The applicability of the major social science paradigms to the study of the agricultural knowledge and information systems of small–scale farmers

Hilda M. Munyua and Christine Stilwell

Hilda M. Munyua
Information Studies Programme
University of KwaZulu-Natal, Pietermaritzburg
munyua@iconnect.co.ke

Christine Stilwell
Information Studies Programme
University of KwaZulu-Natal, Pietermaritzburg
Stilwell@ukzn.ac.za

Abstract

The social sciences offer a rich array of paradigms within which to locate agricultural knowledge and information systems (AKIS) research. This article provides an overview of the major paradigms in the social sciences, identifying those which offer a lens through which the AKISs of small-scale farmers can be viewed. It is based on a review and analysis of the paradigms, perspectives and approaches that are appropriate for studying different facets of an AKIS. These systems are complex by nature but Social constructivism, Phenomenology, Interpretive and Participatory paradigms make possible a pluralistic and compatibilist approach that provides the necessary logic and harmony for such a study. A systems approach, mixed methods methodology and multiple data collection methods can be used to improve understanding of AKISs of this type. A pragmatic paradigmatic stance is recommended to guide the design for a comprehensive study of the AKISs of small-scale farmers in developing countries.

Introduction

The social sciences offer a rich array of paradigms within which to locate agricultural knowledge and information systems (AKIS) research. This article describes the outcomes of efforts to develop an approach which would provide a lens through which the AKISs of small-scale farmers could be viewed. In doing so we examine paradigmatic possibilities in terms of their suitability for an AKIS study.

The construct paradigm is attributed to Thomas Kuhn. It describes a set of beliefs, rules and standards, procedures and practices that guide the world view of a group of researchers (Kuhn 1970: 11). Research paradigms provide a way of looking at phenomena (Wagenaar and Babbie 2001: 18-19). They represent a "scientific approach to some phenomena that provides model problems and solutions to a community of authors" (Rogers 1983: 43). To Dooley, Johnson and Bush (1995: 2), a paradigm is a set of assumptions from which subsequent theory is developed. The beliefs, rules or assumptions "serve as touchstones in guiding ... activities" (Guba and Lincoln 1989: 80). They provide "frames of reference" in the search for meaning about the nature of social reality (Wagenaar and Babbie 2001: 18). The frame of reference or framework determines the research approach which is linked to the researcher's worldview, or his/her way of "being in the world" (Heron and Reason 1997).

The term paradigm is derived from the history of science, where it was used to describe "a cluster of beliefs and dictates for scientists" in a particular discipline that influenced what should be done, and "how results should be interpreted" (Bryman 2008: 14). Paradigms legitimise the manner in which the research is conducted, and guide the researcher concerning what knowledge exists and how it can be known and comprehended. In other words, paradigms are like lenses that help to view phenomena (Polit and Beck 2004: 17).

To unpack the term further, the different ways in which knowledge can be produced are distinguished by their different assumptions, worldviews or paradigms (Terre-Blanche and Durrheim 2006: 2; Creswell 2007: 19). Paradigms define the nature of inquiry of a researcher in a tri-dimensional manner, focusing on ontology, epistemology and methodology (Durrheim 2006: 6). Ontology refers to the assumptions made about the nature of reality to be studied, or the knowable and what can be known about reality (Snape and Spencer 2003). Byrne (2001) describes epistemology as the philosophy of knowledge and assumes a separation exists between knowing and being.

Epistemology specifies the nature of knowledge or the nature of the relationship between the researcher and how knowledge is acquired. It presents a general set of assumptions about the best ways of studying the nature of the world. Lastly, methodology refers to how researchers go about studying in a practical manner what they believe can be known (Durrheim 2006: 6). For Wilson (nd) "methodology is the philosophical basis for method."

In other words, paradigms are based on the assumptions of the philosophy to which they lend themselves (Easterby-Smith, Thorpe and Lowe 2002: 33). They shed light on the related philosophical issues and improve the quality of research by guiding the choice of research design (Cohen, Manion and Morrison 2007: 78). Paradigms influence the methodology and methods adopted (Easterby-Smith, Thorpe and Lowe 2002: 33); are important for understanding and contributing to the logic and harmony of qualitative, quantitative and mixed methods studies (Stilwell 2006: 3); help to filter researchers' ways of viewing the world and guide how knowledge is conceived and analysed in order to uncover essential features of the research (Terre-Blanche and Durrheim 2006: 2).

Whether it is made explicit or not, all research is likely to be underpinned by a paradigm. In library and information studies this is not always made explicit. Very few articles addressing paradigms are found in the local literature in the field. Guba and Lincoln (1994: 116) stress that all research should be informed and guided by a paradigm and Wyssusek, Schwartz and Krallmann (2002: 3) call for aligning research to appropriate paradigms of inquiry. Durrheim (2006: 40) concurs that aligning research with particular paradigm(s) helps to ensure clarity in viewing phenomena. The study of agricultural knowledge and information systems (AKISs) should also be carried out using an appropriate paradigm.

What is an AKIS?

Röling (1989: 1-2) defines an AKIS as

> a set of agricultural institutions, organisations, persons and their linkages and interactions, engaged in the generation, transformation, transmission, storage, retrieval, regulation, consolidation, dissemination, diffusion and utilisation of knowledge and information, with the purpose of working synergistically to support opinion formation, decision making, problem solving and/or innovation in a given sector, branch, discipline or other domain.

For the Food and Agriculture Organisation of the United Nations (FAO) and World Bank (2000), an AKIS links rural people and institutions to promote

mutual learning and generate, share and utilise agriculture-related technology, knowledge and information. It helps to manage knowledge and information (Bagnall-Oakeley *et al.* 2004). It delivers knowledge to clientele and describes a two-way flow of information and knowledge among different sub-systems such as research dissemination and users (Bagnall-Oakeley and Ocilage 2002).

An AKIS improves linkages between actors and learning (Moussa 2006; Opondo, German, Stroud and Engrok 2006), and facilitates innovation (Engel and Salomon 1997; Hoffmann *et al.* 2007: 355). It contributes to the improvement of extension work and advisory services (Carrasco 2001; Garforth 2001) and provides opportunities for collaboration, cost sharing in research, dissemination and networking (Rees *et al.* 2000: 14). An AKIS helps address complex issues and problems in the agricultural sector (Röling and Wagemakers 1998: 16), and is considered essential to the success and development of the community (World Bank 2007). Knowledge systems research falls into the Soft systems perspective, as such systems exist through interaction and learning (Röling 1992). Soft systems approaches (Checkland 1999; 2000; Wilson 2001) are considered appropriate for handling the complex situations depicted in an AKIS (Hamilton1998: 187; Röling and Wagemakers 1998: 16).

Given the complexity of studying an AKIS, which is multidisciplinary and multifaceted in nature, our goal was to develop an approach that enabled us to see the AKIS of small-scale farmers in a developing country context, in a holistic way and to make sense of its complexities. First we had to examine the relevant paradigms in social science research.

Paradigms for studying the AKIS of small–scale farmers

Positivism and Social constructionism, also referred to as Phenomenology or Interpretivism, are regarded as the main paradigms for social research (Hunt 1991; Easterby-Smith, Thorpe and Lowe 2002: 28). Critical postmodernism is another (Gephart 1999). For Byrne (2001), Constructivism, Feminism and Interpretivism are the three core qualitative paradigms for social research. Alternative paradigms include Postpositivism, Social constructivism (that is combined with Interpretivism and Naturalistic inquiry), Advocacy or the Participatory paradigm and Pragmatism (Creswell 2007: 20; Creswell and Plano Clark 2007: 22). Wikgren (2005) and Smith (2006) add Critical realism. In addition, several new research paradigms (see Table 1) based on the earlier ones have been advanced (Hoskisson, Hitt, Wan and Yiu 1999: 419).

According to Gephart (1999; 2001), the social sciences cannot be folded into the natural sciences which tend towards more Positivistic approaches. In the social sciences individuals or groups make sense of the world around them by imposing patterns and relationships on social situations and sharing their experiences via communication. For this reason Gephart (1999) supports the use of paradigms other than Positivism for social research. The choice of a paradigm needs to be guided by the research question of the study, and should provide a logical arrangement that is coherent with its research design (Durrheim 2006: 38-39).

Many authors concur that multiple paradigms can coexist for viewing the different aspects of a complex study. These provide an understanding of phenomena from different philosophical viewpoints (Dervin and Nilan 1986; Styhre 2003; Creswell and Plano Clark 2007). The following sections examine the paradigms that provided the philosophical base for the study of the AKISs of small-scale farmers in a developing country context (Munyua 2011).

Phenomenology and the Social constructivist paradigm

In this section Phenomenology, Social constructivism (and Sense-making), as well as Social constructionism are explored for their suitability for an AKIS study.

Phenomenology
Phenomenology is a philosophy that seeks to get to the truth by describing phenomena in the manner they appear to the actor, who in turn aims to understand the explanations "from within" (Moran 2000: 4). Phenomenology is an individual's perception of the meaning of an event. Alternatively it is the art of understanding the perceptions and perspectives of participants and their views of social reality in specific situations (Leedy and Ormrod 2005: 108,139), or their experiences as they tell it in context or their "empathic perspective" (Terre-Blanche, Kelly and Durrheim 2006: 275, 277). Sion (2009) calls it "the study of appearance." Knowledge is constructed from the appearances of objects, of what is perceived, and from "inborn" knowing, where the content is described in a neutral manner and the appearances are logically organised into knowledge (Sion 2009: 10, 14). Phenomenology describes the "life-world" and involves inductive analysis (Gray 2009: 28). Phenomenologists thus aim to describe, interpret and analyse inner awareness based on conscious experience or what is familiar to an individual (Smith and Thomasson 2000). The strength of this approach includes the ability to understand the meanings of people, to

focus on change processes over time and space and adjust to new issues. Further, it provides natural ways of gathering data (Easterby-Smith, Thorpe and Lowe 2002: 32). For Cohen, Manion and Morrison (2007: 25), Phenomenology preserves contextual integrity by focusing on the constructions of the individual being studied.

In the context of the study of AKISs, information is seen as a social phenomenon and hence requires social science research methods. Phenomenology explores why individuals behave in the manner they do, and exposes common patterns or understandings among the target group studied (Wilson 2002a; 2003). Consequently, Phenomenology has attracted a number of investigators, including Wilson (2002b) and Olsson (2003; 2005a) both of whom applied this approach in information behaviour research. For Wilson (2003) Phenomenology is a clear and coherent philosophy on which research findings on information behaviour can be grounded and his (1999) model of information behaviour fits within the Phenomenology paradigm (Bawden 2006: 673), and in particular within Social constructivism.

Social constructivism
Denzin and Lincoln (2003: 33) note that research that is "guided by a set of beliefs and feelings about the world and how it should be understood and studied" is interpretive, and this includes research within the Social constructivist paradigm. Social constructivism is part of the Interpretive paradigm (Jennings, 2007: 16) and is embedded in Phenomenology (Bengstson *et al.* 2009) in the sense that what is observed is constructed. There are, however, variations in the experiences, interpretations and procedures used.

Social constructivism is rooted in the early works of Lev Vygotsky (1978) and others, who emphasise the role of social interaction in the development of knowledge. Constructivists are concerned with the interplay of several types of knowledge, that is, subjective, objective and intersubjective knowledge. The latter involves knowing the minds of others (Gephart 1999). Gephart and others (Stenmark 2001; Easterby-Smith, Thorpe and Lowe 2002; Wilson 2002b) argue that the combined perspective of Phenomenology and Constructivism provides a deep understanding of experiences encountered in everyday life and how meaning is constructed.

Social constructivists seek to discover learning or to understand processes in which meanings and understandings grow out of social encounters (Cooperstein and Kocevar-Weidinger 2004). For Vosniadou (1996: 96) Social constructivism suggests people being involved in different activities and processes in collective

learning through social and cultural interaction. These people could include farmers and farmers' groups. The Constructivist approach allows for the perspectives of the group being studied to be addressed in depth and the people in the groups are able to use their own words to make their meanings known (Williamson 2006: 98). This ability is linked to Dervin's (1993; 1998; 1999) idea of verbings.

Stenmark (2001) agrees that the constructivist approach helps one to understand a community view of knowledge. Knowledge is not static but entails processes through which it is continually structured and constructed resulting from reciprocal action between an individual, what they know, their values, attitudes, emotions, power relations and the surrounding community that directly affects the individual (Lor and Britz 2010: 8). Easterby-Smith, Thorpe and Lowe (2002: 30) assert, "human action arises from the sense that people make of different situations." In the context of the AKIS of small-scale farmers, these individuals include researchers, extension workers, farmers, educationists, civil society organisations, and private and public sector organisations.

Constructivism is "a theory about knowledge and learning" (Reagan 1999: 413, 417). It is based on the ontological assumptions that there is no objective reality but rather what we perceive as reality is constructed by individuals. Multiple constructions are possible depending on an individual's social context and experience (Terre-Blanche and Durrheim 2006: 6). For example, reality is constructed and shaped through social interaction between and among the different actors, and the researcher and the researched are linked through the interactions (Hamilton 1995: 32), hence there are multiple realities. Epistemologically, knowing is constructed by each individual using his/her own standard of judgement. According to this assumption, individuals build understanding of the world by interacting with their own worlds, symbolic, social, natural, and physical (Dervin 2003: 73, 83-84). Reality is a product of people's minds and is subjective (Sheppard 2004: 44-45).

Constructivism uses an inductive approach (Cooperstein and Kocevar-Weidinger 2004: 141). Because Constructivist methods are qualitative and interpretive and pertain to meaning, and focus on language (Reagan, 1999: 421; Terre-Blanche, Kelly and Durrheim 2006: 275-279) such research designs assume reflexivity and use conversation techniques for data collection. Within this paradigm, in research, individuals construct meaning socially through interactions between the researcher and informants based on their personal experiences and subjective views, hence the research yields complex and multiple meanings (Creswell 2007: 20-21).

The Social constructivist paradigm (combined with Interpretivism and Naturalistic inquiry) supports learning processes, and helps us to understand how the social world of individuals or a community is constructed (Röling and Wagemakers 1998: 13; Schunk 2008: 236, 516).

The use of Social constructivism, including Phenomenology, in the study of AKISs for the reasons given, are seen to lead to the desired understanding of social interactions of actors and the information behaviour of small-scale farmers.

Sense-making and Social constructivism
In library and information studies research the use of social constructivism has tended to focus on sense-making that is driven by the desire to gain greater understanding of the inner knowledge and motivations of information users (Dervin 1999; Olsson 2003; 2005a; 2005b; Creswell 2007). Olsson's (2003; 2005a) work demonstrates the application of social constructivist theories such as Dervin's (1999) Sense-making theory and highlights the constructions of meaning and importance of social processes. This point is emphasised by Dervin (1999: 730), who argues that "Sense-making mandates simultaneous attention to both the inner and outer worlds of human beings", and points out that it is not possible to separate the two. Social constructivism focuses on the embodied actions of people who influence each other and are intertwined rather than the abstract actions of an individual (Larochelle, Bednarz and Garrison 1998: 43). The Sense-making approach could be applied to the behaviour of farmers and farmers' groups within their social contexts and cultures in the context of an AKIS.

For Olsson (2005c) Social constructivist approaches provide researchers with a theoretical lens through which they can gain a clearer picture of information users as social beings and experts and not as "needy" individuals who have to be "helped." He (2003; 2005a) concludes that individual participants' constructions are rooted in their existing knowledge, beliefs and understandings, and that the individual's social contexts influence the constructive process.

Social constructivism is considered appropriate for exploring the meanings and understandings of the information behaviour of farmers and learning among farmers' groups and other agricultural actors. It is holistic and addresses issues of theory and practice (Brand 1971: 7; Janssen 1970 cited in Seigfried 1976). As Terre-Blanche and Durrheim (2006: 6) emphasise above, multiple realities can exist based on the social and cultural context of individuals. The focus of

Social constructivism is thus to understand the manner in which individuals and groups construct their perceived social reality in time and place and to interpret the meaning of such constructions (Röling and Woodhill, 2001). To sum up, Social constructivism supports the notion that the construction of knowledge depends on the social (Terre-Blanche and Durrheim 2006) and cultural context (McMurray and Clendon 2011) and is closely associated with Sense-making theory.

It is noted that Social constructivism is also linked to Bandura's (1977) Social cognitive theory, the Social capital concept (Coleman 1988; Woolcock 2001) and the concept of Communities of practice (Wenger 1999) as well as Wilson's (1999) model for information behaviour and Meyer's (2000) model for information transfer used for the study of AKISs of small-scale farmers (see Munyua 2011).

A weakness of the Constructivist paradigm is the cost in terms of the time and resources required for gathering data. Another has to do with challenges in the analysis and interpretation of data, while yet another is that some critics give low credibility to studies pursuing the Constructivist approach. Furthermore, constructivist methods can be complex and subjective (Easterby-Smith, Thorpe and Lowe 2002: 32, 39-40, 42, 54). Despite these shortcomings, the Social constructivism paradigm is considered a relevant paradigm for studying multiple actors in situ, the interaction of farmers in farmers' groups and their varied views from their own perspectives, that is, for understanding of small-scale farmers and their information behaviour and other actors within an AKIS.

Social constructionism
Aronsson (1997: 52-53) views constructionism as a subset of constructivism but argues that "constructivism does not necessarily involve constructionism." The emphasis with Social constructionism is on appreciating the person's experience of the world and the different constructions and meanings of the surrounding situation as opposed to objective and external factors. Social constructionism focuses on the artefacts created through the interactions of a group while social constructivism focuses on an individual's learning that takes place because of their interactions in the group (Social constructivism and Social constructionism 2012). For Aronsson (1997), the key terms in constructivism are action, language and operations, while those in constructionism are collaborative action, participation, co-construction and embodied action. The focus is on what people, either individually or collectively, are feeling and thinking and how they communicate with each other (Easterby-Smith, Thorpe and Lowe 2002, p. 30).

The researcher experiences the situation with and through the action of others, making the experience inter-subjective (Patton 2002: 104).

Holland (2006: 92) supports a distinction between constructivism and constructionism arguing that social constructionism in the context of information studies refers to dialogue and discourses with an emphasis on the role of language in constructing. For Spender (2006: 17) constructivism refers to internal mental processes and conversions of knowledge. Constructivism is a philosophical explanation that shows how learners create their own learning through discovery and verification. Social constructionist approaches, on the other hand, attempt to examine the powers with which social images, signs, and meanings underlying actual or imagined experiences, create representations of people (Gephart 1999). Social constructionist methods are thus concerned with "power" and "meaning", how "understandings or experiences of individuals or groups" are derived, and are qualitative and interpretive. Constructionist methods, which some people refer to as Critical hermeneutics assume that the thoughts, feelings and experiences of individuals are "products of meaning that exist at a social rather than an individual level" (Terre-Blanche, Kelly and Durrheim 2006: 277-279), and are useful in interpreting and distilling the different constructions to yield "consensus construction" (Hamilton 1995: 14).

Spender (2006: 17) emphasises that constructionism "weights the processes external to individuals", for example, language. In other words, with constructionism, emphasis is placed on the learners' skills and the contexts in which they construct knowledge (Schunk 2008: 236, 516). According to Terre-Blanche, Kelly and Durrheim (2006: 277-279, 283), language is considered crucial in Social constructionism. Language does not just refer to objects but is the real object of study because it allows communication, which is the carrier of meaning. Social constructionism assumes that human life is founded on language.

Talja, Touminen and Savolainen (2005: 80) share the view of Gergen (1999: 59-60), who sees constructionism as the way in which the mind of an individual constructs reality in a systematic relationship with the environment. Emphasis is on conversations and the way the power of social structures influence the understandings of an individual and the world, and on the role of language in constructing reality (Holland 2006: 92). Dialogue and discourses are thus considered to be essential elements in describing people's experiences in seeking, accessing, creating, using and sharing information. The general consensus of the community determines meaning, the idea that is intended and

what is of use (Guba and Lincoln 2008: 264). For Röling and Woodhill (2001: 9) dialogue calls for a constructivist paradigm which is holistic.

Röling and Wagemakers (1998: 13) used the term constructionism to describe an epistemology that supports learning processes and guides thinking around whole systems. Social constructionism is one of a group of approaches that has been referred to as "interpretive methods" (Habermas 1970, cited in Easterby-Smith, Thorpe and Lowe 2002: 29). Terre Blanche, Kelly and Durrheim (2006: 277-279, 283) point out that the Interpretive and Constructionist research paradigms tend to transform into each other and that there are no clear cut boundaries between the two. It would seem to be more a matter of emphases.

Social constructionists seek to understand the social construction in the world of individuals (Gephart 1999; Creswell 2007), and investigate how objective features in society, such as organisations or farmers' groups in the context of an AKIS, emerge through processes such as group discussions and training, as well as how they are constituted by subjective individual meanings. As pointed out by Sey (2006: 529), the constructionist approach belongs to the postmodernist school of thought, and for Denzin and Lincoln (2008: 29) postmodernist scholars support the view that "there is no clear window into the inner life of an individual" and that "no single method can grasp all the subtle variations of on-going human experience."

The Interpretive paradigm

The Interpretive paradigm aims to understand interpretations of the world by placing people in their social contexts (Hunt 1991: 35; Gephart 1999). It further seeks to understand the subjective world of individual experience from within while reflecting on the observers' interpretations (Cohen, Manion and Morrison 2007). Snape and Spencer (2003: 7) define Interpretivism as the philosophy that focuses on interpretation and observation. The goal of the Interpretive paradigm is to interpret the actions of individuals (Diesing 1991: 124; Cohen, Manion and Morrison 2007: 21), expressions (Diesing 1991: 124), shared experiences and understanding of actions that are meaningful to people (Cohen, Manion and Morrison 2007: 21), and that which is expressed or signified by facts (Terre-Blanche and Durrheim 2006: 9). As such, it would appear that reality is mental and comprises peoples' perceptions (Hunt 1991: 35). Gephart (1999) considers the key focus of the Interpretive paradigm to be the search for patterns of meanings. Social constructivism and Phenomenology (Denzin and Lincoln 2003: 5) are interpretive and are interlinked. Social constructivism informs the

Interpretive and Phenomenology paradigms (Merriam 2009: 9). "Interpretivist constructivists" seek to show variation in meanings of individuals and differences in sense-making under objective realities (Gephart 1999).

Interpretive methods have been criticised for not using objective scientific procedures but focusing on peoples' perceptions and ignoring the power of external structural forces in shaping events and behaviour. Cohen, Manion and Morrison (2007) consider it risky to interpret the perceptions of an individual in a world "outside the participants' theatre of activity." However, they (Cohen, Manion and Morrison 2007: 21-22, 25-26) note that with the Interpretive paradigm, theory is generated through the collection of data that is grounded, and theory emerges from specific situations.

Methods for data collection using the Interpretive paradigm include ethnography, participant observation, interviews, conversational analysis and case studies (Gephart 1999). In the context of the study of AKIS, the Interpretive paradigm has the potential to explain what is expressed by actors such as small-scale farmers, researchers, extensionists, educationists and others in their own language, and through their actions and viewpoints.

The Naturalistic paradigm

Supporters of this paradigm place emphasis on understanding the holistic as well as personalised aspects of human experience in natural settings where people are viewed in the totality of the environment and its elements (Lincoln and Guba 1985: 37-40; Polit and Beck 2004: 17). This paradigm is founded on a Relativist ontology (Lincoln and Denzin 2003: 226). It assumes that there are several interpretations of reality and that the aim of naturalists is to comprehend how individuals construct reality in their own social environments (Lincoln and Guba 1985: 37; Loiselle, Profetto-McGrath, Polit and Beck 2010: 12). With this paradigm, all knowledge stems from interactions between people and nature (Giere 2000: 308), and knowledge is heightened when researchers and participants work closely together (Loiselle, Profetto-McGrath, Polit and Beck 2010: 12).

Naturalistic inquiry thus uses qualitative methodology in order to interact with the people being studied and learn from them (Lincoln and Guba, 1985). Researchers assume that the experiences that determine how things appear exist within a context (Loiselle, Profetto-McGrath, Polit and Beck 2010: 11-12). The Naturalistic paradigm moves away from the questions asked in a Positivistic approach and allows the use of methodologies, methods and techniques that

bring out the richness of group research (Frey 1994: 552-557), such as that on the farmers' groups in an AKIS. For Krauss (2005: 767) and Loiselle, Profetto-McGrath, Polit and Beck (2010: 12), the Naturalistic paradigm is synonymous with the Constructivist paradigm.

The Naturalistic paradigm has been used to guide inquiries on information use (Dervin and Nilan 1986; Kirk 1997), and for studying various groups, decision making and group communication (Frey, Gouran and Poole 1999: 60), as well as to understand communities, culture and community change (McMurray and Clendon 2011: 377). Criticisms levelled against the Naturalistic paradigm include that it is insufficiently rigorous (Guba and Lincoln 2000: 380), that its relativity implies that it is not possible to assign a methodology for coming to know what needs to be uncovered, and that it calls for "intense face-to-face contact", making it difficult to maintain confidentiality and anonymity (Lincoln and Denzin 2003: 228-229).

The study of AKISs is collaborative and participatory and involves the researcher and the participating actors, hence it calls for practical action. We thus consider the Naturalistic paradigm which underpins action research to have much to offer a study of the AKISs of small-scale farmers and for capturing the processes and complexities of farmers' groups in their own natural environment.

The Relativist paradigm and Critical realism

Critical researchers or relativists assume that social reality is historically constituted (Myers 1997). This reality is produced and reproduced by individuals and focuses on oppositions, conflicts and contradictions in society. The goal of this paradigm is to uncover covered interests, expose contradictions and facilitate more informed awareness (Gephart 1999).

Relativist paradigm
The relativist school of thought argues that different observers may have different points of view emanating from different forms of mental constructions. The starting point of the relativism epistemology is to express an opinion, which may be based on supposition or incomplete evidence. The Relativist paradigm supports the use of multiple sources of data and perspectives and cross sectional designs. It enables extrapolation of results beyond the study area (Easterby-Smith, Thorpe and Lowe 2002: 42, 45). Terre-Blanche, Kelly and Durrheim (2006: 283) concur with Easterby-Smith, Thorpe and Lowe to argue that all descriptions of reality are simply acts of informing and construction.

Furthermore, relativists aim to understand and interpret the world based on its actors (Cohen, Manion and Morrison 2007: 26).

Weaknesses of the relativist approach include some of the data collection methods used, particularly survey techniques which may require large costly samples. Further, these methods may not explain why the patterns being observed are there. In addition, multiple sources of data may be difficult to reconcile, especially where there are inconsistent and non-compatible sources (Easterby-Smith, Thorpe and Lowe 2002: 42, 45).

 For the AKIS study the advantage of this paradigm lies in the recognition that different observers may have different points of view emanating from different forms of mental constructions, as well as the use of multiple sources of data and perspectives and cross sectional designs. Klein (2004: 123, 125) argues that adoption of the relativist paradigm could advance knowledge that overcomes the negative effects of the fragmentation of actors in other types of research.

Critical realism
Some authors regard critical realism as a variant of the relativist paradigm, which views social conditions such as power and political orientation as having consequences and considers concepts to be human constructions (Easterby-Smith, Thorpe and Lowe 2002: 32, 33). Backing this recognition, Dobson (2002) states that there is consensus among critical realists that "knowledge of reality" cannot be understood without the involvement of social actors. Klein (2004: 123, 125) points out that although critical realism has been used in the study of information systems to address the integrated nature of information, researchers are divided over the meanings of concepts such as knowledge and information and about the degree of rigour involved in the various methodologies.

Critical realists emphasise explanation over prediction, and see "knowledge [as being] communicatively constructed." Critical realism assumes that reality comprises different levels, which may be biological, social or cultural, and one level cannot be reduced to another level (Wikgren 2005: 12, 14). This assumption has implications for social phenomena such as information needs, seeking and use, which are complex and require multiple approaches. For Wilson (1986) the nature of individuals' everyday life, in relation to work and social interactions, is important in determining their information needs or those of their community and in guiding the development of information systems. This paradigm provides a useful framework for studying information systems (Dobson 2002; Wikgren 2005). We consider it suited to the study of the AKISs

of small-scale farmers because it is based on an assumption that reality comprises different levels and one level cannot be reduced to another level. This approach suited the study of social phenomena such as information needs, seeking and use, which are complex and require multiple approaches.

Smith (2006) sees critical realism as offering an improvement on the paradigms of Positivism and Interpretivism, arguing that information systems research conducted within Positivism and Interpretivism suffer from theory-practice inconsistencies. In addition, Smith (2006) points out that the critical realist paradigm addresses the divide between Positivism and Interpretivism and allows for re-interpretation of phenomena and greater explanatory ability. This ability makes the Critical realism paradigm suitable for investigating multidisciplinary studies with many levels such as user studies (information creation, seeking, use and processing). Critical realists support the idea of using abstraction, relying on interpretive forms of study and explanation (Wikgren 2005: 11, 12-14). In agreement with Dobson's (2002) view, Wikgren suggests that critical realism is applicable in information behaviour studies. But although critical realism permits multiple ontologies such as the natural and the social worlds, it has been criticised for failing to reflect the limits and the relativity of the basis on which it is grounded (Klein 2004: 130, 140). Wikgren (2005: 19) explains that an information seeker often takes a position in a given cultural situation and an already existing structure or system of sources of information and search possibilities.

The objective of critical realists is to give an account of social behaviour through addressing inequality among individuals and groups (especially the disempowered) in an egalitarian society, resulting in some form of change or transformation of society (Cohen, Manion and Morrison 2007: 26). Critical social scientists base their arguments on critical theory and believe that research cannot be separated from issues of power (UKZN, School of Education, Training and Development 2004: 45). Theories in the critical realist paradigm take literary and narrative forms. Applicable research methods and types of analysis include field research, historic analysis and dialectical analysis. However, some critical researchers do use conventional positivist methods such as survey research (Gephart 1999). In summary, we consider the Relativist / Critical paradigm useful for the study of AKISs for the following reasons. It is suited to investigating multidisciplinary studies with many levels such as user studies. It also supports the idea of using abstraction, relying on interpretive forms of study and explanation, is applicable in information behaviour studies and supports looking at social behaviour, taking power relations into account.

The Participatory paradigm

This paradigm views people and communities as part of their world, as "part of the whole" and envisages them collaborating with others in conducting research through co-operative inquiry and experiential encounters. It does not impose conceptual labels on the minds of those participating in the inquiry hence they can shape their experiences based on what exists in reality.   The Participatory paradigm focuses on research that is situated, reflexive and explicit (Heron and Reason 1997; Reason and Bradbury 2001). According to Creswell (2007: 21), the participatory world view provides a "voice" for marginalised individuals and groups in an agenda for change in improving the lives of the participating target group. The critical focus of the participatory world view is therefore to engage with marginalised individuals for the better (Creswell and Plano Clark 2007: 23). Heron and Reason (1997) suggest that it is difficult to give an exhaustive account of reality using conceptual language and the Constructivist and Participatory paradigms. Critics have also argued that data from the Participatory paradigm approaches are not reliable (Mosse 1994), and that such methods shy away from standardisation and quantification (Maxwell 1999).

However, the Participatory research paradigm provides an approach for collaboration between the researcher and the informants. In this respect, the paradigm, which is associated with the Soft systems approach and action research, is considered appropriate for the study of the AKIS of small-scale farmers. It integrates theory and practice and provides a holistic participatory action oriented approach to understanding and AKIS.

The Pluralistic / pragmatic paradigm

Kuhn (1970: 79,110) points out that there is no single research paradigm that completely "resolves all its problems." Advocates of bringing several alternative philosophical views to bear suggest the use of pluralistic paradigms and methodologies. They emphasise that research studies can use aspects of more than one paradigm in a way that is consistent and coherent with the research question to address the complexities of social science research (Wilson 1981; 1999; Dervin and Nilan 1986; Johnson and Christensen 2008: 442). Stressing the use of multiple paradigms, Greene and Caracelli (2003: 95,104) state, "We reject both the continued search for the one best paradigm and the assumed incommensurability of different paradigms as relics of a past era." They point out that mixing paradigms allows for the collection of data using multiple methods.

In their study of mixed methods, Creswell, Plano Clark, Gutman and Hanson (2003: 231) and Creswell and Plano Clark (2007: 26) argue that there is no single paradigm that can guide mixed methods research. Denzin and Lincoln (2005: 189) recommend "freedom from the confines of a single regime of truth" and concur that there is no single conventional paradigm or "truth" because "all truths are partial and incomplete." For McNiff and Whitehead (2006: 39) one paradigm may borrow from another, and at times it is not easy to tell where one starts and where the other ends. Adding to this debate, Durrheim (2006: 40) states that "all paradigms rest on untestable (metaphysical) assumptions, none can be incontrovertibly right" and researchers need to ensure their results and conclusions are rooted in paradigms that use logical research designs. Creswell (2003: 11) advocates a pragmatic approach, namely linking the choice of paradigm to the purpose and nature of a study. The pluralistic paradigm that Creswell and Plano Clark (2007: 23) refer to as the Pragmatic paradigm leans towards "what works", and advocates the application of more than one paradigm to a single study (Teddlie and Tashakkori 2009: 99).

Terre-Blanche and Durrheim (2006: 7) advocate an "intersubjective or interactional epistemological stance" towards the truth about reality and the use of methods such as interviewing and participant observation that support a subjective relationship between the researcher and those being studied. Mixed methods research fits the Pragmatic paradigm, and is ontologically based on the discovery of patterns, testing of theories and discovering and revealing the best set of explanations for understanding results (Johnson and Onwuegbuzie 2004: 17). However, Easterby-Smith, Thorpe and Lowe (2002: 41) observe that advocates of pluralistic paradigms offer no advice regarding what to do when different sets of data contradict one another. Nevertheless, the study of AKISs could adopt a dialectic stance, which assumes multiple paradigms that offer a greater understanding of the phenomena being studied (Teddlie and Tashakkori 2003: 22). Such a stance would enable the addressing of the various research questions with a view to providing understanding of the "worldviews" of the different facets of the AKISs from different philosophical viewpoints (Rocco, Bliss, Gallagher and Pérezz-Praado 2003: 26).

The dialectic stance sees each of the multiple paradigms as contributing to greater understanding of phenomena and serves as the foundation for combining multiple methods (Teddlie and Tashakkori 2003: 22). Leeuwis and Pyburn (2002: 178) note that "All kinds of paradigms may be relevant starting points to contribute to different parts of solutions." The study of AKISs could thus combine inductive and deductive approaches as advocated by Cooper and

Schindler (2003: 38), and inductive research may be carried out through observation and interviews. The research design for the study of the AKISs of small-scale farmers could be largely guided by the Social constructivist paradigm (combined with Interpretivism and Naturalistic inquiry), as well as the Participatory and the Relativist paradigms. The Interpretive paradigm also allows for the use of cross-sectional design with multiple sources of data (including questionnaires and survey techniques), and the inclusion of the perspectives of various actors in a holistic manner.

Wilson (2006: 667) sees the study of information as multi-disciplinary and calls for the use of social research methods that focus on behavioural and organisational 'contexts' of information seeking from the perspective of the paradigm of social science. The Social constructivist approach supports the learning process (Röling and Jiggins 1998; Röling and Wagemakers 1998) and would guide the researcher in understanding how the social world of small-scale farmers is constructed.

Johnson and Onwuegbuzie (2004: 16-17) favour a compatibilist approach to research. They viewed pragmatism or pluralism as suitable for mixed methods research. They advocated a mix of research approaches to exploit the "best fit" in responding to research questions. They and other pluralists (Creswell and Plano Clark 2007: 27) conclude that the best philosophical position for a mixed methods study is the Pragmatism paradigm. The study of AKISs is multifaceted and also relies heavily on the Rapid Appraisal of Agricultural Knowledge Systems (RAAKS), an Action research method, focus group discussions, interviews and observation. It needs to be guided by a mix of paradigms. To the foregoing we added the Cynefin framework (Snowden 2000; 2002), which is rooted in Complexity theory (Benbya and McKelvey 2006). It is associated with the Critical paradigm (French, 2009: 28). The Cynefin framework is appropriate for addressing complex systems and problem solving. It is useful for the study of decision making among small-scale farmers and farmers' groups.

Summing up

This article set out to address a gap in the local literature in library and information studies which has paid scant attention to the issue of selecting a research paradigm. It provides an overview of the major paradigms in the social sciences, identifying those which offer a lens through which the agricultural knowledge and information systems (AKISs) of small-scale farmers can be viewed. To sum up, Table 1 presents the major paradigms in the social sciences

and the paradigms recommended for the study of the AKISs of small-scale farmers in developing countries.

Table 1: Paradigms – their ontology, epistemology and methodology. Compiled from Guba and Lincoln (1994: 105-117), Terre-Blanche and Durrheim (2006: 6) and Creswell and Plano Clark (2007: 24-25)

	Ontology	**Epistemology**	**Methodology**
Positivist	-Stable external reality -Law-like	-Objective -Detached observer	-Experimental -Quantitative -Hypothesis testing
Postpositivist	-Critical realism -Singular reality	-Distance & impartiality	-Deductive -Qualitative & quantitative
Constructivist	-Socially constructed reality -Discourse -Power -Multiple realities	-Closeness to participants -Suspicious -Political -Observer constructing versions	-Inductive -Deconstruction -Textual analysis -Discourse analysis
Interpretivist	-Internal reality or subjective reality	-Empathetic -Observer subjectivity	-Qualitative -Interviewing -Observation -Interactional -Interpretation
Naturalistic enquiry	-Multiple, divergent & holistic reality -Knower & known interactive & inseparable	-Objective	-Qualitative -Interviewing -Observation
Relativist	-Reality constructed intersubjectively -Meanings & understanding developed socially & experientially	-Transactional -Objectivist	-Qualitative -Naturalistic -Interviewing -Observation & analysis
Critical realism	-Multiple ontologies - Reality comprises different levels -Reality constructed historically & connected to power	-Interpretive forms of study & explanation -Knowledge mediated reflectively through the perspective of the researcher	-Survey research -Interviewing -Observation -Field research -Historic analysis & dialectical analysis
Participatory	-Political reality -Negotiation with participants	-Collaboration of researcher & researched -Inside knowledge valued	-Participatory -Tends toward social, cultural or political change -Individual empowerment
Pragmatist / pluralistic	-Singular & multiple realities	-Practicality -Interested in what works	-Qualitative & quantitative

Conclusion

The social sciences offer a rich array of paradigms within which to locate agricultural knowledge and information systems research. Although there may be shortcomings in mixing paradigms, Social constructivism combined with Interpretivism and Naturalistic inquiry, along with Relativist and Participatory paradigms are relevant for the study of the AKISs of small-scale farmers. The pragmatic paradigmatic approach provides a progressive lens for looking at, and making sense of phenomena in a complex, multidisciplinary and multifaceted study comprising multiple actors, different knowledge systems, information behaviour and information and knowledge management practices. The use of a pluralistic paradigm helps to address research questions using the most appropriate methodology and methods.

References

Aronsson, K. 1997. Age in social interaction: on constructivist epistemologies and the social psychology of language. *International Journal of Applied Linguistics* 7(1): 49-56.

Bagnall-Oakeley, H. and Ocilaje, M. 2002. Development of procedures for the assessment and management by farmers of their agricultural information networks and needs at the sub-county level in Uganda, AKIS study report, Client Oriented Agricultural Research and Dissemination Project. Available at: http://www.naro.go.ug/Information/COARD%20Project%20Documentation/Knowledge%20Systems/AKIS%20study.pdf Accessed 12 June 2007.

Bagnall-Oakeley, H., Ocilaje, M., Oumo, F., Nangoti, N., Oruko, L. and Rees, D. 2004. Mapping and understanding farmers' indigenous agricultural knowledge and information systems and the implications for contracted research and extension. *Uganda Journal of Agricultural Sciences* 9: 119-125.

Bandura, A. 1977. *Social learning theory*. Englewood Cliffs: Prentice Hall.

Bawden, D. 2006. Users, user studies and human information behaviour: a three-decade perspective on Tom Wilson's 'On user studies and information needs'. *Journal of Documentation* 62(6): 671-679.

Benbya, H. and McKelvey, B. 2006. Toward a complexity theory of information systems development. *Information Technology and People* 19(1): 12-34.

Bengstson, V.L., Gans, D., Putney, N.M. and Silverstein, M. 2009.Theories about age and aging. In Bengstson, V.L., Gans, D., Putney, N.M. and Silverstein, M. (eds). *Handbook of theories of aging* 2nd ed. New York: Springer. pp. 3-23.

Brand, G. 1971. *Die lebenswelt: eine philosophie des konkreten apriori.* Berlin: de Gruyter.

Bryman, A. 2004. *Social research methods.* 2nd ed. Oxford: Oxford University Press.

Bryman, A. 2008. The end of the paradigm wars. In Alasuutari, P., Bickman, L. and Brannen, J. (eds). *The SAGE handbook of social research methods.* Los Angeles: Sage. pp. 13-25.

Byrne, M.M. 2001. Linking philosophy, methodology and methods in qualitative research. *AORN Journal* 73(1): 207-209.

Carrasco, E.A. 2001. The role of extension in the Cuban agricultural knowledge and information system: the case of Havana City Province, PhD. Iowa: Iowa State University.

Checkland, P. 1999. *Soft systems methodology: a 30-year retrospective.* Chichester: John Wiley.

Checkland, P. 2000. Soft systems methodology: a 30-year retrospective. *Systems Research and Behavioural Science* 17: s11-s58.

Cohen, L., Manion, L. and Morrison, K. 2007. *Research methods in education.* 6th ed. London: Routledge Falmer.

Coleman, J. 1988. Social capital in the creation of human capital. *American Journal of Sociology* 94 supplement: s95-s120.

Cooper, D.R. and Schindler, P.S. 2003. *Business research methods.* 8th ed. New York: McGraw-Hill.

Cooperstein, S.E. and Kocevar-Weidinger, E. 2004. Beyond active learning: a constructivist approach to learning. *Reference Services Review* 32(2): 141-148.

Creswell, J.W. 2003. *Research design: qualitative, quantitative and mixed methods approaches.* 2nd ed. Thousand Oaks: Sage.

Creswell, J.W. 2007. *Qualitative inquiry and research design: choosing among five approaches.* 2nd ed. Thousand Oaks: Sage.

Creswell, J.W. and Plano Clark, V.L. 2007. *Designing and conducting mixed methods research.* Thousand Oaks: Sage.

Creswell, J.W., Plano Clark, V.L., Gutmann, M.L. and Hanson, W.E. 2003. Advanced mixed methods research designs.In Tashakkori, A. and Teddlie, C. (eds). *Handbook of mixed methods in social and behavioral research.* Thousand Oaks*:* Sage. pp. 209-239.

Denzin, N.K. and Lincoln, Y.S. 2003.The discipline and practice of qualitative research. In Denzin, N.K. and Lincoln, Y.S. (eds). *Strategies of qualitative inquiry.* 2nd ed. Thousand Oaks: Sage. pp. 1-45.

Denzin, N.K. and Lincoln, Y.S. (eds). 2005. *Handbook of qualitative research,* 2nd. ed. Thousand Oaks: Sage.

Denzin, N.K. and Lincoln, Y.S. (eds). 2008. *The landscape of qualitative research.* 3rd. ed. Thousand Oaks: Sage.

Dervin, B. 1993. Verbing communication: mandate for disciplinary invention. *Journal of Communication* 43(3): 45-54.

Dervin, B. 1998. Sense-making theory and practice: an overview of user interests in knowledge seeking and use. *Journal of Knowledge Management* 2(2): 36-46.

Dervin, B. 1999. On studying information seeking methodology: the implications of connecting metatheory to method. *Information Processing and Management* 35: 727-750.

Dervin, B. 2003. Information-democracy: an examination of underlying assumptions. In Dervin, B., Foreman-Wernet, L. and Lauterbach, E. (eds). *Sense-making methodology reader: selected writings of Brenda Dervin.* Cresskill: Hampton Press. pp. 73-100.

Dervin, B. and Nilan, M. 1986. Information needs and uses. *Annual review of information science and technology* 21. New York: Knowledge Industry Publications. pp. 3-33.

Diesing, P. 1991. *How does social science work?: reflections on practice.* Pittsburg: University of Pittsburg Press.

Dobson, P.J. 2002. Critical realism and information systems research: why bother with philosophy. *Information Research* 7(2). Available at: http://informationr.net/ir/7-2/paper124.html Accessed 9 January 2008.

Dooley, K., Johnson, T. and Bush, D. 1995. TQM, chaos, and complexity. *Human Systems Management* 14(4): 1-16.

Durrheim, K. 2006. Research design. In Terre-Blanche, M., Durrheim, K. and Painter, D. (eds). *Research in practice: applied methods for the social sciences.* 2nd ed. Cape Town: University of Cape Town. pp. 34-59.

Easterby-Smith, M., Thorpe, R. and Lowe, A. 2002. *Management research: introduction.* 2nd ed. London: Sage.

Engel, P.G.H. and Salomon, M. 1997. *Facilitating innovation for development: a RAAKS resource box.* Amsterdam: Royal Tropical Institute.

Food and Agriculture Organisation of the United Nations (FAO) and World Bank. 2000. *Agricultural Knowledge and Information Systems for Rural Development (AKIS/RD): strategic vision and guiding principles.* Rome: FAO. Available at: http://www.fao.org/sd/EXdirect/EXre0027.htm Accessed 17 March 2007.

French, S. 2009. Cogito ergo sum: exploring epistemological options for strategic management. *Journal of Management Development* 28(1): 18-37.

Frey, L.R. 1994. The naturalistic paradigm: studying small groups in the postmodern era. *Small Group Research* 25(4): 551-577.

Frey, L.R., Gouran, D.S. and Poole, M.S. (eds). 1999. *The handbook of group communication theory and research.* Thousand Oaks: Sage.

Garforth, C. 2001. Agricultural knowledge and information systems in Hagaz, Eritrea, SD Dimensions. Available at: http://www.fao.org/sd/2001/KN1001a_en.htm Accessed 3 April 2007.

Gephart, R. 1999. Paradigms and research methods. *Research Methods Forum* 4 Summer. Available at: http://division.aomonline.org/rm/1999_RMD_Forum_Paradigms_and_Research_ Methods.htm Accessed 18 June 2007.

Gergen, K.J. 1999. *An invitation to social construction.* London: Sage.

Giere, R.M. 2000. Naturalism. In Newton-Smith, W.H. (ed). *A companion to the philosophy of science.* Oxford: Blackwell. pp. 308-310.

Gray, D.E. 2009. *Doing research in the real world.* 2nd ed. London: Sage. London.

Greene, J.C. and Caracelli, V.J. 2003. Making paradigmatic sense of mixed methods practice. In Tashakkori, A. and Teddlie, C. (eds). *Handbook of mixed methods in social and behavioral research.* Thousand Oaks: Sage. pp. 91-110.

Guba, E.G. and Lincoln, Y.S. 1989. *Fourth generation evaluation.* Newbury Park: Sage.

Guba, E.G. and Lincoln, Y.S. 1994. Competing paradigms in qualitative research. In Denzin, N.K and Lincoln, Y.S. (eds). *Handbook of qualitative research.* Thousand Oaks: Sage. pp. 105-117.

Guba, E.G. and Lincoln, Y.S. 2000. Epistemological and methodological bases of Naturalistic inquiry. In Stufflebeam, D.L., Madaus, G.F. and Kellaghan, T. (eds). *Evaluation models: viewpoints on educational and human services evaluation.* Dordrecht: Kluwer. pp. 363-381.

Guba, E.G. and Lincoln, Y.S. 2008. Paradigmatic controversies, contradictions, and emerging confluences. In Denzin, N.K. and Lincoln, Y.S. (eds), *The landscape of qualitative research.* 3rd. ed. Thousand Oaks: Sage. pp. 255-286.

Habermas, J. 1970. Towards the theory of communicative competence. *Inquiry* 13(1 & 4): 360-375.

Hamilton, G.A. 1998. Co-learning tools: powerful instruments of change in Southern Queensland, Australia. In Röling, N.G. and Wagemakers, M.A.E. (eds). *Facilitating sustainable agriculture: participatory learning and adaptive management in times of environmental uncertainty.* Cambridge: Cambridge University Press. pp. 172-190.

Hamilton, N.A. 1995. Learning to learn with farmers: a case study of an adult learning extension project conducted in Queensland, Australia 1990-1995. PhD. Wageningen: Wageningen University.

Heron, J. and Reason, P. 1997. A participatory inquiry paradigm. *Qualitative Inquiry* 3(3): 274-294.

Hoffmann, V., Probst, K. and Christinck, A. 2007. Farmers and researchers: how can collaborative advantages be created in participatory research and technology development? *Agriculture and Human Values* 24: 355-368.

Holland, G.A. 2006. Associating social constructionism and extended cognition in information studies. *Journal of Documentation* 62(1): 91-100.

Hoskisson, R.E., Hitt, M.A., Wan, W.P., and Yiu, D. 1999. Theory and research in strategic management: swings of a pendulum. *Journal of Management* 25(3): 417-456.

Hunt, S.D. 1991. Positivism and paradigm dominance in consumer research: toward critical pluralism and rapprochement. *Journal of Consumer Research* 18: 32-42.

Janssen, P. 1970. *Geschichte und lebenswelt: ein beitrag zur diskussion von Husserts Spitwerk.* Den Haag: Martinus Nijhoff.

Jennings, G.R. 2007. Advances in tourism research: theoretical paradigms and accountability. In Matias, A., Neto, P.A. and Nijkamp, P. (eds). *Advances in modern tourism research.* New York: Physica-Verlag Heidelberg. pp. 9-35.

Johnson, B. and Christensen, L. 2008. *Educational research: quantitative, qualitative and mixed approaches.* 3rd ed. Thousand Oaks: Sage.

Johnson, R.B. and Onwuegbuzie, A.J. 2004. Mixed methods research: a research paradigm whose time has come. *Educational Researcher* 33(7): 14-26.

Kirk, J. 1997. Managers' use of information: a grounded theory approach. In Vakkari, T., Savolainen, R. and Dervin, B. (eds). *Information seeking in context, Proceedings of an International Conference on Research in Information Needs, Seeking and Use in Different Contexts, 14-16 August, 1996, Tampere, Finland.* London: Taylor Graham. pp. 257-267.

Klein, H.K. 2004. Seeking the new and the critical in critical realism: dé jà vu? *Information and Organization* 14: 123–144.

Krauss, S.E. 2005. Research paradigms and meaning making: a primer. *The Qualitative Report* 10(4): 758-770.

Kuhn, T.S. 1970. *The structure of scientific revolutions.* 2nd ed. Chicago: University of Chicago Press.

Larochelle, M., Bednarz, N. and Garrison, J.W. (eds). 1998. *Constructivism and education,* Cambridge: Cambridge University Press.

Leedy, P.D. and Ormrod, J.E. 2005. *Practical research: planning and design.* 8th ed. Upper Saddle River, NJ: Pearson Education International.

Leeuwis, C. and Pyburn, R. (eds). 2002. *Wheel-barrows full of frogs: social learning in rural resource management.* Assen: Koninklijke Va Gorcum.

Lincoln, Y.S. and Denzin, N. K. 2003. The ethical revolution. In Lincoln, Y.S. and Denzin, N.K. (eds). *Turning points in qualitative research: tying knots in a handkerchief.* Lanham: Rowman and Littlefield. pp. 217-238.

Lincoln, Y.S. and Guba, E.G. 1985. *Naturalistic inquiry.* Newbury Park: Sage.

Loiselle, C.G., Profetto-McGrath, J., Polit, D.F. and Beck, C.T. 2010. *Canadian essentials of nursing research.* Philadelphia: Lippincott Williams and Wilkins.

Lor, P.J. and Britz, J. 2010. To access is not to know: a critical reflection on A2K and the role of libraries with special reference to Sub-Saharan Africa. *Journal of Information Science* 20(10): 1-13.

Maxwell, S. 1999. The meaning and measurement of poverty. Available at: http://www.odi.org.uk/resources/download/2277.pdf Accessed 3 March 2011.

McMurray, A. and Clendon, J. 2011. *Community health and wellness: Primary Health Care in practice.* 4th ed. Chatswood, NSW: Elsevier.

McNiff, U. and Whitehead, J. 2006. *All you need to know about action research.* London: Sage.

Merriam, S.B. 2009. *Qualitative research: a guide to design and implementation.* San Francisco: John Wiley.

Meyer, H.W.J. 2000. The transfer of agricultural information to rural communities, D. Phil. Pretoria: University of Pretoria.

Moran, D. 2000. *Introduction to phenomenology.* London: Routledge.

Mosse, D. 1994. Authority, gender and knowledge: theoretical reflections on the practice of participatory rural appraisal. *Development and Change* 25: 497-526.

Moussa, I.M. 2006. Impact of privatization of advisory services on agricultural knowledge and information systems: evidence form 'LEC' knowledge management in Banikoara, Benin. *IAALD Quarterly Bulletin.* LI (3/4): 208-214.

Munyua, H.M. 2011. Agricultural Knowledge and Information Systems (AKIS) among small-scale farmers in Kirinyaga district, Kenya. PhD. Pietermaritzburg: University of KwaZulu-Natal.

Myers, M.D. 1997. Qualitative research in information systems. *MIS Quarterly* 21(2): 241-242.

Olsson, M. 2003. The construction of the meaning and significance of an 'author' among information behaviour researchers: a social constructivist approach. PhD. Sydney: University of Technology.

Olsson, M. 2005a. Meaning and authority: the social construction of an 'author' among information behaviour researchers. *Information Research* 10(2). Paper 219. Available at: http://InformationR.net/ir/10-2/paper219.html Accessed 10 December 2007.

Olsson, M. 2005b. Sense-making methodology: information researchers construct Dervin and her work. Paper presented at a non-divisional workshop held at the meeting of the International Communication Association, New York City, May. Available at: http://communication.sbs.ohio-state.edu/sense-making/meet/2005/meet05olsson ex.pdf Accessed 20 December 2007.

Olsson, M. 2005c. Beyond 'needy' individuals: conceptualizing information behaviour. In *Proceedings 68th Annual Meeting of the American Society for Information Science and Technology*, *American Society for Information Science and Technology* 42. Silver Springs: ASIST. Available at: http://onlinelibrary.wiley.com/doi/10.1002/meet.1450420161/pdf Accessed 5 February 2011.

Opondo, C., German, L., Stroud, A. and Engorok, O. 2006. Lessons from using participatory action research to enhance farmer-led research and extension in South western Uganda. African Highlands Initiative, Working Paper No. 3. Available at: http://www.africanhighlands.org/pdfs/wps/ahiwp_03.pdf Accessed 10 June 2007.

Patton, M.Q. 2002, *Qualitative research and evaluation methods*. 3rd ed. Thousand Oaks: Sage Publications.

Polit, D.F. and Beck, C.T. 2004. *Nursing research: principles and methods*, 7th ed. New York: Lippincott Williams and Wilkins.

Reagan, T. 1999. Constructivist epistemology and second/foreign language pedagogy. *Foreign Language Annals* 32(4): 413-425.

Reason, P. and Bradbury, H. (eds). 2001. *Handbook of action research: participatory inquiry and practice.* London: Sage Publications.

Rees, D.J., Momanyi, M., Wekundah, J., Ndungu, F., Odondi, J., Oyure, A.O., Andima, D., Kamau, M., Ndubi, J., Musembi, F., Mwaura, L. and Joldersma, R. 2000. Agricultural knowledge and information systems in Kenya: implications for technology dissemination and development. Agricultural Research and Extension Network (AgREN) Network Paper no. 107. London: Overseas Development Institute. Available at: http://www.odi.org.uk/work/projects/agren/papers/agrenpaper_107.pdf Accessed 24 March 2007.

Rocco, T.S., Bliss, L.A., Gallagher, S. and Pérezz-Praado, A. 2003. Taking the next step: mixed methods research in organizational systems. *Information Technology, Learning, and Performance Journal* 21(1): 19-28.

Rogers, E.M. 1983. *Diffusion of Innovation.*3rd ed. New York: Free Press.

Röling, N.G. 1989. *A research/extension interface: a knowledge system perspective.* Wageningen: Wageningen Agricultural University.

Röling, N.G. 1992. The emergence of knowledge systems thinking: a changing perception of relationships among innovation, knowledge process and configuration. *Knowledge and Policy* 5(1): 42-65.

Röling, N.G. and Jiggins, J. 1998. The ecological knowledge system. In Röling, N.G. and. Wagemakers, M.A.E. (eds). *Facilitating sustainable agriculture: participatory learning and adaptive management in times of environmental uncertainty.* Cambridge: Cambridge University Press. pp. 283-311.

Röling, N.G. and Wagemakers, M.A.E. (eds). 1998. *Facilitating sustainable agriculture: participatory learning and adaptive management in times of environmental uncertainty.* Cambridge: Cambridge University Press.

Röling, N.G. and Woodhill, J. 2001. From paradigms to practice: foundations, principles and elements for dialogue on water, food and environment, background document for National and Basin Dialogue Design Workshop, Bonn,1-2 December. Available at: http://portals.wi.wur.nl/files/docs/msp/rolingwoodhill_dialogueWFE.pdf Accessed 9 September 2010.

Schunk, D.H. 2008. *Learning theories: an educational perspective.* 5th ed. Upper Saddle River: Pearson Merrill Prentice Hall.

Seigfried, H. 1976. Descriptive phenomenology and constructivism. *Philosophy and Phenomenological Research* 37(2): 248-261.

Sey, J. 2006. Postmodernism: a critical practice. In Terre-Blanche, M., Durrheim, K. and Painter, D. (eds). *Research in practice: applied methods for the social sciences*. 2nd ed. Cape Town: University of Cape Town. pp. 523-537.

Sheppard, M. 2004. *Appraising and using social research in the human services: an introduction for social work and health professionals.* London: Jessica Kingsley.

Sion, A. 2009. *Phenomenology: basing knowledge on appearance.* London: Routledge.

Smith, D.W. and Thomasson, A.L. (eds). 2000. *Phenomenology and philosophy of mind.* Oxford: Oxford University Press.

Smith, M.L. 2006. Overcoming theory-practice inconsistencies: critical realism and information systems research. *Information and Organization* 16(3): 191-211.

Snape, D. and Spencer, L. 2003. The foundations of qualitative research. In Ritchie, J. and Lewis, J. (eds). *Qualitative research practice: a guide for social science students and researchers.* London: Sage. pp. 1-23.

Snowden, D. 2000. Cynefin, a sense of time and place: an ecological approach to sense making and learning in formal and informal communities. In Depres, C. and Chauvel, D. (eds). *Knowledge horizons, the present and the promise of knowledge management.* Oxford: Butterworth. Available at: http://www.knowledgeboard.com/library/cynefin.pdf Accessed 22 January 2008.

Snowden, D. 2002. Complex acts of knowing: paradox and descriptive self-awareness. *Journal of Knowledge Management* 6(2): 100-111.

Social constructivism and Social constructionism. 2012. Wikipedia. en.wikipedia.org/wiki/Social_constructivism Accessed 21 March 2012.

Spender, J.C. 2006. Method, philosophy and empirics in KM and IC. *Journal of Intellectual Capital* 7(1) 12-28.

Stenmark, D. 2001. The relationship between information and knowledge. In Proceedings of 24th Information Systems Research Seminar in Scandinavia (IRIS), Ulvik, Norway, 11-14 August. Available at: http://www.viktoria.se/~dixi/publ/ddoml02.pdf Accessed 26 March 2008.

Stilwell, C. 2006. "Beyond reason and vanity?": some issues in academic journal publication in library and information studies. *South African Journal of Libraries and Information Science* 72(1): 1-11.

Styhre, A. 2003. Knowledge management beyond codification: knowing as practice/concept. *Journal of Knowledge Management* 7(5): 32-40.

Talja, S., Touminen, K. and Savolainen, R. 2005. "Isms" in information science: constructivism, collectivism and constructionism. *Journal of Documentation* 6(1): 79-101.

Teddlie, C. and Tashakkori, A. 2003. Major issues and controversies in the use of mixed methods in the social and behavioural sciences. In Tashakkori, A. and Teddlie, C. (eds). *Handbook of mixed methods in social and behavioral research.* Thousand Oaks: Sage. pp. 3-50.

Teddlie, C. and Tashakkori, A. 2009. *Foundations of mixed methods research: integrating quantitative and qualitative approaches in the social and behavioural sciences.* Thousand Oaks: Sage.

Terre-Blanche, M. and Durrheim, K. 2006. Histories of the present: social science research in context. In Terre-Blanche, M., Durrheim, K. and Painter, D. (eds). *Research in practice: applied methods for the social sciences.* 2nd rev. ed. Cape Town: University of Cape Town Press. pp. 1-17.

Terre-Blanche, M., Kelly, K. and Durrheim, K. 2006. Why qualitative research. In Terre-Blanche, M., Durrheim, K. and Painter, D. (eds). *Research in practice: applied methods for the social sciences.* 2nd rev. ed. Cape Town: University of Cape Town Press. pp. 271-284.

University of KwaZulu-Natal (UKZN), School of Education, Training and Development Pietermaritzburg: University of KwaZulu-Natal.

Vosniadou, S. 1996. Towards a revised cognitive psychology for new advances in learning and instruction. *Learning and Instruction* 6(2): 95-109.

Vygotsky, L.S. 1978. *Mind and society: the development of higher psychological processes*. Cambridge: Harvard University Press.

Wagenaar, T.C. and Babbie, E. 2001. *Practicing social science research: guided activities to accompany the practice of social research*. 9th ed. Stamford: Wadsworth/Thomson Learning.

Wenger, E. 1999. *Communities of practice: learning, meaning and identity.* Cambridge: Cambridge University Press.

Wikgren, M. 2005. Critical realism as a philosophy and social theory in information science. *Journal of Documentation* 61(1): 11-22.

Williamson, K. 2006. Research in constructivist frameworks using ethnographic techniques. *Library Trends* 55(1): 83-101.

Wilson, B. 2001. *Soft systems methodology: conceptual model building and its contribution*. Chichester: John Wiley.

Wilson, T.D. 1981. A case study in qualitative research. *Social Science Information Studies* 1: 241-146.

Wilson, T.D. 1986. Information needs in social services: an overview. In Horobin, G. and Montgomery, S. (eds). *New information technology in management and practice*. London: Kogan. pp. 12-24. Available at: http://informationr.net/tdw/publ/papers/infoneeds85.html Accessed 27 January 2008.

Wilson, T.D. 1999. Models in information behaviour research. *Journal of Documentation* 55 (3): 249-270.

Wilson, T.D. 2002a. "Information science" and research methods. Available at: http://informationr.net/tdw/publ/papers/slovak02.html Accessed 17 March 2008.

Wilson, T.D. 2002b. Alfred Schutz, phenomenology and research methodology for information behaviour research. Paper delivered at ISIC4 - Fourth International Conference on Information Seeking in Context, Universidade Lusiada, Lisbon, Portugal, September 11 – 13. Available at: http://informationr.net/tdw/publ/papers/schutz02.html Accessed 22 January 2008.

Wilson, T.D. 2003. Philosophical foundations and research relevance: issues for information research. *Journal of Information Science* 29(6): 445-452.

Wilson, T.D. 2006. On user studies and information needs. *Journal of Documentation* 62(6): 658-670.

Wilson, T.D. n.d. Structure in research methods. Available at: http://informationr.net/tdw/publ/ppt/ResMethods/sld001.htm Accessed 25 February 2011.

Woolcock, M. 2001. The place of social capital in understanding social and economic outcomes. *Isuma: Canadian Journal of Policy Research* 2(1): 11-17.

World Bank. 2007. Agriculture knowledge and information systems – AKIS. Available at: http://lnweb18.worldbank.org/ESSD/ardext.nsf/PrintFriendly/467971A95B22470 185256D5D006EAD2F?Opendocument Accessed 18 July 2007.

Wyssusek, B., Schwartz, M. and Krallmann, H. 2002. Sociopragmatic constructivism: towards a research agenda for knowledge management in learning organizations. In Proceedings of the Third European Conference on Organizational Knowledge, Learning, and Capabilities (OKLC), Laboratory of Business Administration, Athens, Greece. Available at: http://user.cs.tu-berlin.de/~wyssusek/publications/Wyssusek-et-al_2002_SPC--Towards-a-research-agenda.pdf Accessed 29 December 2010.