knowledge flows between and among the rice farmers). Appropriate and sustainable knowledge sharing strategies implemented in rice farming communities in Ghana will improve yield and productivity.

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