

A Systematic Literature Review of Agriculture Knowledge Management in KM and non-KM Journals.

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Abstract: This paper discusses the contrast in approach to agriculture knowledge management (AKM) empirical research between mainstream Knowledge Management (KM) scholars and scholars from non-KM fields, and the implications of this contrast to the development of AKM scholarship. The paper uses a systematic literature review, gathering papers from both mainstream KM literature and non-KM literature. A total of 44 peer-reviewed publications were analysed. Of these, 12 publications were from the mainstream KM literature while 32 publications were from the wider non-KM literature but had an agriculture knowledge management focus. While KM scholars predominantly conducted AKM research in structured, organized settings such as agriculture organisations and agri-business enterprises, scholars from non-KM fields, mostly agriculture, conducted AKM research in less formal settings, engaging farmers and local communities in research and exploring the indigenous knowledge that arises out of such communities. This contrast shows a disconnect in the studies conducted by the two groups of scholars. The disconnect is also reflected in the fact that the scholars from the different backgrounds do not cite one another and hence AKM literature does not have any coherent development. This paper offers an overall picture of the existing knowledge of AKM, and provides pointers for future AKM research

Keywords: Knowledge; Knowledge Management; Agriculture; Agriculture Knowledge Management; Farming

1. Introduction

The agriculture sector is on the frontline of global efforts to address the world's problems of food insecurity, poverty, climate change, sustainability, and environmental degradation. The importance of leveraging agriculture knowledge therefore cannot be downplayed. The field of knowledge management (KM) has registered tremendous success and continues to evolve, which makes consideration for KM's application to strategic sectors like agriculture eminent. A systematic review of the relevant literature however found that research on agriculture knowledge management (AKM) is limited, fragmented and highly interdisciplinary. The authors have identified a limited number of 'primary' AKM studies from the mainstream KM journals and 'secondary' AKM studies from non-KM journals examining different aspects of agriculture-related research. As such, this study follows Bandara, et al. (2011) who argued that where a field is emerging and novel, researchers may also need to review what they termed as 'secondary papers' that do not specifically discuss the topic of interest, but still includes some discussion of it embedded within other topics. The purpose of this paper is three-fold: 1) to analyse the contrasting approaches to AKM empirical research between scholars from mainstream KM journals (primary literature) and scholars from non-KM journals (secondary literature); 2) to examine the implications of these two research streams in terms of research and practice and 3) to recommend a possible research direction for AKM scholars. The paper is structured as follows: section 2 presents the methodology; section 3 presents the findings, section 4 presents the discussion of findings and recommendations for future research; while section 5 presents the conclusion.

2. Methodology

A widely accepted approach, that of a systematic literature review, was employed to ensure transparency and rigor (Thomé, et al., 2016). Like Podsakoff et al. (2005), the authors limited the systematic review to peer-reviewed journal articles omitting other sources such as books, book chapters and working article series. While AKM is also present in unpublished reports and other 'gray' literature, the authors focused on peer reviewed literature to ensure quality of evidence and consistency with accepted systematic review practices (e.g., Mariano & Awazu, 2016); Massaro, et al., 2015).

An initial search examined the top 20 journals (tiers A & B) from Serenko & Bontis' list of Knowledge Management and Intellectual Capital (KM/IC) journals (2021). The researchers carried out searches in each of the 20 journals using the keywords "knowledge* AND (agri* OR farm* OR food*)" present in the text with the asterisk (*) to facilitate unlimited truncation. An initial screening resulted in 72 peer-reviewed articles, further reduced to 58 after eliminating duplicates. Four inclusion criteria were then applied: (a) the article investigated

knowledge management in an agricultural context, (b) the article was empirical, (c) the article was in English and (d) the full text was available to the researchers through existing university library subscriptions. This resulted in only 12 eligible articles.

Given the small number of papers identified from mainstream KM journals and the need for literature reviews to be comprehensive, identifying all available articles (Aromataris & Riitano, 2014), the researchers decided to retain the search terms and inclusion criteria but expand the scope of the search to include papers from non-KM journals. The researchers conducted another manual search on ‘Academic Search Complete’, a multi-disciplinary database with more than 7,300 peer-reviewed journals of different fields. This search returned 311 potentially relevant papers, reduced to 206 after the elimination of duplicates. After the four inclusion criteria were applied, 32 papers from non-KM journals were identified, making a total of 44 relevant papers for the systematic literature review.

A coding matrix was developed to review the identified papers. For each article, the authors reviewed the journal in which article was published and the setting/context in which the study was conducted. Coding was carried out independently by two of the authors. Where slight differences occurred in the initial coding, the relevant papers were reviewed and discussed until consensus was reached.

3. Findings

3.1 Journal of publication

This systematic literature review examined 44 studies, 12 from KM journals and 32 from non-KM journals. Among the KM journal articles, the most popular publication outlets were the Journal of Knowledge Management (5 papers) and Knowledge Management Research and Practice (3 papers), while the remaining studies were from four different journals. There was a wider spread of journals in the 32 non-KM articles, which were published in 27 different journals, with a dominant trend being the publication of a single paper per journal. The only journals that had multiple publications were: the Journal of Ethnobiology and Ethnomedicine (3 papers), Agriculture and Human Values (3 papers) and the Sarhad Journal of Agriculture (2 papers).

The quality of the papers was examined using both Impact Factors (Clarivate) and Cite Scores (Scopus) as metrics. The quality of the KM journals was almost double the quality non-KM journals using both impact factors and cite scores. In addition, while almost all the KM journals had cite scores and 9 out of 12 had an impact factor, non-KM journals possessed less of both, with 28 out of 32 having cite scores and only 19 out of 32 having an impact factor.

Table 1: Paper quality

Journal Type	Average Impact Factor	Average Cite Score
Knowledge Management Journals	4.95 (n=9/12)	6.50 (n=11/12)
Non-Knowledge Management Journals	2.80 (n=15/32)	3.84 (n=19/32)

KM Journals n=12, Non-KM Journals n=32

3.2 The setting/context in which studies were conducted

The predominant focus of the AKM articles in KM journals was similar to typical KM areas of interest, considering how to leverage knowledge for business growth, competitive advantage, and organisational improvement, although the former articles considered agricultural organisations and agri-business enterprises. 10 out of the 12 mainstream KM studies were conducted in structured organisational settings (Chisita & Fombad 2020; Gardeazabal et al., 2021; Ahmed & Newton, 2005), across inter-organisational settings (Fait et al. 2019; Garcia-Villaverde et al. 2008; O’Connor & Kelly 2007) or in institutional settings that bear resemblances with organisations such as a cooperative (Galindo 2007), a network (De Bernardi et al. 2021) and a project (Feng et al. 2009). The operational context in such structured organisational settings allowed managers/leaders to identify areas where knowledge processes can be leveraged and identify tools and techniques that could be used to reinforce the application of knowledge, whether consciously or unconsciously. The organisational contexts enabled easier access to respondents by researchers. Only 2 papers from mainstream KM journals (Torres et al. 2021; Mahindaratne & Min 2019) considered research participants in non-organisational settings: both studies were conducted in farming communities and engaged individual farmers without any organisational attachments.

In sharp contrast, researchers from non-KM journals predominantly conducted AKM studies in non-organisational settings, engaging rural farming communities and individuals in AKM research. 29 out of 32 secondary studies reviewed were conducted in community settings, mainly focusing on farmers. Inherent in these studies was an acknowledgement of farmers' indigenous knowledge. These studies recognised that farmers possess a deep and rich knowledge of many aspects of agriculture such as environmental conservation (Jiao et al. 2011; Mamun 2010), sustainable natural resource management (Heijting et al. 2011; Wyckhuys & O'Neil 2007), pest management (Yemataw et al. 2016; Eisenberg et al. 2009; Guimarães and Mourão 2006), soil (Asse´ and Lassoie 2011), fertilizers (Misiko et al. 2010), and plants (Thorn et al. 2020). This literature review indicates that such indigenous knowledge, held by farmers and in community, rather than organisational settings, is overlooked by mainstream KM scholars whose focus is on formal agriculture organisational and agri-business settings, where knowledge processes are facilitated by organisational managers/leaders, who may not appreciate the role, authenticity and value of indigenous knowledge. Communities in less formal contexts, provide members with opportunities for different knowledge processes without formal/organised facilitation. Only 3 of the 32 secondary studies were conducted in structured/organised settings (i.e. Imam et al. 2021; Lopez et al. 2021; Powell 2017).

One non-KM study (Barua and Rahman 2018) was unique in that the researchers recognized the agriculture sector as being composed of diverse stakeholder groups, belonging to both organisational and non-organisational contexts. The researchers used a Participatory Rural Appraisal technique to investigate the perspectives of fishers in their local community, which was supplemented with interviews with NGO personnel, researchers, private entrepreneurs, government representatives and resource users. In this study, while some research participants were from non-organisational contexts (e.g. fishers/farmers, local communities), other participants were interviewed in the context of their organisations (e.g. NGO personnel, private entrepreneurs, government representatives, researchers). Barua and Rahman (2018) explored the utilization patterns and management aspects of natural resources and economic valuation of the ecosystem services through indigenous knowledge practices in Bangladesh. Rather than focus on farmers and local communities as resource users, the researchers engaged organizational stakeholders because of the role these play in facilitating resource use in communities. Barua and Rahman (2018) observe that environmental-friendly traditional values can be enforced by effective environmental protection policies. While they acknowledge communities as key resource users and holders of valuable indigenous knowledge, they also recognize that private sector players, NGOs and government players play equally important roles in promoting ecological and economic benefits from resource use.

4. Discussion of findings and recommendations for further research

4.1 Journal of publication

There is limited research on AKM in knowledge management journals, with studies focusing on the organisational leveraging of knowledge. In contrast, AKM research has been published across a larger number of non-KM journals and examined the relevance of knowledge from a wider range of agricultural topics, such as rural development, agriculture, climate change, environment, ecology, and agronomy among others. Such a distribution of agricultural issues and KM responses means that AKM research has, to date, developed on a piecemeal basis and is currently lacking a coherent underlying theory that seeks to link key KM activities with the idiosyncrasies of the agricultural context. The scattered distribution of papers among multiple journals also shows that there is no journal that is seen by researchers to be a natural 'home' for a developing stream of AKM research.

As demonstrated in table 1, the 12 AKM papers from mainstream KM journals though limited in number have much higher citation impact than the 32 AKM papers from non-KM journals. This shows that the papers from KM journals have more reach in the scientific community, compared to the papers from the lower quality non-KM journals. There is need therefore for the higher impact KM journals to facilitate scholarly attention on AKM in order to help the evolution of AKM literature. The field of AKM is open and presents opportunities for potential scholars to explore. KM journals should facilitate specialised streams of AKM research, providing a platform for KM and non-KM scholars to collaborate in building a scholarly dialogue in the field.

5. The setting/context in which studies were conducted

The focus of current KM research is predominantly aligned to for-profit organizational settings. Consequently, KM scholars' approach to AKM research has also focused on an organisational context that is similar to existing

KM studies. Currently, KM has been successfully applied to organisations to enhance decision making (O'Connor & Kelly 2017), competitive advantage (García-Villaverde et al., 2018), innovation (Gardezabal et al., 2021) and production (Torres et al. 2021). In this paper, we argue that there exists a growing need for KM scholars to go beyond organisational contexts, specifically when examining the agriculture sector.

There has been considerable reflection on KM in the public sector, including Massaro et al. (2015) who provides a helpful review of literature for knowledge management application in that context. Boyne (2002) argues that public and private sector organisations are different and require different approaches in application of management principles. In this article, we extend this argument by suggesting that the agriculture sector also has unique differences. Therefore, KM application to any sector ought to begin with a comprehensive analysis of the sector to inform suitability of available KM principles to the sector or a review and adaptation of KM principles to the sector context. This systematic literature identified three areas of uniqueness for the agriculture sector that set it apart from not only private organisations but other public sectors as well: heterogeneity of knowledge actors, heterogeneity of agriculture knowledge, and structural context.

Heterogeneity of knowledge actors: From the literature reviewed, the agriculture knowledge actors were identified as farmers, local communities, farmer associations, local governments, national governments, technical agriculture experts, researchers, international development organisations, national/local Non-Governmental Organisations (NGOs), education institutions and private sector agro-enterprises. By virtue of their different roles, these knowledge actors possess different knowledge, expertise, motivations and goals and stem across multiple epistemic boundaries. Even when the work of these diverse knowledge actors is ostensibly interdependent, agriculture researchers (Sumane et al. 2018; Lwoga et al. 2010) have acknowledged that the various groups of agriculture knowledge actors are largely disconnected from one another, due of strained relations or conflicting perspectives and goals but some may also hold mutually supporting knowledge.

Heterogeneity of knowledge: The heterogeneity of knowledge actors leads to a diverse heterogeneous knowledge base. While the benefits of heterogeneous knowledge are widely acknowledged in KM literature (Rodan 2002; Rodan & Galunic 2004; Nielsen 2002), it can also be disruptive, requiring well thought out consideration by researchers. In the agriculture sector, farmers' indigenous knowledge is often disregarded by policy makers and other actors who downplay it as inefficient, outdated or merely based on mysticism (Lopez et al. 2020; Mashavave et al. 2013). Farmers, in their turn, have also often disregarded conventional knowledge transmitted to them through government extension systems (Kamurudin et al. 2015). Agriculture researchers have lamented the lack of interest in, and adoption of, their findings by farmers and other agriculture sector players (Nain et al. 2018). Technical experts such as veterinarians continue to face marginalization by farmers and other agriculture players because they have tended to lose their monopoly over knowledge in an information age (Ruston et al 2016) with their knowledge often in conflict with farmers' indigenous knowledge (Kamurudin et al. 2015). Alternatively, government interventions and the knowledge that arises out of these interventions tends to focus on agriculture commercialization and profitability, while the typical smallholder farmer is interested in farming as a livelihood and a source of food security (Anderson, Leach and Gardner 2016). These examples indicate that the heterogeneous knowledge present in the agriculture sector may not necessarily translate into positive outcomes in circumstances where researchers do not provide well thought out KM frameworks. While existing KM research already provides tools and techniques for dealing with heterogeneous knowledge, it is important that AKM scholars avoid an uncritical application of existing KM tools and techniques to the agriculture sector, but rather, analyse the sector and its knowledge actors before developing agriculture sector specific tools/techniques for dealing with heterogeneous agriculture knowledge.

Structural context: The agriculture sector is characterized by knowledge actors in structured organisational settings and knowledge actors in unstructured settings such as individual households and communities. This makes interactions and socialization amongst the sector's knowledge actors, that would enhance the different knowledge processes, socially complex. While knowledge actors in organisations are likely to seek information with organisations tending to implement strategies to facilitate knowledge processes amongst members, agriculture knowledge actors in unstructured settings such as farmers tend to be conservative in knowledge seeking and may prefer to rely more on their tacit (largely indigenous) knowledge for decision making (Mahindaratne & Min 2019). The context of the agriculture sector calls for change in focus by AKM researchers, from both KM and non-KM journals, to one which examines research participants in both settings rather than, as observed in the majority of studies, a single setting. As the fundamental thinking on which KM ideas were

originally developed is based on organisational settings, AKM researchers need to reflect on whether such settings remain appropriate in non-organisational settings as well as mixed settings.

6. Conclusion

As a contribution to achievement of key SDGs related to agriculture sustainability, KM journals should develop an AKM theme to facilitate the development of a deeper and more cohesive AKM theory. KM scholars exploring AKM should draw on the non-KM studies to develop an understanding of how AKM contexts differ from organisational KM contexts to develop a more agriculture-specific understanding of the role KM can play.

This study is not without limitations. By restricting it to the top KM journals and the “Academic Search Complete” database, this study may not have allowed complete coverage of all empirical articles in the field of AKM. Yet it is reasonable to assume that the review process covered a substantial proportion and realistic representation of the AKM studies.

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