

*Full Length Research Paper*

# **The use of local knowledge in agricultural extension: A systematic review of the literature**

**Kirt Hainzer\*, Catherine O'Mullan and Philip Hugh Brown**

Institute for Future Farming Systems, Central Queensland University, Bundaberg, Australia.

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**Smallholder farms are complex systems, constantly adapting to context and rely on local, place-based knowledges. The vital role of local knowledge in smallholder farming systems has seen attempts throughout low- and middle-income countries to entwine local knowledge with scientific knowledge to improve outcomes from agricultural extension. Using a systematic review and exploratory meta-synthesis of selected literature, this research explored the use of local knowledge in agricultural extension. The synthesis found local knowledge plays a vital role in the adoption of new technologies or practices because as the dominant form of knowledge in communities they give learners confidence and they provide a context upon which new information can be introduced. However, effective use of local knowledge requires a realistic perspective which recognises that some combination of local and scientific knowledge, developed in a participatory process, will likely result in extension delivering greater outcomes to farmers.**

**Key words:** Local knowledge, agricultural extension, smallholders.

## **INTRODUCTION**

Smallholder agriculture throughout low- and middle-income countries is rooted in place. Its practices are honed over generations of observation and experimentation to suit climatic and cultural demands (Briggs, 2005). Farmers have honed these subsistence farming systems for survival and have developed ways to ensure consistent supply to satisfy the immediate food and fibre needs of their families. However, there are livelihood limitations to the subsistence farming system. Particularly amongst rapid population growth, farmers in low- and middle-income countries face capacity gaps as

they attempt to transition to more intensive or productive forms of agriculture as a way of improving their livelihoods through income generation (Anderson and Feder, 2004). It is in these instances where national governments and international development projects throughout low- and middle-income countries have tried to bridge the desires of smallholders with the capacity needed to realise their livelihood desires using agricultural extension (Cook et al., 2021).

Agricultural extension has been a part of adult education for decades and has remained a vital part of

\*Corresponding author. E-mail: [kirt.hainzer@cquemail.com](mailto:kirt.hainzer@cquemail.com).

agendas to improve rural livelihoods due to many communities in low- and middle-income countries still being fundamentally linked to agrarian livelihoods (Norton and Alwang, 2020). The interrelatedness of agriculture and its driving economic force in rural communities means gains from agriculture result in gains realised by other farm and non-farm sectors (Cervantes-Godoy and Dewbre, 2010) and can therefore impact a wide variety of livelihoods. Although originally conceived as a way of transferring production technologies from knowledge creators to rural farmers, agricultural extension has moved beyond agricultural production challenges to cover a much broader range of content and included more demand-driven, farmer-centric approaches (Norton and Alwang, 2020). Despite its wide application and evolution in its content and approaches, research into the effectiveness of agricultural extension has found mixed results (Maertens et al., 2021). Indeed, it is this deeply interrelated agrarian nature of communities which makes ascribing outcomes to individual extension activities difficult (Anderson and Feder, 2004) and perhaps most prohibitive to livelihood changes is the ongoing detachment of extension content from its socio-political context (Cook et al., 2021).

While agricultural extension sought to overcome agricultural challenges in pursuit of larger changes in livelihoods through economic gains, this focus on technologies and economic change often neglected the broader “social development” (Li, 2011) required to sustain livelihood changes, rendering extension technical (Cook et al., 2021). The rendering technical of extension detaches content from context which diminishes the power of introduced technologies and has resulted in the extension discourse emphasising “the unrealised economic rewards of available technologies” (Cook et al., 2021). This rendering technical, or the detachment of extension content from the broader changes required to sustain livelihood changes, also worked to legitimise certain knowledge, while delegitimising others which often excluded the place-based knowledge and context of which adult learners were familiar (Šūmane et al., 2018). As Freire (1970) noted long ago, learning cannot be separated from its context, and learners will make meaning from their world which is culturally, linguistically and place-specific (Pamphilon, 2015). Although authors have long acknowledged the influence of socio-cultural factors on the success of extension (Bartlett, 2008; Cook et al., 2021; Vanclay, 2004), these elements continue to be excluded from extension content and approaches. By neglecting the local knowledge systems in which farmers exist, it limited the effectiveness of the new approaches to close capacity gaps (Chakraborty and Chaudhuri, 2018).

Authors and practitioners propose that for extension to be effective, it must reach those searching for it, and once learners reach it, content needs to be rooted in the

knowledge systems in which the adult learners exist (Radcliffe et al., 2021). Despite consensus from practitioners on the need for extension to include the broader contexts in which learners exist (Cook et al., 2021), what is less clear is what constitutes local or cultural knowledges and how it can be used in agricultural extension programs or approaches. Furthermore, the knowledge created by generations of experimentation in local farming systems is the knowledge in which farmers are confident and familiar and neglecting this place based knowledge often demotivates learners (Anaeto et al., 2013). Therefore, this research aims to better elucidate what constitutes as local knowledge within smallholder farming systems, and the rationale behind using local knowledge in extension. The research also looks at extension projects which have incorporated local knowledges to explore whether local knowledge can be effectively included into agricultural extension in low- and middle-income countries where smallholder farming systems are the dominant form of agricultural production.

The aims of the research will be explored using an analysis and meta-synthesis of selected published literature that detailed an agricultural extension approach or program implemented in a low- or middle-income country. Using a targeted search strategy, selected literature will detail an intervention that incorporated local knowledge, local culture or in some way tried to culturally embed extension content into the knowledge systems of targeted learners to answer the following research questions:

- (1) What constitutes local knowledge when used in agricultural extension in low- and middle-income countries?
- (2) What are the rationales behind using local knowledge in agricultural extension in low- and middle-income countries?
- (3) How has local knowledge been included into agricultural extension programs or approaches in low- and middle-income countries?
- (4) What are the key issues in the use of local knowledge in agricultural extension in low- and middle-income countries?

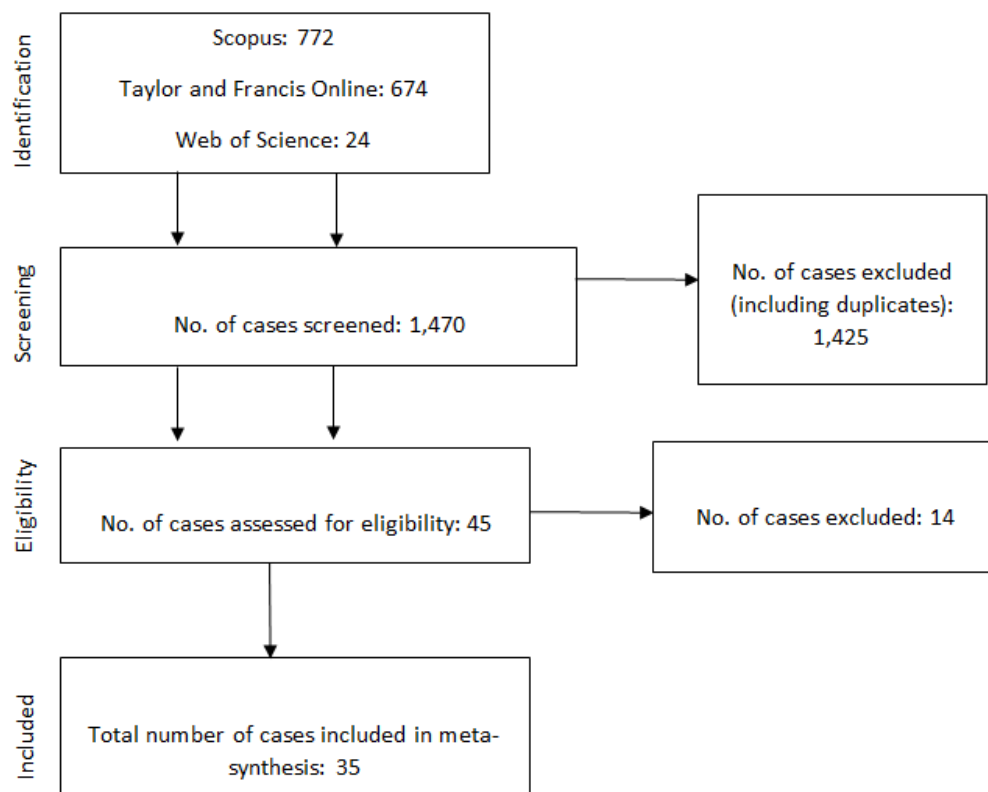
## METHODOLOGY

Systematic review methodology according to Liberati et al. (2009) was used to guide the planning and review of scientific literature. An exploratory meta-synthesis of the selected literature was used to conceptualise the use of local knowledge in extension. In contrast to meta-analysis, which uses quantitative data from studies to provide clarity and certainty around cause and effect, a meta-synthesis seeks to better understand or explain a phenomenon (Walsh and Downe, 2005).

The first stage of the systematic review was the development of a search strategy by identifying literature that had detailed an

**Table 1.** Search terms used to identify selected literature.

Key words
"agri* extension" OR "agri* education" OR "farmer train*"
"local knowledge" OR "local culture" OR "culturally relevant"

**Figure 1.** A flowchart that shows the inclusion and exclusion of literature.

extension approach or project which sought to include local knowledge as the basis of content or sought to involve local farmers and their knowledge in an extension program. Keyword searches were conducted using three bibliographic databases (Scopus, Taylor and Francis Online and Web of Science). The keyword search strategy used in the bibliographic databases sought to cast a wide net and find as many potential extension articles as possible. The search strategy used keyword searches through the entire document rather than restricting keyword search to the title, abstract or keywords. The use of local knowledge in extension is an expanding field, therefore a broad strategy was used as the terms used to describe the approaches and programs may vary given no standard set of terminology yet exists in this expanding field. Cases were selected from peer-reviewed literature, published in English, without any restrictions on the year of publication. The keyword strategy combined two primary themes: the education of farmers through extension and the use of culture or local knowledge within that education. Table 1 presents the search terms used to identify literature. The keyword search in Taylor and Francis Online used the search terms in full without the Boolean operator.

The next stage of the search strategy used inclusion and exclusion criteria to purposely refine the search results. Some search strategies in the synthesis of literature aim for an exhaustive sample of literature to uncover or predict a theme, whereas the purpose of the search strategy in this research was to obtain conceptual saturation so that an interpretation can be formed (Thomas and Harden, 2008). Research has shown that the number of articles on agricultural extension as a discourse to be growing rapidly (Cook et al., 2021) and in using a purposely broad search strategy, there were a large number of excluded cases. Figure 1 shows a flowchart of included and excluded articles. A large selection of literature was excluded because they detailed extension approaches in a high-income country and the focus of this research was the inclusion of local knowledge into extension directed at low- and middle-income countries. Low- and middle- income countries were defined as those countries with a gross national income per capita of below \$12,735 (Beer Prydz and Wadhwa, 2019). Exclusion for high-income countries was not included in the search terms in favour of a larger sample. A large number of exclusions also detailed approaches to changes extension but didn't identify the

inclusion of culture or local knowledge into the proposed changes to extension. The broad search terms used to identify extension using "local knowledge" meant a number of papers were excluded which detailed or outlined a practice or a portion of local knowledge but did not use that knowledge in the education of farmers. During the assessment of eligibility, a final 14 cases were excluded from the research. Although these cases satisfied inclusion criteria, they did not contain content which would be used in the meta-synthesis due to it being repeated in other selected cases.

The final stages of synthesis required a full-text assessment of the selected literature to extract the analytical units before synthesising those units into a greater understanding of the use of local knowledge in agricultural extension. Deciding on the units of analysis, which are considered data in meta-syntheses, is an important step and is based on the researcher's judgement (Nowell et al., 2017) but should be guided by capturing those themes which provide insight in answering the research questions. The research questions focussed on four dimensions of local knowledge which explored: *What constitutes local knowledge when used in agricultural extension in low- and middle-income countries? What are the rationales behind using local knowledge in agricultural extension in low- and middle-income countries? How has local knowledge been included into agricultural extension programs or approaches in low- and middle-income countries? What are the key issues in the use of local knowledge in agricultural extension in low- and middle-income countries?* The units of analysis were therefore quotes or specific references related to the research questions. Analytical units were extracted during a full-text assessment of the 35 selected papers and assigned under four different codes related to the research questions (why, what, how, issues) in NVivo (QSR International, NVivo 20, 2021).

The final stage of interpretation used a qualitative literature meta-synthesis to translate the codes from NVivo into a more complete understanding of the phenomena (Erwin et al., 2011). The selected quotes or references which formed each code were analysed to determine themes (and sub-themes where relevant) within the data to allow for conceptualisation to answer the research questions. For example, research question two explored the rationale behind using local knowledge and under this code "why" two sub-themes (holistic rationale and pragmatic rationale) were identified as two separate and distinct groups in which the extracted quotes and references aligned to.

## RESULTS

A total of 35 studies were identified which described either an intervention (or project) to incorporate local knowledge and the rationale behind its use or defined local knowledge and the issues with its use. The results present the literature synthesis in four sections, which align to the four research questions.

### **What constitutes local knowledge when used in agricultural extension in low- and middle-income countries?**

Of the selected literature, 18 papers detailed how they defined local knowledge and explained the dimensions of local knowledge which they had included within an Extension project. Local knowledge is most commonly defined throughout selected literature to encompass

three dimensions which focus on (1) local knowledge as being rooted in place, (2) it being connected to people, and (3) it being shaped by their beliefs both individually and collectively (Anaeto et al., 2013; Kolawole, 2013). It is defined as knowledge that is created in a region and therefore related to the people of that region (Rajasekaran and Martin, 1992). Most authors further note that it is place-based and deeply embedded within cultures, which increases its suitability for local systems, but also means it can only be seen fully by observing its economic, political and cultural contexts (Briggs, 2005).

Its connection to people and their beliefs is a common thread throughout the literature, and it is this connection to culture and society which leads authors to regularly define this knowledge as dynamic in nature (Razeghi et al., 2011). It is seen as an important part of local culture as it provides a record of what has happened and what has worked in the past, providing local people with experiences to draw upon (Wang, 2015). Anaeto et al. (2013) define it as "knowledge which is embedded within dynamic systems in which spirituality, kinship and local politics shape strategies and techniques." It is dynamic due to its constantly adapting nature and has been developed to cope with changes in the socio-cultural and environmental conditions as well changes in the social and ethical values of its people (Chakraborty and Chaudhuri, 2018). The development of local knowledge often happens collectively, and it is largely based on observations. The observational approach to the development of local knowledge is readily identified throughout the literature. It is knowledge that is largely based on observation and orally diffused from generation to generation, and farmer to farmer (Anaeto et al., 2013). Oral diffusion can take a number of forms and local knowledge is shared via ritual, song, stories and fables (Radcliffe et al., 2021). Other local knowledge is only shared at times of specific ceremonies.

The majority of papers only used a small part of local knowledge targeted at a specific issue in their extension projects, such as increasing the resource efficiency of farming systems or promoting local conservation behaviours. Using just a portion of local knowledge meant many definitions focused on the application of local knowledge (Briggs, 2005; Radcliffe et al., 2021; Wang, 2015). However, local knowledge is much broader than agricultural practices and Chambers (1983) and Razeghi et al. (2011) provide a definition in which he prefers the term "rural people's knowledge", rejecting the simplicity of the term local knowledge as he believes that names suggest knowledge of a local environment, whereas rural knowledge includes people existing as a system of concepts, beliefs and ways of learning. Chambers goes on further to provide an encompassing definition of what continues local knowledge by breaking it down into four categories which broadly cover farming practices, the rural environmental conditions, the abilities

of rural people and the outcomes of their experimentation. His view of rural knowledge includes farming practices and knowledge of the environment (observations regarding such things as soil and climate). It also includes rural people's faculties, which as the nature of local knowledge as dynamic in nature and predominately orally diffused, it is constantly renewed or lost, meaning this knowledge is hugely influenced by the observations, curiosity, memories for detail and transmission ability of the rural people. Chambers sees the final dimension of rural knowledge as its experimental nature and in line with the aforementioned researches, proposes that farmers are experimental and innovative by nature, and this has been obscured by the preoccupation of agricultural extension being research or science-based.

### **What are the rationales behind using local knowledge in agricultural extension in low- and middle-income countries?**

As outlined in the introduction, there has been a concerted effort to improve agricultural extension by developing approaches that are demand-driven and farmer-centric. In adapting extension services agencies have focussed on incorporating local knowledge as a way of improving extension and its outcomes (Cook et al., 2021). As Radcliffe et al. (2021: 135) explain, for extension to be more effective for smallholder farmers "it should be contextual, and include local, scientific and indigenous knowledge". The need to adapt advisory services to local contexts is now a position adopted by both national extension services and by various international organisations such as the World Bank (Faure et al., 2012).

When describing the rationale for incorporating local knowledge into extension, selected literature broadly follows two tracks. Of the 25 articles that detailed reasons for using local knowledge about half of the selected articles detail holistic reasons for using local knowledge which believe practices cannot be isolated from context and believe a broader view of community is required to properly understand local knowledge. While the other half of the selected articles employed a more pragmatic view which believes local knowledge is crucial to the adoption of new practices or technology, which as the focus of extension justified the use of local knowledge. The key factor in both of these new extension paradigms is the involvement of those who possess local knowledge in the development activities (Chakraborty and Chaudhuri, 2018).

#### ***Holistic view for community development***

Holistic views of local knowledge reason for its inclusion due to this knowledge being part of complex systems and

unable to be isolated from its context (Šūmane et al., 2018). They contend that a singular focus on the agricultural practices of local knowledge decontextualises it, rendering it useless to many farmers (Radcliffe et al., 2021; Briggs, 2005). Most small-scale farmers in sub-Saharan Africa, for example, adopt "new information only when it is relevant to them and has an explicit link to their daily lives" (Bonfadelli, 1999). Therefore, "contextualised information, which considers the relevant challenges and provides solutions, has a higher chance of being adopted leading to greater gains in knowledge" (Spurk et al., 2020).

Researchers have noted that local knowledge influences the thinking of farmers both directly and indirectly (Wang, 2015), and it influences thinking beyond mere production challenges. Authors contend that contextually relevant information is also a decision-making tool for empowerment (Chakraborty and Chaudhuri, 2018). Holistic views also contend that farmers primarily value local knowledge as it is "mainly experience-driven, practical and can be shared or transmitted informally amongst other farmers" (Chakraborty and Chaudhuri, 2018).

Holistic views propose that the incorporation of local knowledge systems into agricultural extension programs is essential to better understanding the perspectives of local people, to bridge the communication gap between communities and extension, and to increase the participation of farmers in developing and integrating solutions (Rajasekaran and Martin, 1992). Holistic views contend that local solutions offer farmers greater confidence (Pincus et al., 2018) and that a more holistic view of community resources, natural environments and the local knowledge systems is more effective in developing local solutions (Anderson, 2007). Authors believe that the traditional forms of linear, top-down extension negate local knowledge and creativity, which ignores farmers' self-confidence. By neglecting the context and confidence of learners it restricts social energy as an important source of change (Röling and van de Fliert, 1994).

#### ***Pragmatic view for practical application***

Pragmatists believe that using local knowledge is essential in the adoption of new agricultural practices. As Pincus et al. (2018) explain, "smallholder farmers rely heavily on traditional agricultural knowledge when deciding whether to adopt, modify, or reject a new practice or technology, especially if they have had little exposure to the science-based knowledge culture within which the technology was developed." Particularly with complex content such as postharvest management, product quality and safety standards, the goal of extension is building capacity and therefore pragmatists contend that the "right" approach to extension depends

on a number of interrelated factors such as the policy environment, available infrastructure, the capacity of extension agencies and staff and farming systems as much as on community identity and local knowledge systems (Ferroni and Zhou, 2012).

Another foundation of the pragmatic view of local knowledge is that its incorporation is vital to the adoption of new ideas because local knowledge systems are the dominant systems of knowledge in these contexts. Currently, at least 50% of the world's population relies on local knowledge for food and fibre production (Lwoga et al., 2011). Knowledge diffusion is also greatest amongst farmers and adoption of extension technologies and knowledge is connected to local knowledge systems (Anderson, 2007). Furthermore, extension is a widely used approach with approximately 500,000 agricultural extension personnel worldwide in 2005 (Aker, 2011) and therefore remains a vital channel of knowledge diffusion and its ability to close capacity gaps warrants its improvement.

The pragmatic view further believes that local knowledge inspires local solutions, which often depend on locally available skills and materials and are therefore often more cost-effective than imported solutions (Kolawole, 2013). Particularly projects aimed at sustainable agricultural development, projects adopt local knowledge as a practical approach to get local solutions to local problems. Seven papers in the selected literature had used local agricultural extension to address practice-related issues such as resource depletion. As this knowledge is rooted in place, pragmatic views contend that local practices are adapted to local conditions (Faure et al., 2012).

### **How has local knowledge been included into agricultural extension programs or approaches in low- and middle-income countries?**

The integration of local knowledge into extension has occurred in both traditional face-to-face extension as well as being included in a growing group of information and communication technology (ICT) extension approaches. When incorporating local knowledge into face-to-face extension the focus is on finding innovative farmers or identifying innovative local practices and establishing methods for extension to integrate this knowledge with research or scientific knowledge in the delivery of extension. Extension using ICT relies much more on content developed or edited by farmers themselves where extension staff or ICT applications act as a conduit for collecting local knowledge.

#### ***Incorporation of local knowledge into traditional face-to-face extension***

When projects integrated local knowledge into face-to-

face extension, the focus has generally been on documenting the practices to form a knowledge base upon which new scientific knowledge can be introduced. As stated by Radcliffe et al. (2021) “an effective alternative to top down-down agricultural extension, is to create new knowledge by entwining indigenous knowledge (prior knowledge) with scientific knowledge”. The discovery and documentation of local knowledge is achieved by strengthening the relationship between farmers and extension agents, involving farmers directly in the development of content and initiating feedback mechanisms between research, farmers and extension staff to continue developing relevant content (Chakraborty and Chaudhuri, 2018). As noted in a study of extension agents by Rajasekaran and Martin (1992), extension staff themselves saw a greater integration of local knowledge into extension projects requiring (i) identifying extension staff's knowledge of local practices, (ii), training extension staff on methodologies for documenting local knowledge systems, and (iii) to strengthen the communication between farmers, research and extension.

In addition to increasing the receptivity of extension agents to uncover and utilise local knowledge, other approaches sought to find farmer innovators and by drawing attention to their successful practices, elevate the status of local knowledge. Two case studies are presented which sought to identify farmer experts or innovators and to include this knowledge into face-to-face extension.

**Case study 1:** The first case study used two separate countries Papua New Guinea and Vanuatu, in a joint project to test an approach to entwining research knowledge with local knowledge with the aim of promoting sustainable practices called the Extension for Sustainable Agricultural Development (ESAD) approach. These two projects employed a holistic view of integrating local knowledge into extension and believed the identification of this knowledge relied critically on local knowledge experts and immersion in communities because local knowledge is socially and culturally embedded in local knowledge systems (Radcliffe et al., 2021). In their four-stage approach, researchers and extension staff immersed themselves in communities to build relationships and to familiarise themselves with the daily routines of the farmers. In the first stage, the researchers developed a repository of indigenous knowledge through semi-structured interviews and farmer observations. Once these practices and knowledges were documented, stage two involved a thematic analysis to find ways of organising knowledge based on the identification of common themes. Stage three involved knowledge creation through consultation between farmers and extension officers. The applicability of local, research or scientific knowledge to be included was assessed by nine questions, which explored the value of

the knowledge, whether it promotes sustainable practices, whether it maintains trust and whether it is gender neutral. In the final stage, the new co-created knowledge was delivered via extension projects to smallholder farmers in PNG and Vanuatu.

**Case study 2:** A second case study conducted in several African countries was driven by local research and extension not generating or introducing technologies that answered the needs of poor farmers, particularly women, in dry and marginal areas of Africa (Kibwana et al., 2001). This project sought to find local innovations on soil and water conservation in Africa and started with the premise that "farmer innovators" or "farmer researchers" and their locally adapted knowledge form an important basis for extension. This project sought to increase extension agents understanding of local creativity and increase local scientists' exposure to the real world of farmers. By means of a contest, extension staff and research scientists were encouraged to discover local creativity and the farmers or groups identified by extension staff or research scientists, were rewarded with prizes for their innovations at district and regional ceremonies. Kibwana et al. (2001) identify that "the greatest challenge has been changing the attitudes of people in extension and research organisations." To overcome this devaluing of local knowledge the innovations were promoted widely through each country in newspapers and on radio and television. The identified female innovators were given particular attention in this project. Many of the women included were heads of poor households. Their informal experiments often involved small, low-cost changes, which demonstrated how local resources can be used more efficiently in smallholder agriculture and reach those often marginalised by extension. The final stage introduced iterative training workshops, where extensionists learnt to promote farmer-to-farmer extension and encourage local experimentation. Local universities and extension agencies organised village-level workshops where farmers and extension staff compared the advantages and disadvantages of local innovations and introduced technologies. Researchers also worked together with farmers to assess and validate the local innovations and to further develop these ideas. Since the implementation of the project, a database held at one of the coordinating universities now includes more than 100 farmers, many of whom have innovated in multiple ways.

### ***Incorporation of local knowledge into ICT and visual-based extension***

In addition to approaches that uncover and elevate the status of local knowledge as part of traditional face-to-face extension, another successful pathway has been its inclusion into ICT based extension services to increase

the relevance and timeliness of extension. Although many ICT systems were originally conceived as somewhat simple systems to provide SMS updates to farmers on weather conditions or market prices, public and private services are now delivering extension through voice, SMS, radio and the internet (Aker, 2011). Many of these systems feature ways in which farmers ask questions and can access answers developed by other farmers or extension staff. Furthermore, the use of ICT services decreases the search costs for farmers, often making it a cheaper and more useful method of extension (Aker, 2011). While ICT programs have been criticised for their impact, their limited scale and their issues in reaching the most impoverished, the rapid spread of mobile phone coverage in many low- and middle-income countries provide a unique opportunity to reach farmers through ICT-based extension programs (Steinke et al., 2020).

Particularly in India where ICT industries employ large numbers of people, a diverse range of innovative approaches have been developed. One non-profit, free online service, which started in 2003 now has over 90% of its content developed by farmers who use the system (Ferroni and Zhou, 2012). Although it is directed towards smartphone and internet access, SMS access is also available, and farmers can ask questions from their phones or internet cafes and have other farmers or extension staff reply in English, Hindi, or Marathi (Ferroni and Zhou, 2012). The service features discussion groups on specific topics and allows for keywords searches of its answer database.

Projects are using ways of promoting rural people's knowledge through the dominant communication mediums, both as extension and as a way of increasing the value of this knowledge. In Ghana, a local rice organisation identified local innovations on a project aiming at the participatory adoption of new technologies for rice farmers (Bentley et al., 2010). The ideas were turned into radio scripts and shared throughout NGOs, Farm Radio International, and partner radios stations across rural Ghana. Farmer innovators were involved in the development of the scripts which were particularly popular amongst the staff of small, local stations who knew well the farming livelihoods of their audience. Furthermore, from this project a staff member supported by the government started hosting a radio show on agriculture, focussing on rice. The one-hour show conducted in a local dialect includes 45 minutes of farmers calling in with questions, comments, and answers. This is particularly useful in reaching the marginalised and remote as there are few extension agents in Ghana. With 2,000 farmers to every extension agent, only a small number of farmers will ever have direct contact with extension staff. Mass media like the radio are vitally important in these countries in order to provide timely, accurate information and for it to reach a

large audience.

Local knowledge is also being included in the development of visual-based extension materials. Particularly in countries of low literacy, the use of video or pictorial materials plays an important role in extension projects. In Nepal a project introduced local knowledge into extension content by having 59 Nepalese women farmers develop and edit 100 picture-based lessons covering a range of soil and water conservation techniques (Devkota et al., 2020). Contrary to academic literature, the authors found that farmers could comprehend the pictures without the help of extension agents, likely due to the editing of content so it is contextually relevant. The farmers in this project preferred printed pictures instead of the more advanced ICT options which were out of reach for these resource-poor farmers. Although a promising approach, the low literacy amongst the older women in the group meant even basic features such as the arrow symbol (which was used in the lessons to sequentially connect images), needed to be explained to them by the younger participants.

### **What are the key issues in the use of local knowledge in agricultural extension in low- and middle-income countries?**

The issues of incorporating local knowledge into extension are many, and well documented in the literature (Briggs, 2005). Four commonly identified issues are presented which focus on:

- (i) the issues stemming from the historical nature of extension as a one-way transfer of technology to rural farmers,
- (ii) a legacy of devaluing farmers and local knowledge,
- (iii) the binary tensions between western science and local knowledge systems in development projects and
- (iv) how a superficial understanding of this knowledge detaches it from its context.

### ***Extensions history as a top-down technology transfer***

Many authors in the selected literature contend that the history of extension as a one-way transfer of ideas from research (via extension) to farmers continues to limit its effectiveness and without addressing these inherent issues with extension, new approaches and ideas are attached to an approach which is largely ineffective (Wang, 2015). In Nepal, a study found that one reason that the extension staff did not practice a 'truly participatory' approach was due to a concern with implementing the programs, rather than in their participatory design. This same study found a focus on

meeting targets assigned to them by governmental extension agencies, rather than involving farmers in methods to solve their farming problems. Similar findings have been found in Ethiopia, where it was found that the government expects financial return from extension and that extension staff are responsible for distributing agricultural inputs to collect payments (Ghimire, 2009).

In another study by Rajasekaran and Martin (1992) in India, the authors found extension staff are familiar with the value of local knowledge, irrespective of their seniority, and that these extension staff also understood the limitation of the technology transfer paradigms to effective extension. A lack of truly participatory approaches has meant that agricultural extension programs "have typically adopted strategies that employ "reproductive" learning approaches generally focused on specific management practices" (Pincus et al., 2018). In order to promote a pluralistic extension system with farmers as active participants, extension staff also need training to "facilitate coordination, collaboration and lobbying within the extension system" (Okorley et al., 2009).

As summarised succinctly by Faure et al. (2012), "literature finally suggests that the promotion of new advisory methods in developing countries is still based on the willingness to disseminate standard advisory methods and not based on the willingness to promote principles aiming to design advisory methods well adapted to local conditions. The best-fit approach proposed by Birner et al. (2009) remains more of an objective than a reality."

### **A history of devaluing local knowledge and local people**

This top-down hierarchical thinking within extension devalued local knowledge in extension projects and the view of this knowledge being in some way inferior has also extended to the view of farmers themselves. In China, extension programs struggled to value the views of farmers as farmers in China are seen as "low-quality" people (Wang, 2015).

This legacy of devaluing farmers and their knowledge is a perspective that has transferred to farmers themselves. In PNG, where local knowledge of crop practices has sustained communities for thousands of years, Radcliffe et al. (2021) found local farmers placed little value on local knowledge and referred to those who used it in derogatory terms associated with being poor and lazy. While Anaeto et al. (2013) identify arguably the most serious consequence in disregarding and devaluing indigenous knowledge systems in that it undermines farmers' confidence in their traditional knowledge leading them to become increasingly dependent on outsider expertise and knowledge.

Another study in Ethiopia found that by devaluing one



part of local knowledge results in many farmers discrediting local knowledge broadly (Hoben, 1995). In this study, farmers discredited local knowledge because they were responsible for environmental degradation. As a consequence, all other facets of local knowledge of crop production such as using manure, crops rotations using leguminous crops and methods of water harvesting were all discredited (Hoben, 1995). Briggs (2005) reports a powerful quote from a farmer in Tanzania who asked, 'If indigenous knowledge is so good, why is my farm so poor?' With a long history of devaluing local knowledge, and improvements in livelihoods in many low- and middle-income countries still a way off, a tension between western and local knowledge exists even in the minds of local knowledge creators.

A study in Vanuatu (Radcliffe et al., 2021) found that even when farmers respect local knowledge, there were clear signs emerging that these knowledges were being abandoned as farmers move away from growing traditional crops in favour of western cash crops such as cabbage, lettuce and kava. Furthermore, although the rapid expansion of ICT extension services may help to serve farmers with more accurate and timely information, studies have shown that as people use ICTs to access external knowledge, they tend to ignore their own knowledge modes and cultures (Lwoga et al., 2011). Briggs (2005) summarises the issues with local knowledge succinctly and contends that a fundamental question needs to be posed when including local knowledge which asks which knowledge counts, believing that simply the existence of local knowledge "does not mean that it is necessarily correct or unproblematic at the local level".

### ***Ongoing tension between Western knowledge and local knowledge creating an 'us vs them' dichotomy***

Another issue is the binary tensions between Western science and local knowledge systems. Authors argue that development projects have relied almost exclusively on a single knowledge system, a modern western one (Briggs, 2005). This dominance of a single knowledge system has played a role in the marginalisation and devaluing of non-Western knowledge systems, with some authors proposing that even using the term 'indigenous' or 'local' creates an artificial dichotomy of 'us and them' between the two knowledge systems (Ellen and Harris, 2000). Although local knowledge is often contrasted to Western or scientific knowledge, authors argue that both knowledges are in fact similar and are largely derived from observation and shaped by people and culture. This 'us and them' dichotomy also results in an often-romanticised view of local knowledge which has reached the status of a "new populist rhetoric" amongst some development practitioners and academics (Briggs, 2005)

which removes this knowledge from its relevant context.

### ***A superficial understanding of local knowledge detached from context***

Although the inclusion of local knowledge into extension and development projects is a long-identified need, authors argue that the interest in local knowledge and is often at the expense of a thorough understanding of the knowledge and the context in which it was developed (Radcliffe et al., 2021). The incorporation of local knowledge has focussed on the practical and empirical knowledge of the local environment and natural resources, and how that can be reinterpreted through extension and reapplied to communities (Briggs, 2005).

This superficial pursuit often detaches this dynamic knowledge from its contextual basis and as Briggs (2005) further identifies, the "economic and socio-cultural contexts in which such knowledge is used seem to be of lesser interest". The decoupling of local knowledge from its socio-cultural context also allows these decontextualised practices to exist as "science-like" facts which encourage focussing on those parts of local knowledge when seem to mirror western science and technology, which further manipulates this knowledge and lessens its applicability (Radcliffe et al., 2021). Incorporating local knowledge has focussed on its use in the designing and disseminating solutions, at the expense of actually understanding the knowledge and its context (Šūmane et al., 2018). As Radcliffe et al. (2021) identified, much time has been spent on uncovering the contents of local knowledge systems without much consideration of their socio-cultural and economic contexts.

The decoupling and decontextualisation of local knowledge further diminish the role of gender in the diffusion of local knowledge. An example from an extension project in Nigeria found that there the dominant pathway of knowledge transfer occurs between men and women, but the author also found there was some evidence of knowledge transfer occurring amongst women, perhaps creating a knowledge that was owned solely or largely by women (Penny, 2001).

### **Conclusion**

This research sought to explore the nature of local knowledge and how these place based practices can be included in agricultural extension. The research found that literature conceptualises local knowledge, also referred to as indigenous knowledge or rural people's knowledge, as knowledge rooted in place, connected to people, and shaped by both individual and collective beliefs. Literature readily identified the deeply embedded,

cultural nature of local knowledge, and most authors contend that this knowledge can only be fully seen and understood by further observing the economic, political and socio-cultural contexts in which they are developed. Authors further contend that this is dynamic knowledge, constantly shifting with changes in the natural environment and the values of its creators and society. It is knowledge that is diffused orally, and its development is driven by observation and the curiosity of local people. Although often defined by agricultural practices, more thorough definitions see this knowledge as much more than practices and include the capabilities of local people, the natural environment and the experimental nature of local knowledge.

Agricultural extension continues to employ large numbers of people throughout the world and as such, it remains a vital part of closing capacity gaps within development projects. The decision to use local knowledge has been largely driven by a well-established need throughout the selected literature to improve the relevance of extension by making it farmer-centric and connected to the context in which the technology or idea will be applied. When using local knowledge in projects, authors have aligned broadly with two views of the rationale behind its use. A holistic view believes the inclusion of local knowledge is vital because this knowledge influences the thinking of farmers both directly and indirectly and that local practices cannot be blindly separated from their context and applied elsewhere. Holistic views argue for a broader understanding of community and context before using local knowledge in extension. A pragmatic view contends that the role of extension is to introduce a technology that will ideally improve land management, farming practices or close a practice related capacity gap. Pragmatists believe that local knowledge plays a huge part when deciding whether or not to adopt a new technology or practice and therefore this knowledge is needed for extension to deliver its aims. The central element of these emerging perspectives is the involvement of local knowledge creators and users in the development of content and programs.

Local knowledge has been incorporated into face-to-face extension and into an expanding number of ICT based extension methods. When incorporating local knowledge into traditional face-to-face extension the focus is on identifying the knowledge or knowledge creators before documenting and promoting this knowledge to increase its value amongst farmers.

Documenting this knowledge also creates a base from which new scientific or research knowledge can be placed. These projects focus on extension staff taking a greater role to bridge the gap between research and farmers and to lead or guide the process of knowledge creation. ICT based projects rely much more on content developed by farmers through web-based or coordinated

forums. In these projects the extension staff or the ICT application act more as conduits for collecting local knowledge and connecting to farmers rather than actively directing its development.

Despite a general consensus among the literature on the ability of local knowledge to improve the outcomes of extension, there are a number of issues in its use. Throughout recent history, farmers in many countries were seen as simple, uneducated and even lower-class people. By devaluing the status of farmers, it also devalued local knowledge. These views continue to persist in many countries and have restricted the use of truly participatory approaches by extension staff. This is due in part to the nature of extension itself which has historically been a top-down transfer of technologies from extension or researchers to farmers. The history of extension continues to feed a culture of superiority among extensionists over the farmers they serve. Furthermore, the identification and use of the term local or indigenous knowledge creates an artificial tension between local knowledge and Western or scientific knowledge. This binary tension also results in a superficial or romanticised pursuit of local knowledge which often detaches the knowledge and its practices from the context in which it is rooted. As identified by Briggs (2005), the existence of local knowledge does not make it inherently correct, and that asking which knowledge is relevant to the goals of each development project should be a guiding principle within all extension projects.

The selected literature on agricultural extension has identified a clear consensus on the value of local knowledge to extension, and authors also readily identify the issues in its incorporation into extension. Although this focus and dedicated effort throughout projects to include local knowledge and to contextualise agricultural extension is a positive development, there is still a focus on production issues, while soft skills or interpersonal skills to complement production improvements are still largely missing from extension literature. Soft skills and interpersonal relationships are incredibly complex facets of human interaction and are challenging concepts to elicit from communities. The deep anthropological insights and connection to community outlined by literature as an integral facet of uncovering local knowledge is often a commitment too far for many projects which are balancing budgets, delivery and outcomes for donors. A focus on the development of methods to include local knowledge into vital soft skills to complement extension needs further research and experimentation within projects.

Another ongoing issue is the broad range of perspectives within development projects, influenced by governmental agendas and individual perspectives, which continues to influence how local knowledge is viewed and ultimately the success of its inclusion into

extension. These divergent perspectives within project teams and donors are a common issue throughout the development industry, and both the Western emancipatory views that romanticise local knowledge and the views of technocratic pragmatists searching for deliverables, continue to limit the discovery and applicability of local knowledge (Briggs, 2005). Arguably a sensitive approach that acknowledges the huge capacity of local people and their knowledge, and the power of local knowledge to inspire confidence and aid in the adoption of new practices, needs to be combined with the reality that local knowledge cannot answer all issues, which farmers readily identify themselves. However, the perspectives from recently published literature do point to a dominant view of local knowledge and local people in a romanticised and superficial way which continues to relegate this knowledge and peoples to the “(arte)factual” (Briggs, 2005).

There are some authors who propose that local knowledges are being lost as cultures are lost to modernity (Mugwisi, 2016; Radcliffe et al., 2021). Arguably though, the loss of local knowledge through elders as global and socio-economic change reaches low- and middle-income countries is less concerning given the inherent dynamic and adaptable nature of local knowledge. The selected literature indicates an ongoing commitment to identifying local knowledge within projects, largely because this knowledge base plays an important role when introducing new knowledge, particularly scientific knowledge. Therefore, continuing to strengthen the communication between farmers and extension is crucial to continue the identification of local knowledge, and also crucial to access a breadth and depth of local knowledge required for a meaningful contribution to extension (Radcliffe et al., 2021). Connected to the ongoing discovery of local knowledge, is the continued focus within projects to increase the value of this knowledge, particularly amongst extension agencies and national governments. Efforts to promote these local knowledge and practices through the dominant communication mediums also remain vitally important.

This research has explored the nature of local knowledge and its use within agricultural extension. A limitation of these findings and of systematic meta-syntheses more broadly, is the subjectivity of the exclusion and inclusion criteria applied to potential literature and the subjective interpretation of the selected literature. In acknowledging this subjectivity, this research determined that smallholders throughout low- and middle-income countries readily recognise that no single knowledge system is sufficient to overcome the capacity gaps they face in achieving the livelihood they desire. However local knowledge provides confidence to farmers and it places new knowledge within a context and framework farmers can understand when approaching

each new capacity challenge. Successful integration of local knowledge requires a flexible and realistic view of local knowledge which understands that some combination of local and research knowledge developed in a participatory process will likely result in extension delivering greater outcomes to farmers.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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