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Utilising knowledge management methods to manage beads-making indigenous knowledge among the Krobo communities in Ghana

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Background: The indigenous beads-making industry in the Krobo communities in Ghana plays a significant role in improving the livelihood of rural dwellers and the national economy. However, studies have demonstrated that a host of indigenous industries in Ghana have been on the decline over the past century. Application of knowledge management (KM) methods to beads-making tacit indigenous knowledge (IK) can enhance the management and preservation of the industry in the same systematic manner as external knowledge.

Objective: Being part of a PhD project, this study investigated how KM methods can be used to manage beads-making IK knowledge in the Krobo communities in eastern Ghana.

Method: Qualitative data were collected using participant observation, semi-structured interviews and focus group discussions. Data were analysed thematically, and extracted manually from the transcripts and summarised into various themes.

Results: The findings of the study revealed that the socialisation process of the knowledge creation model was intensively practised in the beads-making communities to create and utilise knowledge, while the internalisation, combination and externalisation processes were practised at a low rate. On the contrary, organising 'ba' and dialoguing 'ba' were practised and found in the communities, while systematising 'ba' and exercising 'ba' were rarely practised.

Conclusion: The study concludes that the knowledge creation model can be partially used to manage indigenous beads-making IK in the Krobo communities in Ghana. The study recommended, among other things, the need for officials of community radio stations, especially state-owned radio and the information centres in the local communities, to develop and broadcast programmes to disseminate information relevant to beads producers so that beads-making knowledge creation and development in the communities do not disappear, and that they should utilise storytelling, drama, traditional dance and singing competitions in the local languages to support the preservation of indigenous beads making.

Keywords: Knowledge management; indigenous knowledge; beads making; Ghana; Krobo communities.

Introduction

Researchers have recognised the processual and hybrid nature of indigenous knowledge (IK), which is a part of creative synthesis of local and global, insider and outsider, and a traditional form of knowledge (Zent 2009) that needs to be managed and protected. The potential of IK in the economic development of local communities is highly recognised all over the world (Iyoro & Ogungbo 2013; Maisiri 2017; WIPO 2010), as it is seen as a set of techniques, perceptions, information and behaviour that guide local community members to use the land and natural resources (Iyoro & Ogungbo 2013).

Within the context of the Krobo communities in Ghana, their sociocultural practices are largely woven around the indigenous glass beads-making industry in the area (Wilson 2003). In some cases, the whole village is involved in the glass beads production business (Affum 2009). The indigenous beads industry is an important economic activity that has generated income for many families (Akoto 2013; National Commission of Culture 2011). The cultural tourism segment of the beads industry has also become an important source of employment for the local people (Akoto 2013; Akpabli 2013). Many people, particularly foreigners and tourists, have developed increasing interest in the Korbo beads in its traditional state (Akpabli 2013; Avotri 2009). The Krobo have produced, used and traded beads for so many years, and as a result beads have become an integral

part of their sociocultural life (Affum 2009; Wilson 2003). Nowadays various forms of glass beads are found in most cultures in Ghana (Akoto 2013).

Anquandah (2006) reported that a host of indigenous industries in Ghana have been on the decline over the past century or so, especially metallurgical skills employed in the production of iron tools, implements and artefacts, brass vessels and ornaments, beads, and silver and gold jewellery. This might be attributed to the fact that IK is tacit in nature and is mostly stored in the minds of elderly people who die irreplaceably (Atkinson 2016; Ikoja-Odongo 2006; Ngulube & Onyancha 2017). Consequently, most of the IK has largely remained undocumented in developing countries, including Ghana (Mascarenhas 2004; Ngulube 2002; Owiny, Mehta & Maretzki 2014). Indigenous knowledge is in danger of being lost, unless it is formally documented and preserved. A failure to maintain adequate records and preserve the Krobo beads-making IK means that much of it is being lost (Agea et al. 2008).

Although the Krobo have been associated with beads production and use over a long time, there seems to be a knowledge gap in the application of knowledge management (KM) methods in beads-making IK, including knowledge creation, codification, preservation, sharing and protection. Hence, this study was conducted to determine how KM methods were applied to manage and preserve the beads production industry in Ghana in the same systematic manner as external knowledge. This is imperative because beads constitute a dense concentration of ancestral wisdom that has to be preserved and passed on to the next generations (Adu-Agyem 2007; Agyei, Adu-Agyem & Steiner 2012; Gyan-Apenteng 2014), including its potential to create employment and sustainable development.

Knowledge management is growing increasingly popular in all sectors of the global economy because of its confirmed importance in fostering knowledge creation, codification, preservation and transfer, and the ability to greatly improve the knowledge capital of an organisation (Fullwood & Rowley 2017; Njiraine, Ocholla & Onyancha 2010; Pathak & Nigam 2017). Furthermore, the application of KM is still in its infancy in most developing countries. Therefore, it is necessary to promote KM practices in rural communities, including the Krobo beads-making communities in Ghana by strengthening the interaction between local networks and organisational structures, even though communication and learning processes take place in a less structured way through social networks and loose groups or between individuals (Bode 2007). The question this study sought to answer was how can KM methods be utilised to manage beads-making IK in the Krobo communities in Ghana?

Indigenous knowledge

The concept of IK is used interchangeably by different scholars to either refer to one of the following terms: traditional knowledge, indigenous knowledge, community knowledge, traditional ecological knowledge, local knowledge, traditional environmental knowledge, aboriginal tradition, 'traditional wisdom' or 'traditional science', cultural patrimony, folklore and cultural heritage (Ngulube & Onyancha 2017; Ngulube 2002; WIPO 2006). However, the use of IK seems to have become more popular than others (Ngulube & Onyancha 2017).

Indigenous knowledge is basically local. It is actually oral and mostly undocumented (Ellen & Harris 1996). It is more practical, rather than theoretical, and repeating in time (Ranger 1983). It is highly functional and, therefore, rediscovered in time. Indigenous knowledge is generated through informal experiments by trial and error, intimate understanding of the environment in a given culture and accumulation of generation-wise intellectual reasoning of day-to-day life experiences (Mapara 2009; Ngulube, Dube & Mhlongo 2015). It is characterised by being developed outside the formal educational system, being embedded in culture and being unique to a given society (Boven & Morohashi 2002). It is referred to as the know-how, skills, innovations, practices, teachings and learning, resulting from intellectual activity and developed within a traditional context (WIPO 2012).

Applying knowledge management methods to beads-making knowledge

Knowledge management encompasses the managerial efforts in facilitating the activities of acquiring, creating, storing, sharing, defusing, developing and deploying knowledge by individuals and groups (Fullwood & Rowley 2017; Rowley 2001; Soliman & Spooner 2000). Knowledge management has become so important because of the pace of change (Hanson & Kararach 2011; Pathak & Nigam 2017). When change occurs, whether external or internal to an organisation, institution, community, society or any entity, people need new knowledge to enhance their existing knowledge to do their work efficiently. Knowledge management has been successfully applied by many formal organisations to build their competitive strength and achieve a sustainable growth pattern (Ichijo & Nonaka 2007). Knowledge can be both tacit and explicit (Lwoga & Ngulube 2007; Von Krogh, Ichijo & Nonaka 2000), irrespective of whether it is indigenous or Western.

The difference between knowledge in the Western tradition and IK is that the latter are largely undocumented or unrecorded and predominantly tacit (Lwoga & Ngulube 2007). Tacit and explicit knowledge can be managed using KM approaches. Lwoga, Ngulube and Stilwell (2010) observe that IK is hard to manage because it is mainly tacit in nature or embedded in practices and experiences that are highly personal and difficult to codify and diffuse.

Although IK is basically tacit, it can be articulated both tacitly and explicitly through artefacts (traditional technologies and tools) produced by indigenous people in the form of music, storytelling, dance, knowledge sharing and through the KM

methods such as the socialisation, externalisation, combination and internalisation (SECI) model developed by Nonaka, Toyama and Konno (2000). The SECI knowledge creation model links tacit and explicit knowledge through four phases and has a potential of converting tacit knowledge into explicit knowledge and vice versa. Using the SECI model of Nonaka et al.'s (2000) knowledge creation, this study explored the use of KM methods in managing beads-making IK in the Krobo communities in Ghana.

Conceptual framework

Drawing from Ngulube (2018), the conceptual framework drew from several sources, theories and models. The conceptual framework employed for this study is Nonaka's (1994) dynamic model of knowledge creation and the improved model of knowledge creation described by Nonaka et al. (2000).

The socialisation, externalisation, combination and internalisation knowledge creation model

Nonaka's (1994) dynamic model of organisational knowledge creation posits that organisational knowledge is created through a continuous dialogue between tacit and explicit knowledge through four patterns of interactions: socialisation, combination, internalisation and externalisation. Nonaka et al. (2000) further improved the model of knowledge creation to include two elements: (1) the SECI process, the process of knowledge creation through conversion between tacit and explicit knowledge through socialisation, externalisation, combination and internalisation, and (2) *ba*, which is a shared context in motion, in other words, the environment and conditions within which knowledge is shared, created and utilised.

According to Nonaka et al. (2000), the knowledge-creating process is necessarily context-specific in terms of who participates and how they participate, hence *ba* (which roughly means 'place') offers a context within which knowledge can be created. *Ba* can operate within four forms, with each of them corresponding to each of the knowledge creation processes. These are originating *ba*, dialoguing *ba*, systemising *ba* and exercising *ba.*

Criticisms against the socialisation, externalisation, combination and internalisation model

Various criticisms have been raised against Nonaka's SECI model of knowledge creation, although they are not to be found in large numbers (Gourlay 2006). In the literature, the critiques often touch on issues such as the empirical evidence of Nonaka's work, the treatment of tacit and explicit knowledge as evident in Nonaka's work, and the universal applicability of the developed model. Gourlay (2006) and Richter (2008), for example, emphasise a lack of scientific evidence in Nonaka's work for the developed SECI model. Another critique of Nonaka's model is its ability to be applied in a universal cultural context (Bratianu 2010).

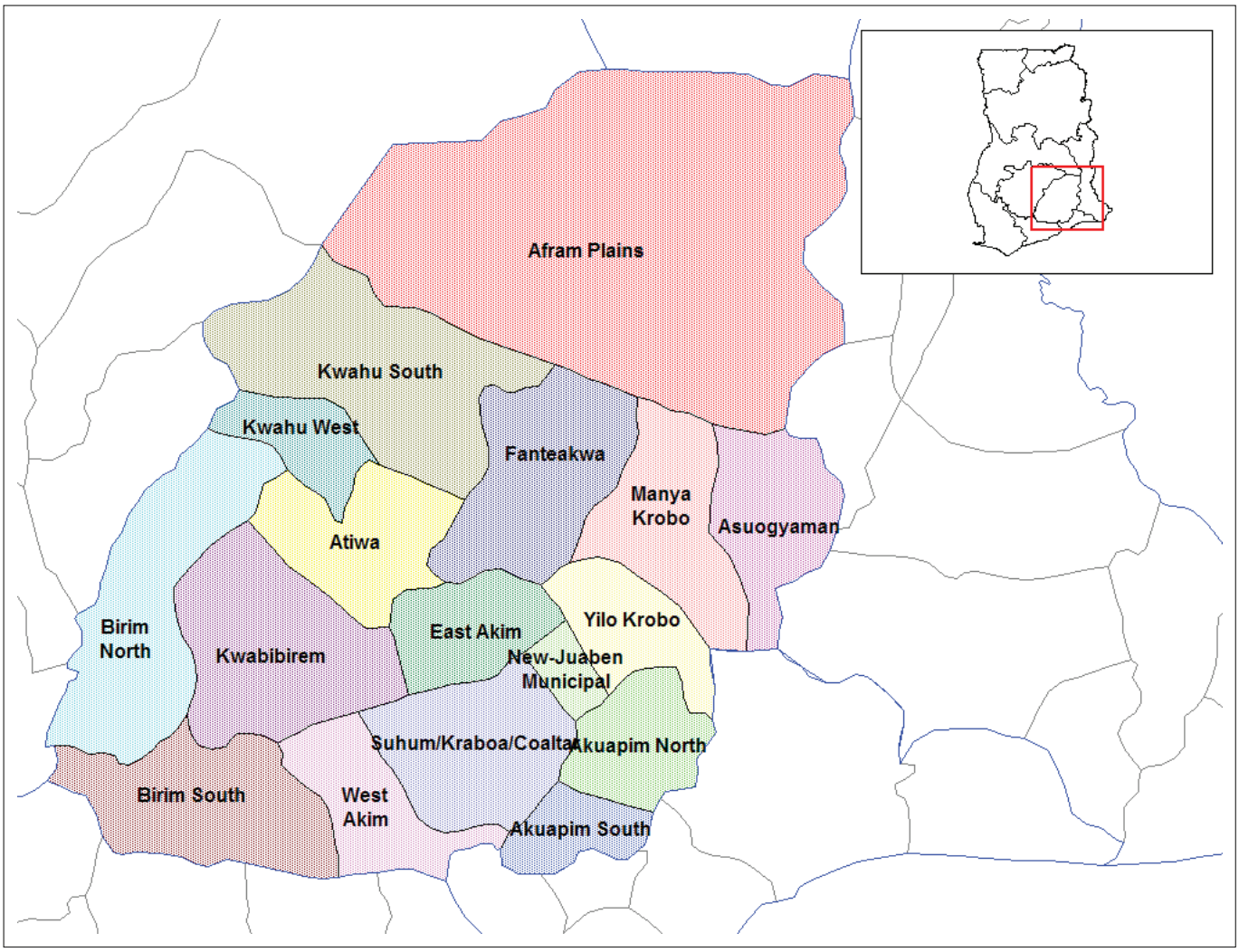
Notwithstanding these criticisms levelled against the SECI model, the literature revealed some positive findings about the universal application of the SECI model. Using Russia as case study, Andreeva and Ikhilchik (2011) demonstrated that the cognitive processes (i.e., conversion of tacit and explicit knowledge) were culturally universal. However, the two authors noted that the model has to be adjusted in order for it to smoothly function in different contexts. On the contrary, Finley and Sathe (2013) revealed that the evidence in the first three cases they examined indicated that the theory underlying the SECI framework can be analytically generalised to increasingly complex organisation settings, and reveals not only the knowledge creation and transfer process, but also the potential knowledge transfer gaps. Furthermore, the literature reveals the application of the SECI model in various studies in various, areas ranging from education (Tammets 2012), information and communication technology (ICT) (Cabrera 2008), banking (Easa 2012; Tan et al. 2010) and sports (Costello & Whelan 2007), to mention but a few. It was in the light of these studies that the SECI framework was also applied in this study.

Methodology

Qualitative method was used in this study. Purposeful and snowball sampling techniques were used to select the sample. The purposive sampling technique was used to select the three Krobo districts (see Figure 1). Two villages or towns from each district were chosen because of the concentration of beads producers in those areas. The districts selected for the study were Yilo Krobo, Lower Manya Krobo and Upper Manya Krobo (the two districts resulted from the split of Manya Krobo into two districts in 2008) (Agyemang, Ngulube & Dube 2018).

The villages or towns involved in the study were Odumase-Krobo, Otrokper, Somanya, Tsebitɛhe, Siblino and Ahabaso. The snowball sampling technique was used to sample the beads producers in each village. With this sampling technique, the first author collected data from the few beads producers she could locate, and then asked those individuals to provide information needed to locate other beads producers whom they knew within their villages.

The data collection instruments used were semi-participant observation, semi-structured interviews and focus group discussions. The semi-structured interview schedule focused on how the beads producers acquired, shared and preserved beads-making knowledge within the communities. The focus group discussions and semi-participant observation were used to supplement data collected from the semi-structured interviews. The different data collection methods were triangulated to compare their results for inconsistent, contradictory and convergent findings (Ngulube & Ngulube 2017), so as to avoid errors or bias and to ensure the



Source: Google Maps, 2015, *Map of eastern region of Ghana showing the Krobo communities*, viewed 12 March 2019, from https://www.google.com/search?q=Ghana+showing+the+Krobo+communities

FIGURE 1: Map of eastern region of Ghana showing the Krobo communities.

trustworthiness of the findings. Participants were recruited and interviewed until no new information was emerging from the participants' stories, that is, when saturation was reached (Glaser & Strauss 1967; Krueger & Casey 2000).

A total of 20 beads producers participated in the semi-structured interviews and 41 participated in focus group discussions. Two focus group discussions comprising six to seven participants were held in the villages of Yilo Krobo (14), Lower Manya (14) and Upper Manya (13).

Thematic data analysis was used to establish the meaning of the data. Data were extracted manually from the transcripts and summarised into various themes. This was done by transcribing data, taking note of items of interest, coding across the entire data set, searching for themes, reviewing themes by mapping provisional themes and their relationships, defining and renaming themes, and finalising analysis.

An introductory letter from the Presbyterian College of Education introduced the first author to the beads producers for the purpose of data collection. Furthermore, the participants were given consent forms describing the purpose and significance of the research to the beads producers that they had to read and sign before participating in the research process. In cases where participants were not able to read English, the first author employed the services of interpreters to translate the English into the local languages of participants so as to show respect to them, to ensure their safety, protection and the integrity of the research itself (Nijhawan et al. 2013). The consent forms made it very clear that participation in the study was voluntary and that participants were free to withdraw from the study at any point without any prejudice to themselves.

Ethical consideration

The study was conducted after obtaining ethical clearance from the University of South Africa's ethics committee (Certificate No. 2016_AGYEMANG_50761463_002).

Findings and discussions

The findings from the communities in the three Krobo districts are framed around the SECI model knowledge

TABLE 1: Profile of the participants.

Variable	Categories	Frequency (*N*)	%
Gender	Female	21	34.4
	Male	40	65.5
Age distribution	14–23 years	19	31.1
	24–32 years	20	32.7
	33–40 years	11	18.0
	41–45 years	7	11.5
	46 years and above	4	6.5
Educational background	Non-formal education	12	19.6
	Formal education	49	80.3
	Primary school	13	21.3
	Middle or junior high secondary	20	32.7
	Senior high secondary	13	21.3
	Polytechnic	2	3.2
	University	1	1.6

creation processes, namely, socialisation, externalisation, combination and internalisation and the 'ba' context.

Table 1 summarises the gender of the participants, their age distribution and education levels. More men than women were in this industry. Many participants were between the ages of 18 and 40. Many beads producers (49, 80.3%) had some form of formal education, while 12 (19.6%) did not have formal education.

Socialisation and knowledge creation

The socialisation process enables the beads producers to share tacit knowledge with each other (such as experiences and technical know-how). This study revealed that beads-making IK was primarily acquired and shared within local and social networks within the communities. The major source of IK acquisition mentioned by some (11) of the beads producers, who were interviewed, was family or guardian or parents. As indicated by one participant:

> … in our community bead-making is part of the family, therefore children in our families pick up the skills in bead-making by the time they rich adolescent because they are involved in all the processes. (E, female, 65 years)

Thirteen beads producers acquired beads-making IK through apprenticeships in the Krobo communities. Apart from beads making, four said *gari* processing (i.e. a powered food processed from cassava) was the prevailing form of apprenticeship practised in the communities, followed by basket weaving, carpentry, tailoring or dressmaking, blacksmith or goldsmith and pottery.

Two women participants stated that they acquired skills in beads making from their husbands. One respondent recounted:

> … when I married my husband he was making beads hence, I decided to learn it so that I can also contribute to bring income to the family. (F, female, 55 years)

Two indicated that they acquired beads-making knowledge from social groups gathering, such as beads-making association meetings, while two mentioned beads festivals. Two said they learnt beads making from their friends and neighbours. Only a few (2) of the beads producers indicated that, apart from their family members, they acquired some knowledge on beads making from formal sources, such as seminars, workshops, exhibitions and researchers. From the focus group discussions, the participants disclosed that most of them (22) learnt how to make beads from their immediate family members. Some (7) said they acquired it from apprenticeship, some (3) of the women participants indicated that they learnt beads making from their husbands, others (7) mentioned friends and neighbours, some (3) stated beads-making associations, while few (2) mentioned workshops and seminars.

Folklore and sociocultural practices

The beads producers also indicated that they acquired and shared beads-making IK through folklore practices. The major folklore practice mentioned by the participants interviewed for creating and sharing beads-making IK, was traditional dance (8), five participants stated songs, four indicated storytelling and appellation, two mentioned proverbs, while one of them stated dirges. Seventeen participants who were interviewed indicated that beads-making IK acquisition and sharing was stimulated by sociocultural activities such as naming ceremonies, puberty rites for adolescent girls, marriage ceremonies, initiation of chiefs and queen mothers, celebration of festivals and funerals.

Data from the information maps indicated that 22 of the participants reported that the major folklore practices that influenced IK acquisition and sharing in the communities were songs, 11 indicated traditional dance, seven mentioned storytelling, two stated appellation and proverbs, while one of them mentioned dirges. According to the participants, these sociocultural practices were important for sharing beads-making IK because beads wearing formed the core of all the social, cultural and religious ceremonies in the Krobo communities.

The participants were also asked if they acquired beads-making IK from printed materials. According to beads producers, they made minimal use of printed materials and formal sources of knowledge. Only six of them indicated that they acquired beads-making IK from formal sources such as workshops, seminars and printed materials.

These findings show that beads-making IK was shared through socialisation processes such as apprenticeships, interaction within the community and family members, folklore and cultural ceremonies. Lwoga, Ngulube and Stilwell (2010) reported that similar practices were used to share IK within the communities in Tanzania. Owuor (2007) also indicated that IK was basically shared and distributed in the communities through practices such as folklore, initiation

rites, apprenticeships and inheritance of specialised knowledge such as indigenous medicine. This demonstrates that socialisation as knowledge creation and sharing concept may be applied to manage and preserve indigenous beads-making knowledge.

Externalisation and knowledge creation

The externalisation process involves the articulation of the beads producers' hidden tacit knowledge into explicit knowledge. The study indicated that beads producers externalised their tacit knowledge into explicit knowledge, although it was not prevalent. When the participants were asked to indicate how they preserved their beads-making knowledge, eight reported that they converted their indigenous tacit knowledge into explicit forms by keeping still pictures of their designs. Six indicated that they stored still pictures of their designs on their mobile phones, while three stated that they drew their designs on walls and in books. Only four participants said they had written down the process of making beads in books.

From the information maps, only a few (11) beads producers indicated that they preserved their knowledge on beads making in the form of still pictures, six stated that they stored their designs on their mobile phones, five mentioned drawing of their designs on walls and in books, the other five indicated that they had recorded the process of making beads in books only and three said they stored processes of making beads in the computer. Through the various observations the first author realised that four of the participants had written down the processes of producing some of the beads in books.

Furthermore, the beads producers externalised their knowledge by interacting with others in formal and informal beads associations. Twenty-six of the participants who were interviewed indicated that they were involved in beads making-related associations. These findings indicated that the externalisation process had been partially practised in the local communities.

Combination and knowledge creation

Combination is the process of creating explicit knowledge by articulating explicit knowledge obtained from various sources. The findings indicated that the beads producers captured and integrated new explicit knowledge by collecting externalised knowledge from other beads producers, for example, 12 obtained permission from a colleague to adapt his or her design to create new designs, 19 copied the design without the consent of the owner and 11 adapted designs from textile materials. These codified designs were pictures, drawings and writings. However, print media were rarely used in the local communities to create explicit knowledge. Only three of the participants interviewed, indicated consulting print materials when searching for information on beads making. This might be attributed to a lack of community libraries, knowledge resource centres and bookshops.

The beads producers shared their explicit knowledge with others through village meetings, group interactions, as well as ICTs. The study revealed that although 17 of the participants interviewed indicated that they used ICTs in the local communities, only seven of them used ICTs to combine and create explicit knowledge. This might be attributed to the fact that most of the beads makers indicated that programmes on beads on other ICT networks, such as one local FM radio, were no longer in existence. The predominant ICT tool used by the beads producers to acquire IK in the surveyed communities was mobile phone with a score of 15. Although the study was carried out in areas which had some form of ICT services, the findings are that these services were mainly available in the district capitals, hence the combination process was partially practised.

Internalisation and knowledge creation

The internalisation process enabled the beads producers to apply their explicit knowledge to the beads-making systems. The findings showed that 43 of the beads makers applied knowledge received from tacit sources in the beads-making systems, as compared to the IK received from ICTs and print materials indicated by 17. Considering the fact that most IK was shared through oral communication rather than through print media and ICTs, these findings indicated that beads producers mainly applied IK received from tacit sources as compared to explicit sources of knowledge.

The beads producers mainly applied indigenous techniques from tacit sources for creating new designs. Face-to-face interaction was very important for enabling the knowledge creation and development processes in the communities as compared to other communication channels such as print formats and ICTs.

From the findings it could be said that the socialisation process was practised in the local communities to create new knowledge for making beads; however, the externalisation, combination and internalisation processes were not prevalent. The research findings revealed that the knowledge creation theory can partially be applied to manage the beads-making IK in the local communities.

These findings are supported by Lwoga, Ngulube and Stilwell (2010), who found that farmers in Tanzania were able to create knowledge through the socialisation process, while externalisation, combination and internalisation were partially used. This was almost similar to Ha, Okigbo and Igboaka (2008), who found that Nonaka's (1994) model was partially applicable because farmers were creating knowledge through socialisation and combination processes, while externalisation and internalisation processes were not quite as successful in Anambra State in Nigeria. Furthermore,

Panakarova and Vlasov (2013) indicated that the spiralling process of traditional knowledge of the Khakas people can be explained in the SECI model. Ha et al. (2008) also found that the Nonaka's (1994) knowledge creation model was partially fulfilled in their study of knowledge creation among farmers in Nigeria, and suggested that the collaborative model of knowledge dissemination can be partially effective among farmers in knowledge creation activities.

The use of *ba* in the local communities

The findings of this study revealed that shared context or 'ba' as proposed by Nonaka et al.'s (2000) knowledge creation model was partially fulfilled in helping beads producers to create, share and apply knowledge for beads-making purposes in the local communities. The beads producers shared their knowledge for making beads, marketing of beads, acquiring of raw materials for beads making, political and social purposes. According to Nonaka et al. (2000), 'ba' is identified in four areas, which is made up of originating *ba*, dialoguing *ba*, systematising *ba* and exercising *ba.*

Originating 'ba' was predominantly found in the local communities. Individual and face-to-face interactions among beads producers, between beads producers and beads sellers, and between NGOs were common and occurred in a physical location. When the participants were asked to mention the purposes for which they shared their knowledge, eight of the participants who were interviewed indicated that they shared their knowledge for beads-making purposes, six indicated that they shared their knowledge for marketing of beads, seven reported that they shared knowledge about the acquisition of raw materials for beads making, while two of them mentioned health as well as political and social purposes. Five of the participants met at their workshops to create, share and utilise knowledge; other places mentioned by the participants were homes (4), the schools (4), the chief's palace (2), on the roads to the river side and the market (3) and under a big tree (2).

From the information maps, 21 of the participants indicated that they shared knowledge on beads making in their workshops, followed by homes (13), schools (12), on the way to the riverside and the market (5) and the chief's palace (2). For the purposes of beads marketing, 17 of the beads producers indicated that they shared their knowledge at Agormanya and Koforidua markets, followed by on the way to the market (11), their workshops (8), at the schools (5), in the chapel (4) and on the road to the riverside (2).

In dialoguing 'ba', the findings illustrated that the dialoguing 'ba' existed within the surveyed communities. It is the place where the beads producers and knowledge intermediaries' mental models and skills are shared, converted into common terms and articulated as concepts. According to the beads producers, collective and face-to-face interaction occurred among them and knowledge intermediaries (i.e. Plan International and officials of the National Commission on Culture), which was common in their communities. The participants said these interactions occurred in a physical location for formal and informal beads-making association meetings and training in saving. The beads producers met mainly at the school, church and under the big tree. Other places where formal beads association members met to hold their meetings included the association chairman's house, an association member's house, under the big tree and the chief's palace. Informal beads producers' groups mainly used group members' houses to hold their meetings. Other places where informal beads producers' groups met to hold their meetings included an open space, their workshops and the school.

Systematising 'ba' was practised at a low rate in the communities, although ICTs were in existence in the surveyed villages. The study findings showed that although 17 of the participants interviewed had used various forms of ICTs, yet only 11 used ICTs to acquire and share beads-making IK. Nine shared beads-making knowledge among themselves or with their customers through cell phones, while other ICTs (such as email and electronic forums) and explicit sources of knowledge (such as books and magazines) were used by a few. Only four beads producers at upper Manya Krobo district confirmed using emails to communicate with each other and their customers.

The focus groups discussions revealed that although 35 of the participants indicated using various forms of ICTs, mobile phone was the predominantly ICT used by 25 of them.

Exercising 'ba' occurred when local communities were able to apply IK from tacit and explicit sources of knowledge and ICTs (such as email and the Internet) into their beads-making activities. However, the findings revealed that the beads producers applied more knowledge received from tacit sources of knowledge (e.g. by consulting neighbours or families and beads association members, and the former apprentice masters) as compared to knowledge received from ICTs. The findings illustrated that the oral communication channels were the major sources of knowledge in the beads-making communities, as compared to explicit sources of knowledge and ICTs. When the participants were asked if they make use of email and Internet to facilitate the beads-making activities, only four of the beads producers indicated that they used emails and Internet (virtual space) to acquire, share and preserve IK, hence exercising *ba* was partially fulfilled. Similar observations were made in another study in Nigeria by Ha et al. (2008) and in Tanzania by Lwoga, Ngulube and Stilwell (2010).

Conclusion

The findings of the study illustrated that face-to-face communication was very important for enabling the knowledge creation processes in the beads-making communities as compared to other communication channels such as print formats and ICTs. Therefore, it may be

concluded that the socialisation process of the SECI model (Nonaka et al. 2000) was practised at a very high rate in the communities, while the combination, externalisation and internalisation processes were practised by the beads producers in the local communities at a very low rate. In the same vein, organising 'ba' and dialoguing 'ba' were practised and found in the communities, while systematising 'ba' and exercising 'ba' were practised at a very low rate in the communities. The research findings revealed that the knowledge creation theory can partially be applied to manage beads-making IK in the Krobo communities in Ghana.

Recommendations

Based on the findings, the study is making the following recommendations to enhance effective knowledge creation activities in the communities:

- Officials of community radio stations, especially state-owned radio and the information centres in the local communities, should develop and broadcast programmes to disseminate information that are relevant to beads producers so that beads-making knowledge creation and development in the communities do not disappear. They should utilise storytelling, drama, traditional dance and singing competitions in the local languages.
- In addition, any ICT initiative intended to invest in local KM activities should focus on the use of the mobile phone and radio instead of advanced ICTs such as Internet and emails to provide adequate access to knowledge in the local communities because most of the beads producers depend on mobile phone and the radio to access information.
- The National Commission on Culture in collaboration with the Tourism Board in the eastern region should train the beads producers to document the processes, tools and materials of beads making, and combine ICTs with print media and indigenous means of communication to disseminate IK in the Krobo communities.
- The study is also recommending that market research in the beads industry be carried out to further understand the economic potential of the industry. Another study that triangulates research methods with a much bigger sample is recommended to establish the reliability of the current study.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article. The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

Author's contributions

B.K.A. collected the data and put the article together. P.N. dealt with the reviewers' comments and was the co-supervisor. L.D. was the supervisor of B.K.A.

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