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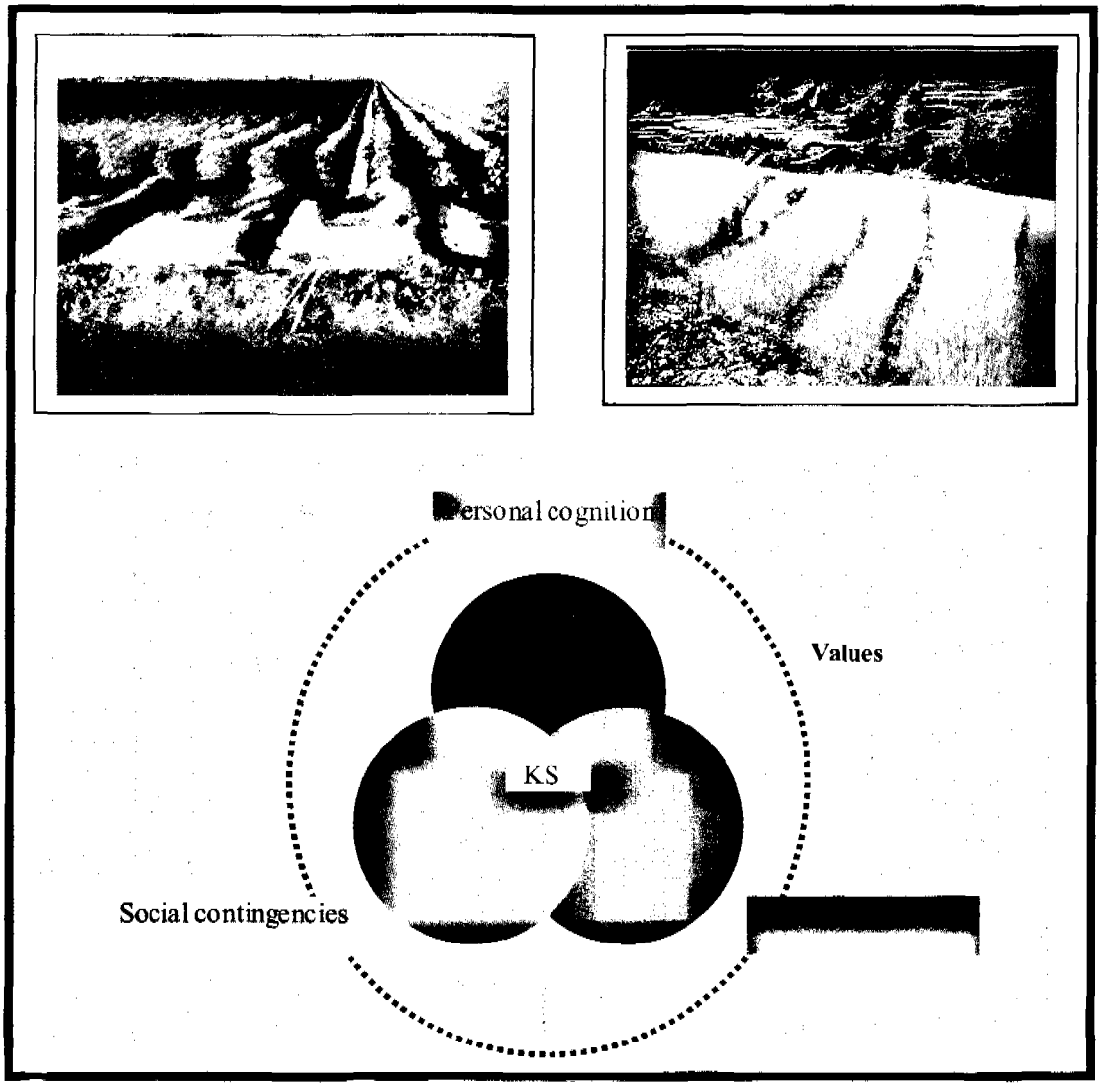

Theoretical model of Knowledge Management for Water Users Association in South Asia

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Theoretical Model of Knowledge Management for Water Users' Associations in South Asia

Master of Science Thesis
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The findings, interpretations and conclusions expressed in this study do neither necessarily reflect the views of the UNESCO-IHE Institute for Water Education, nor of the individual members of the MSc committee, nor of their respective employers.

Dedicated to the DHUNGANAS
and the MARAHATTAS

Abstract

Water Users' Associations (WUA) are common water management organisations in South Asia. They are responsible for the operation and maintenance of majority of irrigation systems. Because irrigated agricultural is the largest consumer of water as well as a significant producer of both food and industrial crops, strengthening of WUA will contribute to a higher performance of the irrigation system. Implementing proper knowledge sharing procedure can be one of the improvements we can bring to these farmers' organisations. Knowledge management (KM) principles have been extensively and successfully applied to enhance organisational capacity in business organisation. This study examines if these principles can be equally applied in a representative and non profit organisation like WUA.

The purpose of this study is to explore what kind of knowledge management studies or practices have been done that are relevant to such organisation. Furthermore, it also identifies the ruling factors of knowledge procedure within farmers' WUA. Consequently, it proposes the suitable type of KM model with detailed components.

This research is based on an extensive literature study in the 1) field of knowledge management (KM), 2) sociology of knowledge 3) water users' association. After introducing the topic and explaining the methodology, the second chapter discusses the theoretical aspects of knowledge, knowledge management, and types of knowledge. This study has focused on the process of knowledge sharing within the KM, based on the argument that knowledge is dynamic and for ever changing.

Since the WUA is a different kind of organisation from a business organisation, theories and application developed for business organisations can not be directly copied. Chapter 3 gives an overview of the WUA- its properties and functions. Both social and technical factors affect the knowledge process within a WUA. The social factors of concern are: inequity, class, gender, education. The relevant technical factors are: tools and infrastructure. Based on these basic components of a WUA, three organisational knowledge sharing models were selected and compared in order to determine their relevance and appropriateness for an organisation such as a WUA.

The data analysis presented in chapter 5 leads to the observation that the selected knowledge sharing models are not easily applicable for the WUA context of knowledge sharing. Nevertheless, these models are helpful to identify the basic components needed to address the issues prevalent in a farmers' organisation. These models helped to identify personal cognition, social contingencies and technical factors as the components of the final KM model, all embedded with personal and social values. Since each WUA is different in its composition and social values, the application model needs to be specific for each of such organisations. The proposed model can be considered as a base to develop the application models. Since this research is at the theoretical level, the proposed model needs to be evaluated in practice. When applying to specific WUA, it needs to incorporate the contextually specific legal, social and technical components.

Key word- *Knowledge management; knowledge sharing; water users' association; organisational sharing; social issues; technology; south Asia.*

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I shall have only myself to blame for any shortcoming of this study despite all contributions from these people.

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List of symbols

FMIS	Farmers managed irrigation system
HRM	Human resource management
ICT	Information communication and technology
IK	Indigenous knowledge
IS	Information sharing
IWMI	International Water Management Institute
KM	Knowledge Management
KS	Knowledge Sharing
MED	Ministry of Entrepreneur Development
NGO	Non- governmental organisations
PCO	Public calling office
WUA	Water Users' Association

Chapter1. Introduction

1.1 Background

Irrigated agriculture is the most water consuming stakeholder in south Asian countries. Most of the small to medium irrigation schemes in this region are managed by a farmers' organisation called water users' association (WUA). Therefore, WUA can be one of the sectors where we can bring improvement to ensure efficient use of water resource and increase agricultural production. An irrigation system demands managing both technical and social factors(Sampath and Young, 1990). At the contemporary context of increased speed of information availability and the influence of global markets, management of knowledge becomes an important factor in addition to technical, managerial and social factors. Knowledge was always important but now we used to figure out how to manage it. Some of the recent studies have shown that implementing proper management of knowledge has been productive in the agriculture of developed countries (Van den Ban, 2002).

Knowledge Management has appeared as a new concept in the development of organisations since late 80s. Indeed the functions of knowledge creation, evaluation and sharing in all sectors of human life was apparently always active since the human civilization(Chua, 2001; Mudege, 2005), but now it has started being done as a separate field. Therefore, improvement of farmers' organisations could also adopt such procedure to ensure organisational growth and better food production.

The evidence of using Knowledge Management (KM) in organisational level has been so far seen productive in the developed countries. Since human has already utilised almost all natural resources, next resource man can make use is the 'knowledge' (Al-Jayyousi, 2004; Van den Ban, 2002). Especially in agriculture sector, it can be the resource that might be able to fulfil the requirement of human being to reduce the hunger of coming generations and uplift the rural life.

This research is based on intense literature studies in two separate fields KM and Sociology of knowledge for a WUA. It has tried to merge KM in the context to south Asian water users' associations. It identifies the extent of knowledge theory and practice being observed in organisational learning. It also develops a framework to carry the knowledge management procedure in the context of WUAs. This research attempts to tie the modern scientific way of knowledge management and its applicability in rural context. It identifies the gap encountered in the field of KM from the perspective of rural south Asia.

1.2 Problem Identification

South Asia has large proportion of agrarian poor and farmers. Their agricultural product have to compete with the global agriculture (McMichael, 2000), which has increased

marginalisation of the rural poor. Almost 70% of irrigation schemes in this region are operated and maintained by WUAs; therefore WUA has major contribution in the food production. Success of irrigation system is dependent on several factors including technical, managerial, institutional, social, cultural values (Sampath and Young, 1990). Lot of emphasis has already been given to technical, managerial and institutional issues of irrigation scheme. One issue in managerial factor is the knowledge procedure which comprises of information flow, constraints, and values which are often under looked Van den Ban (2002), has shown that management of knowledge helped to increase agricultural production in some selected countries. So the argument is why not to implement KM on the WUAs of this region to improve the activity of WUAs.

Several organisations in the developed countries are already benefiting from the application of KM (Devenport and Prusak, 1998). It has been argued that, rapid organisational growth of the Japanese manufacturing sector has been possible due to proper management of knowledge(Nonaka and Takeuchi, 1995). Although the importance of knowledge and its sharing has been realised by all sectors, its procedural management is still in initial stages especially within very few business organisations.

Mostly knowledge process in the organisations like farmers water users' association (WUA) have been dealt with sociological and anthropological studies. But this study has tried to deal the knowledge with the help of organisational knowledge management theories. Hence the knowledge management and sharing procedure for a farmers' community needs a thorough study and application.

Society is rich in knowledge, but acknowledging those seems often lacking. We often forget about the utilisation and sharing of the knowledge based on human mind, experiences, values and beliefs and try to find the knowledge in some database. Indeed, knowledge is embedded in the combination of advanced database and the human mind and experience. Moreover, knowledge is associated with values, society and culture of the locality. But these issues are poorly dealt with the current trend of KM activities. Therefore, a gap was observed that almost all studies regarding KM have been done in the context of developed countries having more emphasis on technology than on social values. Similarly almost none of the studies are done focusing on the farmers' knowledge of developing countries and their prosperity by the viewpoint of KM. Therefore, this research aims to raise the most abandon sector in the field of modern KM procedure.

1.3 Objectives

The overall objective of this research is to focus on the importance of KM in the irrigation management. This research is believed to identify the missing factor, knowledge and how that can be introduced in an organisation like WUA. It identifies the factors that govern such kind of activities within the society. It aims to explore the following points:

1. To study a wide range of knowledge theories available in KS sector
2. To investigate various factors influencing the knowledge in WUA society.

3. To find the linkage between the WUA of south Asian region and the existing knowledge sharing theories and to identify the gap in between.

Research questions
1. What are the current KM studies being done at the theoretical level and practical level?
2. What are the essential components of a KM/ KS model in order to apply in the WUA of South Asian region?

1.4 Methodology

This study is done in order to explore the theories of knowledge management especially knowledge sharing, suitable for the farmers' organisations of South Asian countries. It is primarily a theoretical perspective which tries to find the existing theories of Knowledge sharing and their gaps to be used in the context of irrigation WUA. Hence the methodology has been divided into two sections.

1.4.1 Literature study

The literature study in the field of knowledge management and sociology of knowledge in WUA is the theoretical vertebra of this research. This part of the research is a complete desk study, which is believed to be the base for the case-specific studies in future. It is based on secondary information obtained from reports, articles and books.

Three separate annotated bibliographies were prepared on the field of knowledge management theories, knowledge management practices and the social factors of irrigation WUA. The output of these annotated bibliographies was the selected three KM models namely Nonaka and Takeuchi's model, Syed-Ikhasn and Rowland's model and Beesley's model (refer chapter 4.2). Similarly the bibliographies also helped to list out the factors that govern the knowledge procedure within a WUA of south Asian sub-continent (refer chapter 3.2).

Besides books available on KM, this section has depended upon a number of international journals and publication to review the current situation of knowledge and sociology of knowledge. The following table 1.1 highlights the journals and articles referred.

The mentioned journals as listed in table 1.1 were screened through abstract and the key words to find out the relevant literature work. Most of the journals like Journal of Intellectual Capital, Expert System and Journal of knowledge management contained the publications illustrating the practical application of knowledge management suitable for business organisation, universities and non-governmental organisations. However, these publications were very clear in understanding the various dimension of knowledge. Very few articles related to developing countries were encountered in Information development, Journal of Knowledge Management. Some journals like Journal of Agrarian change, Expert Systems focused on economics related to agriculture, and hence did not contribute significantly to this research.

Table 1.1 List of journals referred

Field	Journals	Covering Years	Total Volumes
KM theory	Journal of Knowledge Management	97-06	40
	Journal of Intellectual Capital	00-06	17
	Knowledge and process management	97-06	36
	Electronic Journal of Knowledge Management		
	Knowledge Management Research and Practice	03-05	09
	Expert System	96-06	43
	Knowledge, Technology and Policy	00-05	20
	Information Development		
Sociology of knowledge	Evaluation	00-06	21
	Agriculture and Human Values	97- 06	38
	Journal of Agrarian Change	01- 06	21
	Development and Change	97- 06	45

Field	Non- journal Series	Total volumes
Sociology and irrigation	Online database	
	Development and Change	80
	IWMI research series	98

Likewise, for the sociology of knowledge and properties of WUA community some good references were available in Agriculture and Human Values, Development and Change, IWMI research series and Evaluation. These publications had several work done focusing to the developing countries and some were focusing on the WUAs.

1.4.2 Data Analysis

The data obtained from literature review of two separate disciplines were analysed based on the indicators mentioned in the analytical framework are shown in figure 3.4. The elements of analytical framework had been derived from the literature studies of the sociology of knowledge and the south Asian farmers' society. The detail description of these elements is discussed in chapter 3. All the three models were evaluated separately with respect to analytical framework and were finally merged to have a comprehensive view. The theories were evaluated for the indicators and the gap was identified that occurs in the case of farmers WUA. This led to propose a general model with its basic components and details.

The overall schematic methodology has been presented in the figure 1.1.

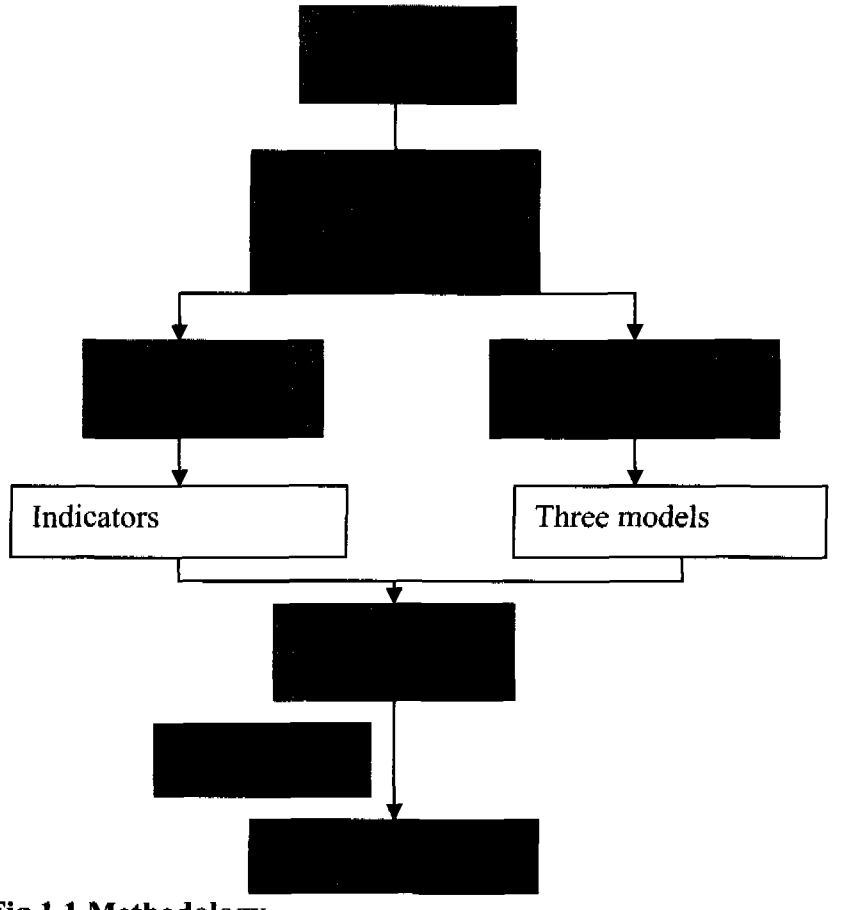


Fig 1.1 Methodology

1.5Scope and Limitation

This research is basically focused on exploration of suitable knowledge sharing process/ cycle for the context of farmers' organisations of south Asian counties. However, the factors like political and legal issues have not yet been considered. Similarly, this research is fully theoretical and its validation is based on the available secondary information and data.

The literature survey showed that very few (almost no) studies have been carried out specifically to the KM of farmers' organisations. Most of the articles and current researches have been done in developed countries and especially suitable for rapidly growing business organisations. Therefore, relevant similar work could not be referred in sufficient numbers.

The data is analysed based on the key indicators those were explored during the literature study. However, the outcome of this M Sc has to be tested with respect to the cognition and vision of the end users: farmers from different WUAs in target region.

1.6Organisation of Report

This thesis has been organised into six chapters which gives the overview of two separate disciplines, KM and knowledge sociology, and finally tries to tie with each other. Chapter 1 deals with introductory part consisting of problem definition, objective and methodology. Chapter 2 provides a brief overview of definitions related to KM, which is necessary to understand various domain of knowledge. Chapter 3 discusses various social and technical factors embedded in WUA society, which enables or disable the KS/KM process within the society. Identifying these factors was necessary since, the ultimate KS model required for such organisation is largely dependent on these factors. This chapter is more about sociology. It also derives the indicators related to KS for a WUA and which has been mentioned in analytical framework (refer to figure 3.4). Chapter 4 shows the current KM/ KS studies and tries to list out most suitable three models for the case of farmers WUA.

Then chapter 5 shows the analyses of the selected KM model based on the sociology of WUA. The same chapter discusses the gap encountered in available KM model with respect to the indicators of analytical framework. Consequently, it proposes the final KM/KS cycle or model suitable for various countries and various societies, specifically to South Asian societies. Finally, some conclusions are drawn in chapter 6 based on the data analysis. After proposing a final KS model comprising of three factors: social contingencies, individual cognition and technology, it recommends that final application model has to be prepared specific to each WUA separately.

Chapter2. Knowledge and its boundaries

2.1 Introduction

This chapter discusses about the theory of Knowledge and its management. It gives an overview of various definition of knowledge management as provided by different experts in the field of knowledge management. The two broad types of knowledge have been discussed as explicit and implicit along with their major differences. Similarly various phases of knowledge management has been identified as knowledge generation, utilisation and sharing. Finally, the properties of knowledge and dynamics have been dealt in brief. It also describes how knowledge varies with respect to person, time and space.

2.2 Defining terms

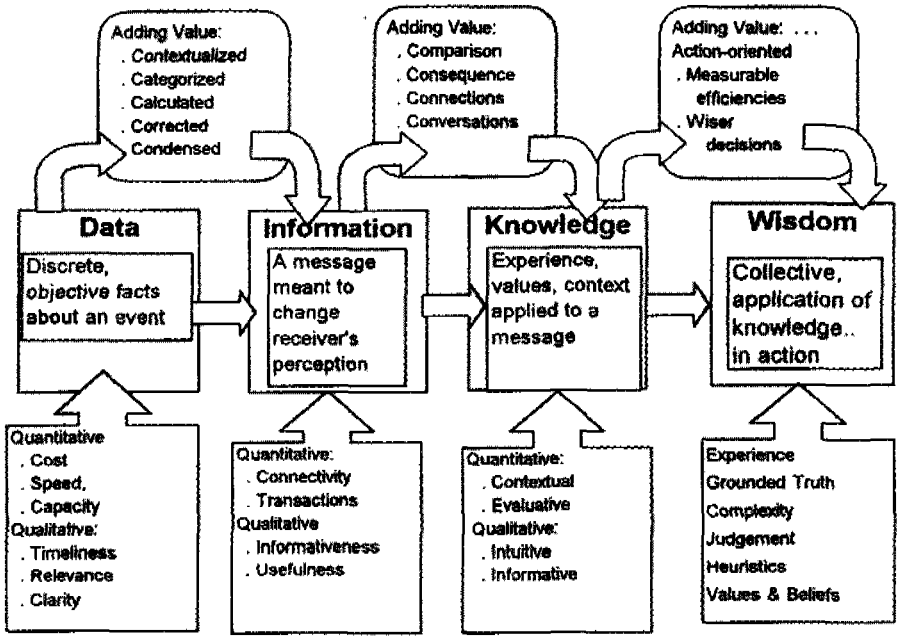
2.2.1 Knowledge

What is knowledge? It is a difficult question when asked to anybody. It has been a subject of study since the time of Plato and is still continuing. There is hardly any single definition or concept of knowledge as it has been dealt with so many disciplines from different cultural, sociological and political perspectives. Management of knowledge was active since human civilisation and is still active in all sectors. However, here we are going to focus on knowledge management as a field and try to check its validity over farmers' organisation (refer chapter 3).

Knowledge can be viewed as a rich form of information system. A simple matrix can explain the relation of knowledge with data, information and the wisdom (Jashapara, 2004; Liebowitz, 1999; Price, 2004; Solomatine, 2003).

Data + meaning = Information
Information + experience = knowledge
Knowledge + values = wisdom

Data is usually raw material for information and similarly information is raw material for knowledge. Data alone has no meaning, unless it is refined and converted into information. Information has to pass through testing and trusting phase to gain the stage of knowledge. Knowledge when remains trusted, shared with addition of values and morals attains the stage of wisdom. It is a very strong chain from data to wisdom, however, according to Tuomi 1999, as cited by (Ford and Chan, 2003), the chain should be reverse; information is derived from knowledge and data is derived from information. For the current research work, the relation of data, information and knowledge has been adopted as data gives information, information gives knowledge and knowledge gives wisdom and it has been schematically shown by the figure below.



Source: Jashapara, 2004

Figure 2.1. Systematic hierarchy of Knowledge

The above matrix shows that data may be in the form of qualitative or quantitative values which is in a raw form. It is about the fact or reality of the event. Such data when contextualised or calculated or arranged in an organised way such that it creates meaning it gets the form of information. Information has some meaning and some utility, but this can not be put in practice unless it is compared, evaluated or added with values. Here the information gains the stage of knowledge. The same information shared to several people might result different knowledge, since the addition of personal experience and values differs from one person to the other. Knowledge is when tested and measured and used in decision making process, gains the level of wisdom.

2.2.2 Knowledge management as discipline

According to Syed-Ikhsan and Rowland (2004), KM is 'new wine in old bottle'; that means management of knowledge has always existed since human civilization, but now it has been given a name 'Knowledge Management'. So it is has been started to use knowledge in the form of field knowledge management (KM).

KM comprises a fluid mix of experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experience and information. It originates and is applied in the mind of knower, society, organisation or generation. In organisations, it often becomes embedded in documents or repositories and also in routines, processes, practices and norms.

Like knowledge, knowledge management has been defined separately and specifically as per the separate disciplines. It is very difficult to find a single version on KM. The best suitable definition of KM according to Todd (1999) is *The process of organizing and leveraging knowledge embedded in people's experience, competencies, talents, ideas, practices, intuitions, skills, wisdom and capabilities, in addition to documented and codified sources, has been characterized as knowledge management*(Todd, 1999: 11). This refers KM is about the people, experience, values, culture and on addition about the technology.

KM has a very long history of development; however now it is observed as a separate field which is multi-disciplinary and useful in multifaceted disciplines. The following figure 2.2 shows the development of the discipline KM and its root disciplines. It highlights the importance of KM in various sectors as they emerged from the root disciplines. Philosophy, sociology, epistemology, ontology are some of the applied field of knowledge. It shows that the use of KM involves issues like culture, tool, system, change, learning, management etc. Similarly, it also shows the two broad types of knowledge: tacit and explicit along with the tools and method to use them.

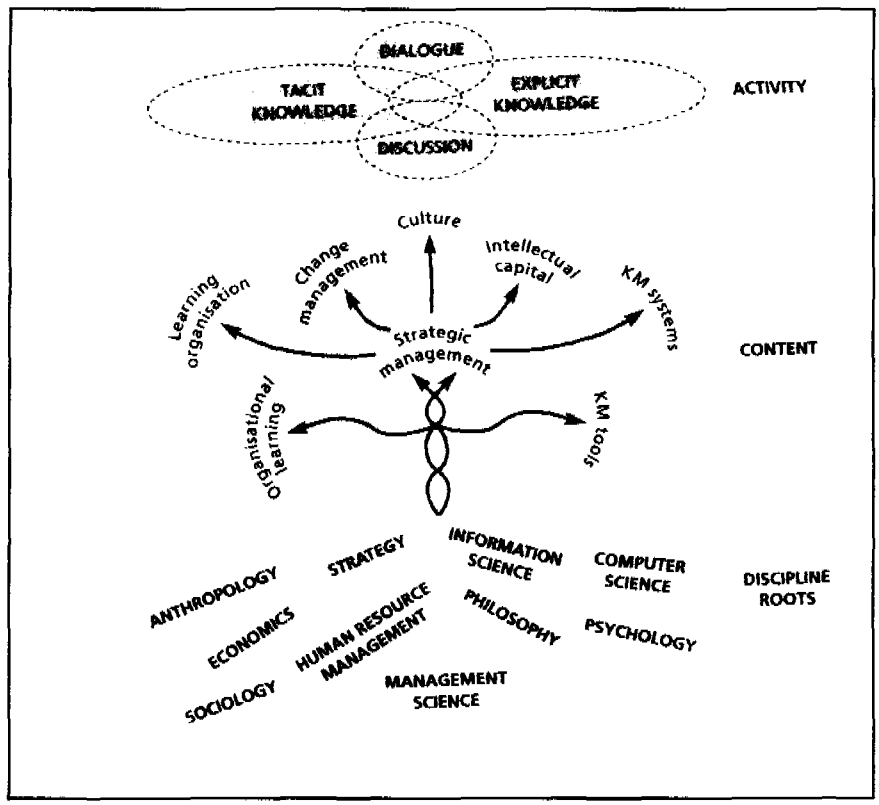


Figure 2.2 Emergence of KM Source: (Jashapara, 2004)

Since KM is needed on all fields it has importance in water management too. This means that there is a basic need for the public to be aware of water utility whether it is matter of

continuous ongoing attention to hygiene, or the preparation for rare flood and drought events. Other groups in society such as farmers and environmentalists need different, more specialised knowledge, information and skills about water(Rich, 1981).

Although KM is relevant in all sector of development, most of its application has been focused on commercial organisations and companies. These organisations have focused on the use of information communication technology (ICT) and human resources management (HRM) to implement the KM programmes. Therefore, there is a confusion that KM is about application of ICT and HRM. However, it is beyond the application of these but definitely these applications contribute to the KM. Since KM is governed by personal experience and values, it gets influenced from the people concerned and the social values.

Jashapara (2004) defines KM as *the effective learning process associated with exploration, exploitation and sharing of human knowledge (tacit and explicit) that uses appropriate technology and cultural environment to enhance an organization's intellectual capital and performance.* The context on which it was defined is very important to mention here, since it influences the definition as well as the application. It was given for the commercial organisation of the developed countries and it points towards more commercial values of knowledge than stated by Todd (1999). Since WUA is not a profit making organisation, Todd's definition suits better than as described by (Jashapara, 2004). But there are some common points in these two definitions. KM is about people, their behaviour, their environment and experiences, which also suits to the organisation like a WUA (refer chapter 3.2 for WUA).

Berg and Popescu (2005) points KM as an *essential asset for companies to survive on increasingly competitive and fast markets.* It is concerned with identification, acquisition, distribution and maintenance of knowledge and involves mainly people, technology, processes and culture. The impact of global development and competition is responsible for need of information / knowledge society for the organisations so as to improve their production activities. Hence this refers that with KM; farmers can become competitive and have better production. The similar statement is also given by Van den Ban (2002) in the context of agriculture in developed country.

Liebowitz (1999) has stated three steps in knowledge management procedure; acquiring, selecting and internalising. These three procedures were given for an organization and generally speaking farmers' organisation can have similar cycle of knowledge management. In his cycle, he has tried to incorporate knowledge sharing as one of the components of selection, but since knowledge sharing is a dominant component, it should be considered as fourth component of the whole cycle.

Similarly, Jashapara (2004) describes five components in knowledge management; discovering, generating, evaluating, sharing and leveraging. In an agricultural society, these components do occur, but clear distinction may not be possible. Occasionally one or two of those components are merged or even missed in some organisation.

Rich (1981), has explained three steps in knowledge management cycle as creation, diffusion/dissemination and utilization. He mentions about 5 types of knowledge in human being; (1) practical knowledge, (2) intellectual knowledge, (3) pastime knowledge/ small talk, (4) spiritual knowledge and (5) unwanted knowledge. Among all these knowledge, practical knowledge is the type which is of worth interesting since it is the one farmer uses in his professional work. But mostly these types are linked with each other and are difficult to separate.

Another angle of perceiving KM is that it is not simply something that is possessed, accumulated and imposed on others. It can not be measured precisely in terms of some quantity or quality. According to Long (2002), it is just matter of power which can quantify the location and level of knowledge. Someone who has power can impose his knowledge over others and hence he is called to have knowledge, however it does not mean that those who do not impose on others do not have it. Therefore knowledge is a relative term. Knowledge and its management are a social construction that results from and reshapes by the interaction between the actors of knowledge.

In general, all knowledge experts have quoted three steps of KM; generating, evaluating and sharing. All the components are equally important for a knowledge society, but this research is aimed at the knowledge sharing in farmers' organisation. The following table enlists the commonly used KM steps or components as given by various experts.

Table 2.1 Summary of KM principles

Specialist	Discover	Generate	Evaluate	Share	Discard	Leverage
Rich 1981	√		√	√	√	
Nonaka and Takeuchi 1995		√	√	√		
Devenport and Prushak 1998		√	√	√		
Liebowitz 1999		√	√	√		
Long 2001[1]	√		√	√		
Jashapara 2004	√	√	√	√		√

Discover- It entails finding out new thought, new practice or reality. Very often it refers to bring an entirely new concept or technology or procedure through experiments, research or creative thinking (Liebowitz, 1999). Normally it refers to something entirely new to the world. It includes the aspects like the motivation, incentive or patent right of the innovator.
Generate- It is the modification of existing knowledge. The individual knowledge that is made available to group or organisation, it has been referred as generation(Jashapara, 2004). Usually, it is not an entirely new thing to the world.

[1] Long argues that basically KM contains features like possession, accumulation and sharing (imposing on others), which all are governed by social issues. Knowledge creation or dissemination or whole process is dependent on the actors of it.

Evaluate- The information that has been shared or generated often passes through testing phase along with the addition of personal values and experience. A huge part of knowledge which is not suitable for us are rejected or forgotten after evaluation.

Sharing- It refers to transferring from one person to another, from one organisation to another. It is the action of transformation and absorption (Devenport and Prusak, 1998), that means transferred information has to be absorbed by the receiver and brought in the practice for problem solving, decision making or job fulfilling (detail in chapter 2.2.4).

Discard- A huge proportion of knowledge or information that we gain can not be used in our specific condition. Since knowledge is dependent on person, space and time; we can not use all the knowledge that we gain (Rich, 1981). However, discard can be considered as a step within knowledge evaluation phase.

Leverage- This term is specially used in commercial use of knowledge. This refers to creation of intellectual capital which can be used as database for further development. Some authors also have noted it by brokerage (IWMI, 2006).

2.2.3 Knowledge types

Jashapara (2004) has categorised knowledge in two sub groups, explicit and implicit. Explicit is the one which can be written into words, numbers and figures, read and taught, which is more formal, unambiguous, systematic, falsifiable and scientific(Liebowitz, 1999). It can be transferred using texts, books, case studies, pilot projects, workshops, television, computer, internet etc. It is easy for sharing but the absorption part as mentioned by Devenport and Prusak (1998) remains untested or can not be confirmed (refer to chapter 2.2.4).

Implicit, on the other hand is knowledge based on experience, behaviour, mythology, natural factors; that are difficult to express in words and to teach someone. A very important section of implicit knowledge is the tacit knowledge, which is learnt by virtue of nature itself, by observation, experience and hearing. For instance, when you feel cold you tend to wear warm cloths, when you get thirsty you take a glass of water. Have you ever studied that you should wear warm cloth or drink water in such situation? Its natural, comes by nature as you grow up. We gain implicit knowledge from story telling, songs, everyday practice, generation transfer, observing, hearing, talking etc. This domain of knowledge is difficult to convert into text or codify for the future use and only small portion of tacit knowledge can be converted into explicit form (Bhatt, 2001).

Before going through the sharing process, it is important to identify the knowledge shared according to explicit and implicit ways. Nonaka and Takeuchi, 1995 considers explicit knowledge to be objective and can be expressed unambiguously in words, numbers and specifications. Hence, it can be transferred via formal and systematic methods in the form

of official statements, rules and procedures. On the other hand tacit/ implicit knowledge is subjective, situational and intimately tied to the knower's experience.

Rich also agrees with two categories- explicit and implicit. Among the five type of knowledge he has proposed, practical knowledge, pastime knowledge and spiritual knowledge are a type of implicit knowledge where as the intellectual knowledge and unwanted knowledge are the explicit type, but there is no distinct boundaries between each type of knowledge (Rich, 1981).

For a knowledge based research, the distinguishing between explicitness and implicitness is very important. The following table adopted from Rubenstein-Montano *et al.* (2001), shows the comparative differences between these two types.

Table 2.2 Comparative assessment of Tacit and Explicit knowledge

Category	Explicit knowledge	Implicit/ tacit
Simple word	Know- what	know- how
Learn	Read, trial & error, meet the work, formal education, training	By growth, by nature, observing, experiencing, listening, custom, religion, culture, trail & error
Work process	Organised task, routine, linear, duty	Spontaneous, changing, unpredictable, individual ways
Teach	Trained syllabus, formatted schedule, meet the goal	One to one, internship, coach, brainstorming, practice
Type of thinking	Logical, based on facts, use proven methods, convergent thinking	Creative, flexible, develop insights, based on practice
Sharing	Documents, ICT tools, forums, person to person,	Photos, dialogue, face to face, storytelling, gossips, networking
Path	Mostly top- down	Open, friendly, unstructured
Technology	Based on cost and use, investing high, mostly focusing modern tool	Facilitating, moderate investment, more human oriented than tools

However these two types of knowledge are complimentary to each other. Explicit knowledge, which is originally implicit or tacit knowledge and that has since been encapsulated in; documents, methods, procedures, models, tools. Only small proportion of tacit knowledge can be made explicit, whether by default or intention. The reason could be because it is mainly embedded in what may be termed the unconscious rather than the conscious mind of an individual. The conversion of knowledge from one form to another is a spontaneous process and that leads to knowledge sharing(Nonaka and Takeuchi, 1995).

2.2.4 Knowledge Sharing

Knowledge sharing is the movement of knowledge from one location to another and its subsequent recipient. It is a very important component of knowledge management. Effective sharing is the result of continuous interaction between the donor and the receiver. When a newly acquired knowledge possessed by an individual, a group or an organisation is shared with the rest concerned, it is challenged, defended, refined and eventually settled or rejected as organisational knowledge (Devenport and Prusak, 1998). In other words, sharing of existing knowledge leads to the generation of new knowledge. This process is highly social in nature since knowledge is the product of social phenomenon (Kuhn, 1970).

Knowledge sharing is highly political issue, which has lot of ambiguity regarding patent, copy right or the acknowledgement of the innovator. Although knowledge is invaluable, but in practice every new information or knowledge has been valuated. The global development of information sector no more keeps the new information limited within the innovator. It spreads out spontaneously still property right or patent are reserved with the innovator.

Devenport and Prusak(1998) have given a matrix to define knowledge sharing/ transfer
Transfer= Transmission + Absorption (and use)

Generally speaking, knowledge sharing refers to the formalised transfer. It is the combination of transmission and absorption. If the recipient does not receive the knowledge and does not bring in his practice, then it can not be called an effective knowledge sharing/ transfer. Price (2004) expresses that knowledge transfer therefore comes from giving the recipients the opportunity to relive the knowledge generation experience, even if in a modified manner.

Knowledge sharing can be achieved either by moving the information or by moving the people. Moving information essentially refers to the sharing of explicit knowledge, where the knowledge is provided through documents, text, books, magazine, computer etc. Where as moving people refers to the sharing of tacit knowledge directing towards one to one transferring, counselling, observing etc. as mentioned in table 2.1. Knowledge sharing needs some tools among which language or dialect is the most important for both types of knowledge. People who share the same work culture can communicate better and transfer knowledge more effectively than the people who do not (Devenport and Prusak, 1998: 98). The facilities provided by the development of ICT gives us the tools to ease the information sharing, but they themselves do not share knowledge.

2.3 Properties of KS

2.3.1 Dynamism

The characteristics of knowledge are that it is dynamic, dependent on some means for sharing (Jashapara, 2004; Mudege, 2005; Price et al., 2000). It is dynamic, since it keeps

changing with respect to person, time and space. Thus dynamism has made knowledge complex than any other factor. According to Price (2004), it is largely dependent on the people concerned, time factor and space factor. For instance, use of organic manure may be knowledge to those who are not aware of the chemical fertilizers where as, those who have awareness and affordability to chemical fertilizers may have knowledge that organic manure is not sufficient for higher yield. Similarly, flood irrigation might be a kind of knowledge to farmers who do not yet know about alkalinity in soil; but as they know about the long term effect created by flood irrigation, they can have different knowledge then after. Hence knowledge is time and space dependent. Moreover, it includes values and beliefs of each individual over the same information shared which results different types of knowledge from the same source of information. This creates knowledge dynamic and dependent on the person it resides in. Therefore, dynamism is created due to the position of the person in his society and the social values (detail discussion in chapter 3.3).

The tools we use are also responsible for the dynamism. For instance, ancient people took longer time to explore new information and to share it, while in 21st century; information or innovation has been able to share to another part of the world rapidly (Ngulube, 2002). However, tools can only provide or share the information, not the knowledge. Information is to be added with values of different people in different way and hence knowledge can be different for various individuals. This makes knowledge management more complex and ambiguous.

The other form of dynamism is that it is defined and utilised in different manner at different level of application. The mode of application of information sharing in ICT organisations to those in University, in a ministry to those in farmers society tend to be different (Price et al., 2000). In addition, information sharing IS/ KS needs certain means or medium to be effective, and hence its performance largely depends on the mode or tool used. For instance tools like speaking, newspaper, drama, dialogue, legend story, radio program, television, education, pamphlets, posters, discussion, computer programs, emails, internet, computer models, metaphors, intranet, collaborative workplace and many more can be used for transferring from one person to another, from one place to another and from one time to another (Price, 2004). The selection of tool depends on the end user of knowledge and the type of knowledge. Similarly the KM programme suitable for 90's would not be applicable in this time context, since time has changed rapidly within the last two decades. Therefore, KM programmes or strategies are moving targets, because when we advance the goals and nodes of KM and KS also changes (Hellstrom and Jacob, 2003)

2.3.2 Increasing Gap

Knowledge sharing or dissemination is a long term process which includes accumulation of results of studies and research in terms of the policy (Knott and Wildavsky, 1981). Knowledge gap is usually emphasized as the gap between the researcher vis-à-vis policy

makers or decision maker; however this gap also exists in between the public and policy maker, public and public and vise versa.

Policy maker and researcher
Most often the policy makers are the administrators, and they might not be able to interpret the complex result of researches done by the researchers in practical context (Knott and Wildavsky, 1981). Principally the researcher fails to share idea and outcome with the one who is going to implement the findings. This creates a knowledge sharing gap between two formally educated people(Bhatt, 2001).

Policy maker and public
When a policy, plan or development reaches a target community, it is often conveyed or transferred in ineffective way. The easy and budget driven sharing methodologies are popular among the developer, which is easy to document that they have shared viz., posters, booklets, pamphlets, announcement from radio, television, upload on its website etc. But it is less concerned whether the target community is actually getting the message or not. This shows a gap in between the policy maker and the end users. The process can be vice-versa too. Public, who has immense tacit knowledge about the development of local might not feel free to put their knowledge vis-à-vis to the policy maker with assumption that earlier will not be heard to.

Public to public
This part of knowledge sharing is of keen interest of this research. The knowledge existing within the farmers needs to be shared from the innovator, older generation, and one community to the needy farmers, newer generation and another community having similar situation of problems. This research explores the factors that govern the public to public knowledge sharing procedure and propose a flow chart to narrow this gap.

2.3.3 Interference

Knowledge management (KM) and KS are often interpreted as the application of information technology; but it is beyond the use of IT. However, information and communication technologies have radically changed the way in which we can facilitate information management and sharing(Price, 2004). It has been already mentioned that KS is dependent on the means it is transferred through, and since ICT is the quickest means we have to date it is often wrongly interpreted as the best tool used for KS.

Indeed, for a community with less approach to ICT, this creates a knowledge divide from the one with more access. Specifically speaking, ICT can be the good carrier of KS in developed counties, but the same has left the developing countries far behind. For developing countries or specially talking of farmers of rural area, ICT should not only be understood as extensive computer and internet application, rather some cheaper means of IT like radio, telephone, television, fax, documentary, movies which can be locally available (International Telecommunication Union, 2003).

Sometimes, KM has also been interpreted as human resource management. Since it includes utilizing manpower for sharing purpose, some organisations see KM as the application of proper human resource management. However, it is beyond human resource management but definitely proper HRM contributes in KM.

2.3.4 Unclear structure

Since it is a young concept, many practitioners and academicians are still unsatisfied with the process of KM initiatives both at the level of praxis as well as theory(Hellstrom and Jacob, 2003: 56). Theoretically everyone agrees with the importance of KM in each sector, but practically they are implemented in very few sectors.

Moreover, there is no single 'blue print' to follow or implement theories of KM and KS in various development sectors. The theories and practice used in that of an NGO is different from that of ICT company and that of a river basin authority (Al- Jayyousi, 2005: 166). This has created dilemma and ambiguity in the application of KS process in different development works. According to Devenport and Prusak (1998), based on study of 31 KM ongoing projects, it was observed that each project was specific to a single organisation, and hence a generalised project or process is still lacking.

2.4 Conclusion

Knowledge and its management have travelled a very long distance since its emergence and have been embedded in various disciplines. It is also referred as the management of value added information, which is obtained from data mining. The above sub-chapters have highlighted that KM involves several phases in its cycle as given by various experts based on several organisational learning processes. We have seen that the most commonly agreed phases of KM are generation, evaluation and sharing.

Broadly classifying, knowledge has two distinct types: explicit and tacit. Since both of these types of knowledge are equally important, any KM programme brought in practice in an organisation should be able to address both of them. Knowledge sharing is a very important phase in the KM, which is actually combination of information sharing and receiving. Information shared when comes in practice by the beneficiary with addition of his values and experience, can finally be called to be transferred from the donor.

According to several experts, KM has now become one of the most cited organisational technology for improving company's 'bottom-line' performance, agility and prospects for survival in market (Berg and Popescu, 2005; Hellstrom and Jacob, 2003; Syed-Ikhsan and Rowland, 2004). It is also observed that the current trend of KS studies is focused on organisational sharing for their success. Although KM is agreed by all disciplines, the actual implementation in different sectors is not practised yet. The reasons behind this are described as the dynamism of knowledge itself, need of tool, unclear structure, the gap created and time and space dependence.

Now the question arises, what is a WUA? What kind of organisation it is and what is its purpose. Similarly, it is necessary to understand the issues that can be responsible to govern the knowledge procedure. Unless we identify the requirement of knowledge programme needed in this kind of organisation, it is not logical to search the current KM studies and work done. Therefore, the coming chapter makes us familiar with the WUA and the factors that govern knowledge matters within it.

Chapter 3 Sociology of knowledge in WUA

3.1 Introduction

This chapter is introduced to familiarise with the water users' association. It also shows the roles, responsibilities and organisational structure of WUA along with an example. This chapter makes a detailed study of the factors within WUA; those are responsible to influence the knowledge and knowledge management. Therefore, it basically discusses the sociology behind the knowledge management focusing in the context of irrigated agriculture in south Asia. These studies help to establish an analytical framework to implement for the rest of the part of study. The knowledge influencing factors have been identified as the issues related to social and technical variables.

3.2 Water Users' Association (WUA)

3.2.1 Definition

A Water Users' Association (WUA) is a nongovernmental, non-profitable entity established and managed by a group of users located along one or several watercourse canals. Water users consist of farmers, peasants, small entrepreneurs, industrialists, environmentalists and other owners who combine their financial, material and technical resources to improve the productivity of irrigated farming through equitable distribution of water and efficient use of irrigation and drainage systems (USAID, 2006). The community manages it by their own common understanding. They develop the rules and responsibilities by their own effort and implement them with the consensus of the community itself (Pradhan, 2002).

South Asian subcontinent has a very long history of irrigation projects The role of such organisation has been observed since very long time (Goonatilake, 1982)although it might not have the name WUA. Indeed, Farmers Managed Irrigation System (FMIS) and indigenous irrigation system are the output of WUAs.

After 1970s, The World Bank realised that the large agency managed irrigation systems in the developing countries were not performing well despite of good technology and costly construction; and started the concept of transferring power to WUA composed of users groups (Sampath and Young, 1990). The WUA was set up as an organisational entity when farmers' knowledge was recognised and when decentralisation policy was set up. According to (FAO, 2005), around 94% of total irrigation systems in Bhutan, 90% in Bangladesh, 75% in Nepal, 66% in India and 35% in Sri-Lanka are the small to medium irrigation schemes which are mostly constructed and/or operated by farmers user groups or WUAs. This means, we can improve the WUAs in this region as they are responsible for proper operation and management of irrigation system and improve food production.

3.2.2 Organisation Structure

It is a kind of organisation that may or may not have legal status but has certain rules, norms depending on each country's irrigation policy and social values. It contains an executive body who are the representative of all farmers and peasants, and a general body which consists of the entire stakeholder using the system. Most of the WUAs provide general membership to one person from each household (Yoder, 1994) or membership depending on the land irrigated. The WUA umbrella cover a wide variety of general members who are men, women, poor, rich, higher class, lower class, marginal people, villagers, tenants, peasants, merchant and sometimes also household water consumers and small entrepreneurs. Some of the WUAs have only men as the general members and the women headed household are excluded from the membership (Zwarteveen and Neupane, 1996). Hence high stratification in terms of social, economical, educational and technological basis is observed in such kind of organisation in south Asia.

It is not very much different than a business organisation in the sense that it has certain mission, vision and goal along with defined functions and status. But it is slightly different kind of organisation than business organisation as it is a representative organisation and includes relatively diverse kind of members. Similarly, it requires more social attention than in other organisations because it has to work together with wide range of general members. Likewise it is not like a job or profession where hiring and firing of employees is possible. Most of them are voluntary organisations with very nominal payment to the executive members whereas the general members have to pay some fee for the membership.

In Pakistan, first WUA was formed in 1981, and since then it got popularity and within 10 years various small-medium scale irrigation system adopted WUA. In Nepal, although WUA had very important role in some of the indigenous FMIS, Government started transferring Agency Managed large schemes to FMIS managed by WUA for the operation and maintenance after 1980s. Chattis Maujja Irrigation system is one of the best performing FMIS since more than 200 years and which has a very strong WUA at present (Pradhan, 2002).

A typical layout of WUA and its composition of executive members and general members are shown below, taken from Chhattis Mauja Irrigation System, Nepal. It is a FMIS and has WUA active since 1994, covering 7000ha of command area. One person from each household gets a general membership and these general members select the village representative and area representative for daily operation and maintenance of the system. They also elect the executive members for decision making and advocacy with the Government and policy making. The arrowhead shows that there is bottom-up approach in the organisational structure. However, in real practice it does not happen always, since the executive members tend to be higher status men and often undervalue the general members. This is just a sample WUA structure however the structure and number of members may vary according to the situation and requirement of local level.

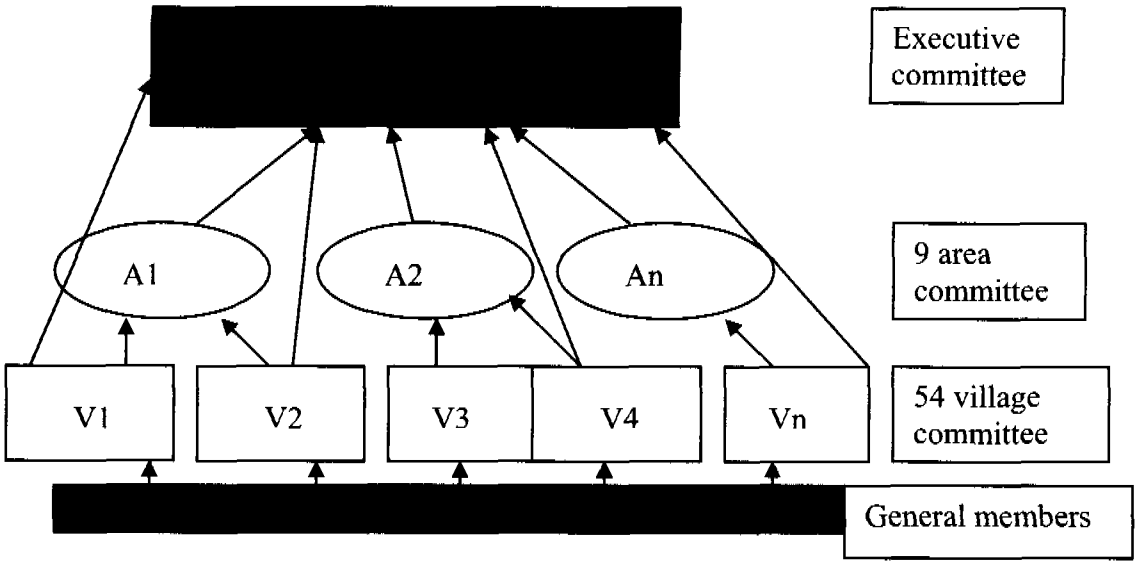


Fig 3.1 A typical layout of WUA Adopted from (Yoder, 1994)

3.2.3 Function

WUA is an organisation having the major duty as regular operation, maintenance and water allocation to the members (Yoder, 1994: 16). Although every WUA has its own role and responsibility depending on local situation, its main duty is the smooth and fair water allocation and management of the irrigation system. Some of the common functions as proposed by USAID 2006 are as follows.

- Provide membership and legal status to each user
- Assure reliable distribution of water among water users
- Resolve disputes that concern water use and management of the irrigation system in an appropriate, transparent, and democratic manner
- Manage book keeping of financial and other assets of the WUA
- Maintain, rehabilitate and improve the irrigation system in the WUA operational area
- Communicate among the members about any problems and mobilise resources
- Train the members for the rational use of water and promote new management techniques and technologies.

3.3 Sociology of Knowledge

Knowledge is something which is not absolute and not limited to certain group, qualification and people. According to long (2001), everyone has knowledge, but the matter is someone can overrule his knowledge upon others and prove to be knowledgeable, while rest hide their knowledge and appear as less knowledgeable. This reveals that knowledge is dependent on power. Where does the power come from? To

understand these dynamics of knowledge and information in a community, it is necessary to analyse social dimensions prevailing in society.

Since KM is related with social interactions, it is worthwhile to look at the factors that enabled or disabled the knowledge matters in the south Asian societies. Several of organisational KM expert have stated the role of people, values, technology behind the knowledge procedure. It is important to screen the factors in terms of social values and technical aspects that governed the knowledge process both in the past and on the present.

According to Kuhn (1970)in his book *The Structure of Scientific Revolutions*, knowledge in a society is governed by social factors. By social factors he refers to the beliefs, values and culture of the society. A case study in the field of forest management in Nepal also discussed about the similar factors comprising power and additionally the technical issues at the back of knowledge procedure (Chettri et al., 2005). The two influencing factors have been shown in detail in the analytical framework (refer to figure 3.4).

Although social values govern the knowledge issues, it is very difficult to separate out various dimensions of these social factors. For the purpose of this research we discuss several social issues as the issues related to power like equity, gender issues, social stratification and type of education.

Since KM is dependent on tools and technology too, we have to discuss how and what kind of tools affect the knowledge in a WUA. Due to the rapid development of science and technology, the way human can facilitate knowledge has changed dramatically. The available tool of KM as well as supporting infrastructures needs to be studied with the focus of suitability to WUA of South Asian countries.

3.3.1 Social factors

3.3.1.1 Power

Power is defined by Weber as 'the probability that one actor within the social relationship will be in position to carry out his own will despite resistance, regardless of the basis on which probability rests' (Jashapara, 2004). This implies, someone who has power can fulfil his desires or need and can face any kind of resistance. In a society, power plays a vital role for someone to carry out his task.

Knowledge processes are embedded in social process that implies aspect of power, authority and legitimating. However, the issue of power and social conflict are poorly dealt with in knowledge system theory and methodology (Long, 2001: 184). There is no doubt that power issue arises in various aspects, in various forms and in various levels within a society. Power in a society come in various form and at various forms like social stratification, inequity, education gap, access to tools, knowledge of operating tools, infrastructures etc. These are discussed separately in the coming chapters.

Social stratification

Social stratification refers to the culture of classifying people belonging to different level, colour or race. Different societies and different regions have different types of social stratification; for instance some countries have race or colour as the stratification. South Asia, especially the Hindu societies have caste issues as social stratification, therefore this section will basically discuss about the caste issue only. According to Jayaraman (1981), classification of caste had some professional categorisation in the past such that there was never competition between the two different castes since the society as a whole was dependent on every caste people. For instance a society needs priests, blacksmiths, fighters, businessmen, warriors, shoemaker, sweeper, laundrymen and many more professionals. Each of these group needed another group for day to day life activities (Jayaraman, 1981).

The society where there was caste differentiation, most of the higher caste people were landlords and the lower caste people the workers, labourers. The higher caste people were economically better off than the lower castes. These paid labourers, essentially knew more about agriculture than their paying masters (Starkloff, 2001). This shows that lower class people have immense knowledge about agriculture and irrigation.

Although the South Asian countries are legally free of caste bar, in practice it is still prevailing. The concept of division of occupation is not valid these days, but access to education, access to water, access to land, better economical and social status still exists among the high caste than low caste.

Box 1 Caste and class in tea plantation in Sri Lanka
Among the 360 people working in Kodame tea estate, higher rank staff and the owner of estate were better-off people, living in bungalow far away from dwellings of labourers. Almost 330 of the lower worker were from lower caste and were the poorest ones. The dwelling of these had different blocks for different caste of people, such that higher caste lived in the same block and were using separate water source.
(Jayaraman, 1981)

The above case study is an example that caste issue is prevalent in Sri Lanka, especially in Tamil families. The same issue is also true in the case of India or Nepal cases.

One point to mention is that the above referred book was written in 1981, 25 years ago. The social structures and hierarchy is no longer the same. It has changed because of migration and more freedom to choose occupation. Whereas some kind of discrimination between the higher caste and lower caste people still exists. Even today, higher caste people have more access to educations, property right, job opportunity etc, which is illustrated by following cases.

Box 2 Caste in higher education

Kaul (1993) briefed that higher caste still has higher hold in education than the lower caste. Since higher education costs money and time, which is the reason most of the lower caste people are poor and can not afford their children until higher education. Majority of lower caste children are compelled to abort studies after secondary school. Based on 15 medicine and engineering colleges, the author found that most of the students were from higher caste and majority were boys. Therefore, this illustrates that despite of legal prohibition on caste; the situation is not so much different than in the past.

(Kaul, 1993)

Box 3 Caste in job opportunity

The lower caste people from *chamar* class in Bijnor district, India are experiencing the utility of 'formal education' as a factor for depression. Higher studies for that class of people was already tough, but after getting degrees they discovered that getting white collar job is almost impossible for them. They are always viewed as sweepers and barbers. This research showed that unemployment of educated *chamar* has increased within period of 1990 to 2001.

(Jeffrey *et al.*, 2004)

The above examples show that the social classification between the higher and lower caste is still prominent in south Asian sub-continent. The socially marginal people are deprived from benefiting from equal right than the higher class people. Such people are also prohibited to attend general meeting or are allocated separate place far away from the elite group. Also marriage within different caste is not so common in this region (Den Uyl, 1995), which limits the growth of knowledge and sharing of experience. Most of the lower caste people are the actual peasants working in the field. The landowners who are often high caste people, do not directly work in farming activities even though they are the decision maker most of the time(Starkloff, 2001).

The case of lower caste and higher caste is not of interest for this research; but since it governs the KM process, where only high caste/ class are supposed to know new things or speak out in mass or implement the better technology, this becomes issue of our interest. Very often these low caste people are also the poor one(Starkloff, 2001) and the society prohibits them to contribute in knowledge management cycle. But it should not refer that these poor farmers have no knowledge regarding their work, they do have immense tacit knowledge, but the society limits them to make it explicit or make it available to others.

Inequity

Inequity among rich and poor, high class and low class, men and women, different religious group etc can be observed in our societies. Each culture, subculture, region or

WUA has own local and heterogeneous concepts of equity. Theoretically everyone agrees with the equity among the society people but it does not occur often.

Since equity is related to rules and legal issues, the legal water right of the water user create kind of equity in WUA community. This can be discussed based on IIED series article no 85, that how the weaker water rights of the water users leads to exclusion from decision making and eventually from knowledge sharing.

Box 4 Water right and equity
This paper discusses how the water right of well off farmers differs from those with the poor and weaker water right farmers under the condition of growing water scarcity. It shows how elite men as the people having strong water rights and the poor and especially women with weak water right. Women in the sense that even though they work better, sincerely and produce satisfactorily; since they are not the documented owner of the farm, they are prohibited to get their share of water.
(van Koppen, 1999).

Water right is missing not only in the case of poor and women farmers but also for the landless farmers. If the marginal people got their share of water, they could lease some land from better-off farmers or even sell their share of water to make some living. This is a way to empower the marginal people and make them benefit from irrigation projects. It does not happen overnight and is a long and slow process, since it is nested with all other social issues. Some evidence of legal enforcement made to empower the marginal people has already started in some part of world and they are mentioned below.

Box 5 Emergence of legal approach
South African National Water Act (1998) is the first law in the world which separated land and water rights in an effort to readdress past gender and racial inequalities. Through this act, the government formally abolished the riparian water rights that white large landowners used to have.
Similarly, irrigation management transfer policy and law in Andhra Pradesh, India is also relevant here. This law ensured tenants' right in the new water users association. However, voting rights are still limited in the landowners, who actually do not perform agricultural activities themselves.
(van Koppen, 1999)

But simply imposing the law of equity does not work effectively, unless it is desired by the farmers and they are aware of their right. Equity should also be available in information right and participation in decision making. In a rural society it is often observed that higher class people, rich or large holders have better position in WUA and they are the one participating actively in all decision making process, therefore their counterpart are not aware about the current decisions and eventually lose their right (Starkloff, 2001; Van Etten et al., 2002).

Box 6 Is equity in water right or in information right?
Andhi Khola Irrigation Scheme has a well running AKWUA (Andhi-Khola multipurpose water users association) since 1997. The donors (higher contribution by United Mission to Nepal) and government decided to have land reform, where 53 marginal and landless farmers were sold land in low cost those which were bought from the large holder farmers in higher sale value. The developer also decided to allocate irrigation water in equal share, irrespective of the farm owned and it was AKWUA's responsibility to communicate with all the users. That meant large holders were getting less water to irrigate and small holders were getting more. The concept was that the poor could sell their share of water to the large holder and make some earning. But since poor were dependent on these better off high class people, and the latter had better hold in WUA, which did not let the poor people to know about this decision. For certain time it was kept secret or within the rich farmers, which caused poor farmers to allow their surplus water to irrigate in rich and large holder farmers land. Finally, the large holders are getting extra water for full farm and small holder, who finally had to depend on low wage works.

(Van Etten *et al.*, 2002)

Although rich and poor farmers had the same water right, due to lack of proper communication at the grass root level, the land and water allocation scheme could not materialise. The most important lesson learnt from this experience is that core of any concept of pro-poor interventions should have steps that directly communicate with the poor themselves, inform, consult and empower them vis-à-vis the better off farmers. If the poor farmers, landless men and women had effectively been included and listened to by the WUA from planning phase, their contribution to the conceptual design of equal land and water rights would have led to realistic concept (Van Etten et al., 2002: 19). This example also shows that WUAs are not free of local politics and discrimination.

Inequity also concerns the gender issue in the society. Irrigated agriculture is the dual effort of men and women in a rural society. Indeed, women have higher workload than the men farmers(Upadhyay, 2004) and in some cases men are out of locality for longer period and women remain the only one to carry out the agricultural and irrigation works. There are several cases that women were not initially provided direct access to irrigation in past and therefore little empirical data are available to show that women do use irrigation water for farming. When the question is about the access to knowledge system and sharing, this is even more difficult to get the quantified information of women contribution in the agricultural society. However, this concept has been changing at the present context, where the role of women in irrigated agriculture is getting recognised(Sampath and Young, 1990)..

Besides being the direct irrigator, women also have a role both in irrigation and the knowledge. They have huge contribution in maintaining daily activities, be it in irrigation or in general knowledge (Harding, 1991). For instance, they are the water manager in household and spend half of their day in provision of water to family members (Cleaver

and Elson, 2005) and therefore they have well understood the problems related to water. The concept change 'water as social good' to 'water as economic good' is marginalising the women and the poor farmers; and finally their knowledge. Since women have less control over money, they are being under looked by this kind of issues. The major concern is that marginalisation eventually means loss of women's knowledge of water resources on the effective use of water resources.

The following case shows that women get less opportunity to share their experience due to several reasons like more work load, social construction or others.

Box 7 Freedom to share knowledge

A woman innovator in Tunisia started sharing her innovation on how she used compost manure to hatch eggs when she was given an opportunity by a local radio station after two years. She could not feel free to tell this concept outside her family circle since she found difficult to spare time to talk and show this process. Radio provided her easy sharing means beyond her family members.

(Reij and Waters-Bayer, 2002: 14)

Observation on literacy rate of these countries indicate women literacy rate to be lower than the men literacy rate (refer figure 3.2). This lower literacy rate also indicates that lesser women are familiar with use of digital tools. Particularly in farmers community, this digital divide is more distinct and which has been illustrated by the case study done by Esharenana *et al.,* (2003). But this does not mean that they do not know. They possess lot of knowledge regarding water and environment, but do not usually get easy access to share what they know.

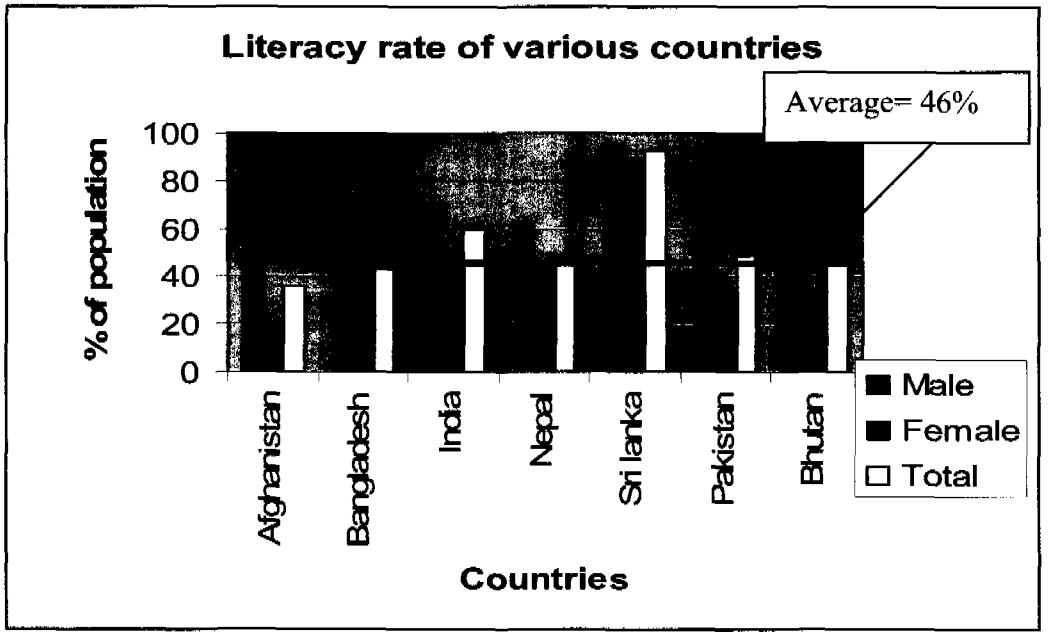
Therefore inclusion of women in the knowledge sector is needed to help the knowledge process. Cleaver and Elson (2005), propose the need of gender-aware system of management that would be able to minimise such tacit knowledge losses. Gender-aware system needs to be introduced in water resources management during the project planning, monitoring and evaluation on the routine basis. Gender aware system does not essentially refer 'in favour of women', rather it proposes that both the sexes should contribute and they should be recognised for that. Therefore, any KM/ KS work done in favour of such organisation has be able to incorporate the knowledge of the men and women, rich and poor, large holder and small holder both in the form of tacit and explicit. Any KS programme brought in practice has been able to include marginal people as important stakeholder and provide the sharing programme accordingly.

3.3.2 Education

Formal education

Education is one of the most effective approaches for knowledge resource generation, evaluation or sharing. It helps to externalise or internalise the knowledge, that means helps in both tacit and explicit type (Nonaka and Takeuchi, 1995). Similarly, it affects the personal attitude towards sharing or gaining knowledge (Syed-Ikhsan and Rowland, 2004). Moreover, it helps to improve personal cognition and also the communication skills plus brings flexibility in the social values, which ultimately cooperate in KS process (Beesley, 2004).

Education basically helps in sharing explicit knowledge through teaching, learning, training, research, workshops, assignments etc. It helps people to become familiar of using KM tools for e.g., computer, fax, internet, audio-visual aid etc. In addition, it helps in sharing the tacit knowledge through drama, trainings. The low literacy rate as shown below in figure 4.1 implies that the people from these countries have more tacit knowledge than the explicit knowledge. Therefore, KM or KS in such society can not be fully worked out in an explicit way; rather it should use both the type of knowledge as the resource for sharing.



Source: (Central Intelligence Agency, 2006)

Figure 3.2 Literacy rate of various countries

Indeed, education should not always refer to the formal studies from school or college or universities. But it is observed that formal education system has large impact on the knowledge sharing in a community. Mostly people tend to trust someone who has higher degrees; no matter what he knows is useful or not.

For instance, local knowledge is often seen as culture-specific and difficult to apply beyond a particular time and settings; while on the other hand, western scientific knowledge is believed to be universally valid. However, a farmers' organisation like WUA needs both the formal and informal education for the sustainable agricultural activities (Musiiwa, 2002).

Since irrigation WUA are composed of various generations and various tribal people, the knowledge residing in the mind of one tribe can be useful to the other tribe too. Hence transferring from generations and from tribes is necessary whether in the form of tacit or explicit knowledge. Therefore, any KS model working for such organisation should be able to address the hidden knowledge of the formally uneducated people and the formally educated people both. Therefore, merely incorporating formal education and formally educated people in WUA KS programme can not be considered as good KM model.

Indigenous/ informal education

Human civilisation shows that initial knowledge history started from so called third world now and passed through Greeks, Romans, Arabs and finally to the first world. Some authors argue that since all human civilisation took place in the area of developing country, it should still have immense reminder of that knowledge (University of California, 1996; Wheeler, 1953: 94). The knowledge and science in south Asia and in Europe of the late 16th century were comparatively parallel to each other. But after the colonisation, from 18th century the new legitimised science and technology had strong hold in the colonised Asia (Goonatilake, 1982). The same concept has been argued by (Harding, 1991: 227) with reference to Walter Rodney's *How Europe Underdeveloped Africa.*

The central focus of knowledge management is sharing what people know among each other (Ngulube, 2002). The fact is that indigenous people had a wealth of knowledge and experience in the past which is still significant resource for the sustainable development of society. According to Ngulube (2002), about 80% of world's population depend on indigenous knowledge (IK) to meet their medicinal needs, and at least half rely on IK for crops and food supplies. The importance of indigenous knowledge is getting high priorities in all sort of development work along with the concept of Integrated Water Resources Management (IWRM) and stakeholder participation.

The rapid change in lifestyle of local communities has largely accounted for the loss of indigenous knowledge (IK). Younger generations lack acceptance of the utility of IK because of the influence of modern technology and education(Warren, 1991). It is hence important that IK should be preserved and integrated into the existing knowledge management system for the benefit of society. Most of this knowledge is in the form of tacit knowledge and their codifying into explicit can be one of the solutions to re-establish them. Or, sharing tacitly can also be done in the case of within WUA or outside WUA (organisational or inter-organisational sharing).

There are some cases where the indigenous people or informally educated people are not listened to and become the most sufferers by the scientific development. We have several evidences about their opposition on scientific outcome, and rejection of some new investment (Chettri et al., 2005; Warren, 1991). This reveals that there are some knowledge gap, between the indigenous local people and formal people.

These gaps have been well analysed in a research by Forest Action Nepal which includes seven case studies done in various natural resources at national, sub-national and local level of country. This research concluded that learning process is very much affected by equity and power(Chettri et al., 2005). The very important finding is that the perception of knowledge for the officials and the locals, the head end and the tail end users were different, that sometimes created conflict between the two communities.

Box 8 Indigenous knowledge and scientific knowledge
The District Development Committee decided the canal intake construction at Lo Mangthan. The engineers constructed a new cemented intake, which later found was too narrow for the water extraction. The engineers were not aware that the local people use the same water for some other domestic purpose too. The officers soon realized the shortcoming and allowed the locals to break the construction and make new intake based on the local knowledge and technology. The farmers built 'non-engineered' intake is serving in Lo Mangthan since long time. In such case local knowledge is best suited to keep the irrigation system working while meeting the needs of the local farmers.

(Chettri *et al.*, 2005)

This implies that the strength of the social local knowledge is stronger than any science or engineering. Indeed, society and its complex relations are the source of science and technology (Kuhn, 1970). Here, the knowledge sharing seems to be missing between the local community and the concerned authority, and this is occurring in all parts of the world. The formally educated people presume that they know better than local people and hence do not see necessity to get public consent for any kind of development work. The locals however think that the degree holder has no experience and no understanding and hence hesitate to give their local idea prior to the work. This is referring to knowledge gap in between two stakeholders, which is the effect of lack of knowledge sharing among them

IIED series no 10 has raised this kind of issue which puts forward the importance, impact and evidences of including indigenous knowledge in the decision making process. It gives clear illustration how the projects failed or are not-accepted by the beneficiaries when superimposed without considering the consent of cultural and social factors in the target society(Warren and Cashman, 1988).

The other aspect of this paper is to illustrate how the local technology can be incorporated with new technology to achieve maximum output with high level of acceptability. On one hand the effectiveness of imported and superimposed technology

has been low on the other hand success of some farmer spreads rapidly and is absorbed effectively by farmers of another location. This has been found that merging of indigenous knowledge and scientific knowledge can contribute for maximum benefit has been observed in the case of Zimbabwean smallholder indigenous farmers in Manicaland (Musiiwa, 2002). Similar experience has been mentioned by Agrawal (2002) that maximum output can be gained when indigenous knowledge and scientific knowledge can be utilised with the combined effect. Here comes the role of knowledge sharing when done by the farmers themselves proves to be effective.

Box 9 Knowledge sharing through farmers
Indigenous knowledge when shared correctly can result in favour of farmers. Centuries old techniques used by the farmers in Mali by building terraces to conserve soil to boost crop yields and restore barren land, is getting popular among the farmers of Kenya. The Kenyan farmers are requesting the local Government authority to create terraces such that it can retain the rainwater and ultimately meet the dry-spells. This was basically proposed from the small-holder farmer which means the poorest of the farmers are getting aware of new technology and are trying to adapt it.
(Warren and Cashman, 1988)

This illustrates the need of knowledge sharing is getting popularity among the farmers society, who are not necessarily formally educated.

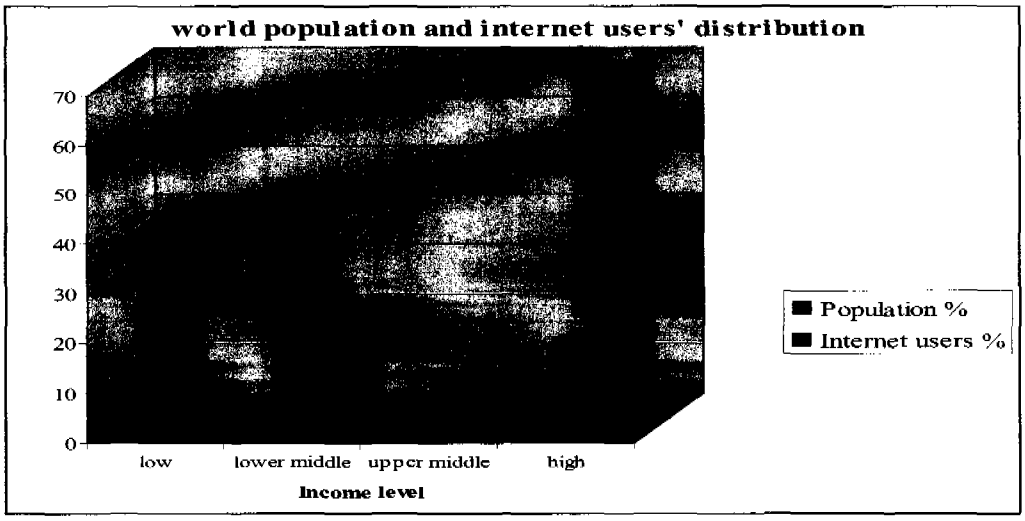
3.3.3 Technical Factors

Tools
Knowledge creating, evaluating and sharing needs some kind of tool (Price, 2004), be it dialogue or machine or something else. Ancient people discovered languages and alphabets in order to facilitate knowledge from one person to another. They used stone carvings and metal carvings to convey their information and knowledge to the later generations.

With the industrialisation the development of tools was rapid and that has given series of tools to facilitate knowledge procedure(Abbott, 2000). We have passed through the age of writing, telephone, fax, telex, radio, television, computer, mobile phone, wireless services, internet, intranet, collaborative workspace and many more recent and future developments. These tools are different in terms of approach, investment, facilities and utilities. Using the latest technology is often out of approach of the south Asian rural farmers. Therefore, the selection of tool depends on the user and the kind of knowledge.

ICT tools are no doubt the fastest means for knowledge/ information sharing. But it can not be assured that latest technology will prove effectiveness along with the speed. Let us see the distribution of internet users in the worldwide context.

World Telecommunication Development Report 2003, expresses that poorest 40% of world population has 5% access to the internet facility where as richest 16% population are enjoying 70% of the it (International Telecommunication Union, 2003) (refer figure 3.3). These digital figures show that developing countries have less access to the ICT facility. Moreover, these data are mostly influenced by the cities of developing countries, where agricultural have been displaced by urganisation. Therefore, this refers that the use of internet at the farmer's level is much more less.



Source: (International Telecommunication Union, 2003)

Figure 3.3 Distribution of world population and internet users

Now the question is; what type of ICT or tool can be used in such society? Can internet be the most important carrier of knowledge management in developing countries? How it can be carried out? What are the problems encountered in such society? Very less emphasis has been given to the KM of such society so far but we should not forget that south Asia has the highest poor population with very less access to computerised world.

Supporting infrastructures

It is afore-mentioned that selection and suitability of tools depend on the end users; in addition it also depends on the supporting infrastructures. For instance, using computer models needs technology to use computer and also the similar manpower. Providing information through internet in the place where computer literacy is very low does not help in knowledge procedure. Since knowledge sharing includes transferring and absorbing by the recipient (Devenport and Prusak, 1998), the conveyed message should be able to reach the end users. Likewise using books and magazines need transportation, storage etc that are apparently connected with suitability of the tool.

Table 4.1 Electrification in South Asia

	% electrification
Bangladesh	20.4
India	43
Nepal	17
Pakistan	52.9
Sri-Lanka	62
South Asia	42.5
World	72.8

Source: (International Energy Agency, 2002)

Another thing to be considered is the type of fuel to run the tool. South Asia, which does not produce significant fossil fuel, electricity is the most accessible type of fuel and above table 4.1 shows that they are the least electricity users in the world. Hence tools running by electricity may not be appropriate in most of these places no matter how good the tool is. In such cases, the tools which can be run with battery or some other type of portable and locally produced energy can be used. For instance, International Telecommunication Union (2003) showed that in Ghana, electrification is available for 20%, however the radio users are 47% and television users are 12%. Since radios are more accessible everywhere than other modern IT tools, this shows that some KS tools are more suitable to the rural context. The use of solar energy, bio-gas etc is getting popular in rural part of Bangladesh and Nepal, which can be one of the solutions to run the KM tool.

To facilitate the rural community, these countries have started to establish rural telecentres, such that basic tools and supporting infrastructures are made available at these telecentres and farmers can use these like library and get required information(HLCIT, 2006; Malthan and Gulati, 2003). National Radio Bangladesh started broadcasting prices of cereals, pulses, vegetables, spices and fish three times a week. In December 2003, a web site providing daily price information concerning the pilot markets was formally launched by the Minister of Agriculture. For the use of internet, a nation wide computerising has been the priority of the Government (Siraj, 2004). Similarly, Bhutan has already started 10 rural telecentres as pilot project and aims to expand it to all parts of the country (Division of Information Technology, 2006). These evidences show that some attempt to introduce computer and internet in rural context has been started, yet it has a long distance to travel.

In addition to fuel, it needs other supporting infrastructures like access road; operator for machines, spare parts etc, which are not equally available in all parts of the world. Dependency on these infrastructures have created larger gap between those who have the access to those who does not. This dependency has led the poor to worse condition while has helped to raise the better off people to improve.

The easy and budget driven knowledge sharing methodologies are popular among the developer, which is easy to document the information viz., posters, booklets, pamphlets,

announcement from radio, television, upload on its website etc. But it is found that they are less concerned whether the target community is exactly getting the message or not (Knott and Wildavsky, 1981). Therefore, improper selection of tool leads to knowledge gap instead of knowledge sharing.

Globalisation has caused dependency on each other which may be in favour of the developed countries but not in favour of developing country farmers(Jha, 2004; McMichael, 2000). For instance, the introduction of HYV seeds to the local farmers of third world also compelled them to use various kinds of pesticides and fertilizers. Although the indigenous seeds had lower production but they were also less susceptible to diseases and could be grown with local input. While with the use of HYV and modified seeds, farmers have to be more familiar with global recent developments to achieve good harvest, which is difficult for the third world farmers.

Moreover, digital divide is more widened by the globalisation of development. The accessibility to the digital tools has challenged to those who interpret KM and KS as the computer application. The knowledge management in farmers' organisations can not be done with the help of higher form of ICT as mentioned by Liebowitz (1999) or by Jashapara (2004).

3.4 Analytical Framework

The discussion above has set a number of indicators or variables that has to be worked out in any KM/ KS model to use in these kinds of farmers' WUA. It shows the breakdown of social as well as technical factors that can govern the KM process within a community. This analytical framework has been adopted to analyse the data or the selected models in order to find one best model of KM.

Some additional factors like political directives, legal issues also govern the knowledge sharing activities however due to limitation of time factor these are not considered at the present study. These indicators are specially prepared for the case of south Asian countries. Now next step will be to collect the KM models being used in organisational development on the basis of these elements.

The following figure shows the analytical framework adopted for this study.

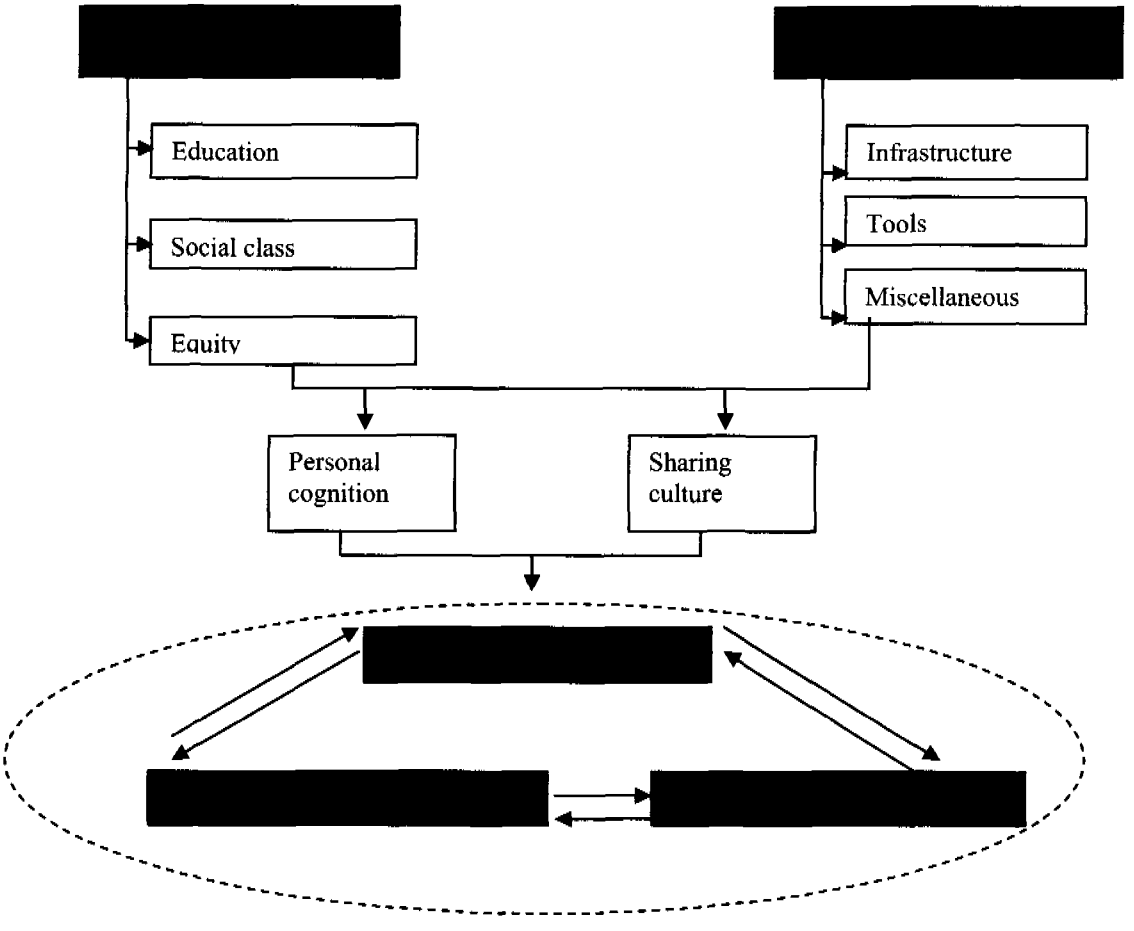


Figure 3.4 Analytical Framework

3.5 Conclusion

This chapter discussed about the water users' association (WUA) - the organisation type and the functions. It showed the development of WUAs in south Asia region and also argued that they are the largest stakeholder in food production and water users. Therefore, to ensure efficient use of water resource, it is necessary to improve the WUAs. Since WUA is much heterogeneous organisation than other business organisations, it was necessary to look at the social factors which are the backing of the knowledge process.

The next part of the chapter explored the sociology of knowledge and it attempted to gather the possible factors that can influence the knowledge process in irrigation WUA societies. Based on sociology, the two factors are explored as the social factors and technical factors that govern the KS. Social factor has been categorised into issues related to power in society. These are more stable elements, deep rooted in society and difficult to change rapidly. These factors are residing within the society but external influence can be responsible to change or modify along with time.

Similarly technical backing looks for the accessibility and feasibility of KM tool and other infrastructures needed to run the tool. Such factors are highly dynamic and hence they cause the knowledge process to keep on changing. The development at one part of the world influences the other part of the world because of these elements.

This chapter selected key indicators to be looked in the KM model which are selected in the coming chapter. These indicators also help us to weigh the validity of selected models with respect to the WUA. Hence analytical framework was set up based on the study of sociology of knowledge within the WUA societies.

So, here arise multiple questions about the socio-economic factors that influence knowledge sharing process. Is there any KM model prepared to address all these issues and all the above tools? How can we incorporate the issue like power in the future KM studies? How can we codify the immense tacit knowledge residing in rural farmers? Does it mean that power is more important than knowledge? Does it refer that, one need to be powerful in order to convey some message in big mass? All these questions are yet to be answered and they comprise the through study of socio-economical factors in various societies to find out solution to the knowledge sharing.

Chapter 4 Status of KM and KS Studies

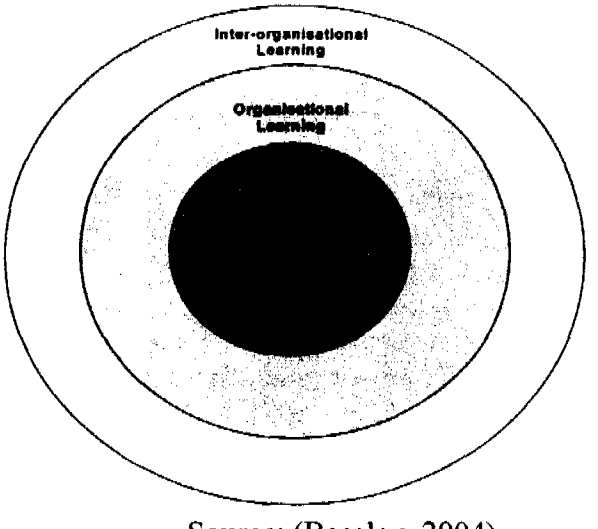
4.1 Introduction

This chapter deals with the practical aspect of KM/ KS studies as well as application. It lists the various ways that different organisations have adopted KM programmes. On the basis of sociology of knowledge and indicators necessary for the knowledge sharing programme for WUA, three knowledge sharing models have been selected and discussed in detail about the original version of those models. However, suitability of these models has to be tested later.

4.2 Trend of KS studies

Let us see the types and trend of KM/ KS studies being done worldwide. Beesley (2004) has proposed four different level of learning comprising a co-centric circle. The core is the individual learning and then followed by group learning, organisational learning and finally inter-organisational learning. This implies that one level of learning/ sharing can not take place until it has occurred at the previous level; nor it is possible to understand the process of learning at one level until understanding the process at previous level has been attained. However, a three years research of the author found that the relationship among these levels is not seen as linear but each level being nested with another.

Similar co-centric circle of learning has been proposed by Jashapara (2004), comprising of three level of sharing: individual, group and organisational. Since group and organisational sharing is not possible without completing the phase of individual sharing, all these are inter-related. The similar linkage can be observed in a community too, for instance; individual cognition, thoughts are individual characters. Culture, social values are group effect, and together all will be able to add the organisational learning. The same can be observed with the sharing too. You can not share any information to the group without sharing to individual, since a group is also formed by collection of individuals.



Source: (Beesley, 2004)

Figure 4.1 Types of learning/ sharing

These various types of learning or sharing are worth listing here, since WUA is an organisation, which involves the organisational sharing. Indeed, it also involves the individual sharing and group sharing to attain the organisational level.

4.2.1 Individual sharing

It is the basic phase of sharing. Individual sharing can occur for explicit or implicit types of knowledge or information. Individual sharing follows one to one transfer for the tacit type of knowledge where dialogue or speech or talking is the best tool. Individual sharing can be done in explicit ways too, like reading, computer surfing, watching television, listening radio etc. Since it is core of all sharing system, it is the most essential to activate the other learning/ sharing functions.

4.2.2 Group sharing

It is the second phase of learning or sharing. It is also basis of organisational and inter-organisational sharing. It is mostly governed by the social values and sharing culture of the organisation.

Knowledge management becomes effective when bodies of explicit knowledge are internalised in the form of tactic knowledge; by means of verbalising into documents, manuals and stories (Al- Jayyousi, 2005). A more explicit recognition of tactic knowledge and related human aspects, such as ideals, values, or emotions, are necessary for developing a richer conceptualisation of knowledge management.

For the practical implementation of KM theory, the four steps- capacity building, pilot activities, capital investment and collaboration with partners has been proposed by(Al-Jayyousi, 2005) in the case of Jaqra River, Jordan. These activities are designed mainly based on Nonaka's model of KM comprising of socialisation, combination, internalisation and externalisation (details in chapter 4.4.1). The similar type of KM programmes can be implemented in farmers' WUAs too

4.2.3 Organisational/ inter-organisational sharing

The organisational learning/ sharing is the group effect of individual and group sharing. Most of the current studies have been observed in the organisational level learning. The organisational learning has already been proved to be one of the success factor in the developed countries (Nonaka and Takeuchi, 1995). Its importance and various ongoing projects have been discussed by Devenport and Prusak. However, the characteristic until now has been seen that every project or every organisation has different KM/ KS model in specific but having some common factors in general.

The common features of the organisational learning/ sharing are people involved, technology available, organisational culture, individual behaviour and sometimes innovation (Bhatt, 2001; Devenport and Prusak, 1998; Moffett *et al.*, 2004; Syed-Ikhsan and Rowland, 2004). Almost all of the existing studies have highly emphasised the technology, cultural issues and personal values as the most dominant factor. The recent studies have realised the need to codify or use the tacit knowledge residing in human mind. Since the root of organizational learning is the individual learning and the group learning, it can not neglect the personal behaviour, cognition, values, culture etc and the same phenomenon is seen in the farmers' community too.

The inter-organisational sharing means sharing among two or more partner organisations. This helps in sharing the knowledge effectively; however the context and content of both the organisations should be able to support the shared information.

Some other knowledge management exercise has been observed at the researchers' level, universities and research centres, these are also organisational learning. Like for instance, International Water Management Institutions (IWMI) has adopted programme called Knowledge Centre Initiative. This programme is still in pilot phase trying to cover two levels: in researchers level and in researcher and user level in water resources sector. It has included four elements in the KM cycle: knowledge generation, sharing, brokerage and application.

IWMI's Knowledge Sharing Initiative in 2001 to 2003 focused on building an internal structure and promoted thinking at IWMI on knowledge sharing and management approaches. This initiative resulted in the creation of IWMI's Information and Knowledge Group (IKG). It brings together science publishing, marketing communication, ICT, web team and library – to provide a common set of services focused at improving the organisation of information and access to IWMI's research. But until this time its most emphasis has been observed in the researcher level, not in the farmers' level, however IWMI has higher initiatives in uplifting rural farmers' livelihood. The following figure shows the KM strategy in IWMI.

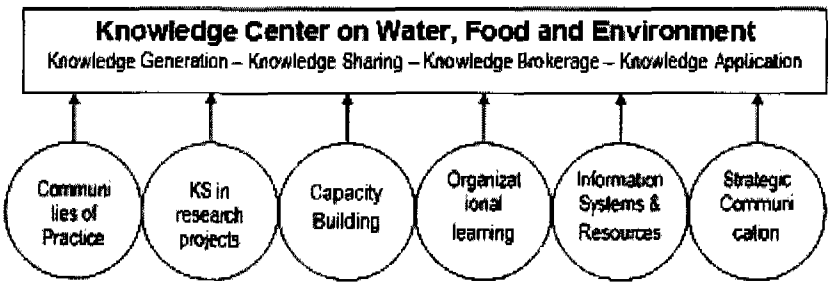


Figure 4.2 IWMI's KM strategy

Such examples show that KM is an important factor to be adopted in the organisations and WUA is not the exception in that, since knowledge is vital to all. But the question is how we can implement such principle in the case of diverse kind of organisation. Let us analyse some KM models in detail so as to check if they can used in the case of WUA.

4.3 Selected KS theories

4.3.1 Model 1

In the field of KM and KS, the model of knowledge creation given by Japanese Professors Ikujoiro Nonaka and Hirotaka Takeuchi has been widely accepted and adopted by various professionals. They are among the pioneers in the field of KM theory and are associated with Hitotsubashi University, Japan. This theory has been followed by several

researchers later in the context of several different field of development (Al- Jayyousi, 2005: 167).

The writers put forward a new explanation on how Japanese companies became successful in 70's and 80's. The argument is that the success factors are not only Japanese manufacturing process; access to cheap capita; close and cooperative relationships with customers, suppliers and government; or lifetime employment; or anything more; but also because of the skill and expertise at 'organisational knowledge creating'(Nonaka and Takeuchi, 1995). The importance of organisational learning and innovation of the knowledge has been explained with the help of examples from Honda Company, Matsushita Electrical Industrial Company, Nippon telegraph etc.

The writers agree with the two types of knowledge i.e., explicit and tacit. They argue that knowledge creation is nothing other than transformation from one type to another. They believe that knowledge creation is anchored to a critical assumption that human knowledge is created and expanded through social interaction between tactic knowledge and explicit knowledge. The focus is that the conversion is a social process between individuals but does not remain confined within an individual.

The assumption that knowledge is created through the interaction between tacit and explicit knowledge allows postulating four different mode of knowledge conversion. They are-
From tactic to tactic- **Socialisation**: This refers to informal sharing of knowledge without converting into explicit form. This occurs by one to one transfer and involves socialisation of those two people. For instance, a craftsman learns craftsmanship not through language or book, but through observation, imitation, and practices. Within different local communities, who have richness of tacit knowledge, socialization takes place in the form of informal dialogues and meetings. It mostly helps in transfer of individual knowledge to individual.
From explicit to explicit- **Combination**: It refers to the involvement of different bodies of explicit knowledge shared or combined together. Individuals exchange and combine knowledge through media such as documents, meetings, telephone conversation, computerised network etc. It shares both group and individual knowledge to either of them.
From explicit to tacit- **Internalisation**: It is closely linked with learning by doing. It includes verbalising or diagramming of documents, manuals into oral stories, tales, proverb, pilot projects, demonstration shows etc which remains catchy and retains for longer timeframe within the tongue of target people. This includes sharing of knowledge from organisation to the group and from group to the individual.
From tactic to explicit- **Externalisation**: Process of articulating tacit knowledge into explicit forms via metaphors, analogies, concepts, hypothesis or models, case studies, participatory research etc. It converts individual knowledge to group and group to organisational knowledge.

These are ongoing process and do not mostly appear separately. Hence knowledge sharing is a spiral of socialisation, externalisation, combination and internalisation. Transformation from one type to another includes the tools like dialogue/ language,

experiencing, trainings, reading, teaching, capacity building. Knowledge transfers from one form to another and hence the shared knowledge for someone becomes the creation of knowledge to another person

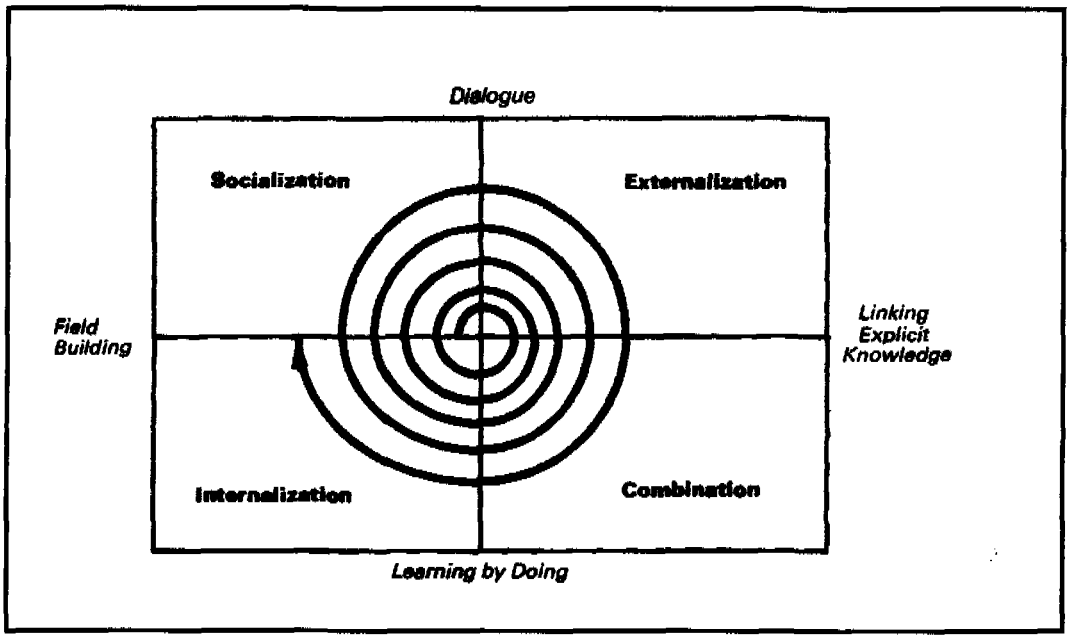


Fig 4.3 Knowledge creation spiral. Source- (Nonaka and Takeuchi, 1995)

The theory given by Nonaka and Takeuchi however is for knowledge creation in organisational level, but it has been used in knowledge sharing context too. For instance, (Al- Jayyousi, 2005; Al-Jayyousi, 2004) have explained its application in the river basin development in Jordan. Similarly it has been used to understand the KM in forest product industry (Van Horne *et al.*, 2004). UNESCO-IHE also follows the same theory of knowledge sharing within the institute. Similar knowledge spiral can be observed in farmers' community for knowledge sharing as well. For instance, any knowledge which is in form of explicit, when transfers to another person in the form of explicit, it follows various means like documents, books, computer etc which is categorised as combination by Nonaka and Takeuchi (1995). The knowledge becomes shared for sharing person and becomes creation for the receiving person. Hence knowledge sharing and creating are complementary to each other. Similarly for tacit to tacit sharing, one needs socialisation between the receiver and the donor. It is done through observation, dialogues and imitation which are not possible without socialisation of both.

On the other hand there are several critiques regarding the applicability of this model in the context of other than Japanese organisation. One of the arguments is that this theory does not give emphasis on the role of tools that can be used to convert the knowledge. Basically, these tools have great influence in sharing explicit to explicit (computer, internet, books etc). It is also needed to share explicit knowledge in the form of tacit type. Similarly other argument is that this model is too focused in social values, which when applied to US or other developed countries, will not result the same (Glisby and Holden,

2003). But this model should work satisfactorily with the farmers' community of developing countries due to the same focus on social values. Nevertheless it is worth testing for its applicability in the mentioned community.

4.3.2 Model 2

Another relevant theory that can be useful for the farmers is the model given by Syed-Ikhasn and Rowland created for the Ministry of Entrepreneur Development (MED), Malaysia. This model describes about the various factors that govern the knowledge sharing performance and knowledge assets within a public organisation. The writers have started with statement that relatively little study has been performed on knowledge management and knowledge transfer in the public sector, and even less in the developing countries (Syed-Ikhsan and Rowland, 2004) and ended up with a milestone model representing developing country context.

The knowledge asset and knowledge transfer performance have been identified as the component of knowledge management for a public sector organisation. Knowledge asset is the knowledge bank, both tacit and explicit. It refers to the store where knowledge resides for instance reports, books, journals, trainings, workshop, routine work, human mind, behaviour etc. It can not be sold or bought, it needs to be built in- house by the concerned organisation. Having the knowledge asset, it can be transferred to right person at right time. Knowledge transfer performance has been expressed as the speed, accuracy and reliability of the knowledge shared. Knowledge transfer performance can lead to advantage through speedier development and sharing to other parts of organisation that can benefit. However, speed alone will not solve the knowledge problems. Hence its accuracy and reliability has to be ensured.

They have identified five elements within the organisation that govern the variable knowledge assets and knowledge transfer. The following conceptual framework as given by the writers has tried to show the inter-relationship of the variable and the elements.

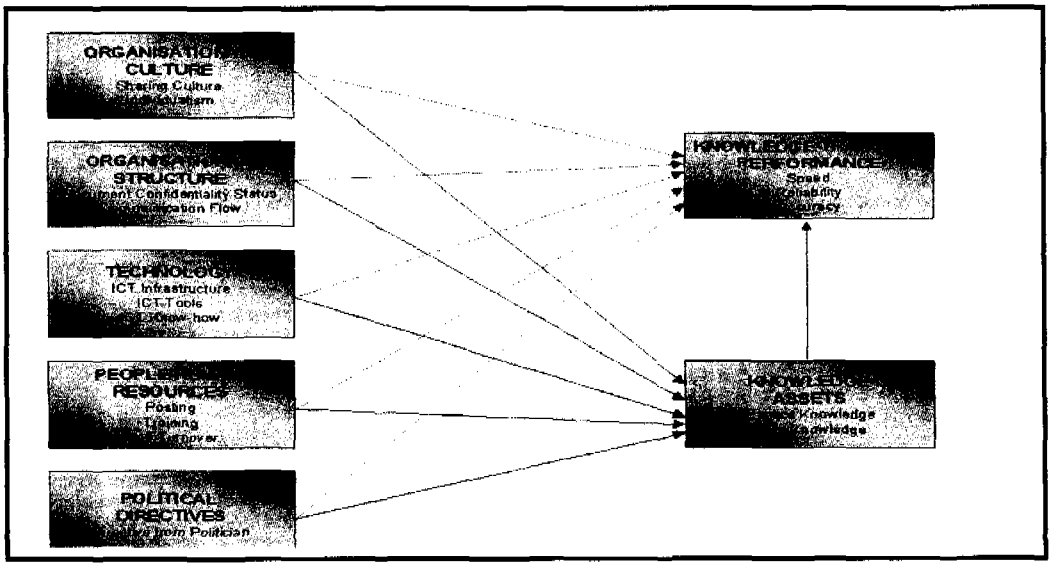


Fig 4.4 Factors affecting the KS process Source (Syed-Ikhsan and Rowland, 2004)

The role of these elements was analysed with the help of interviews among the employees and the impact of five factors over the two components was identified. For instance, it was found that organisational culture has positive and high influence; technology also has positive and medium to high influence. However, in organisational structure; communication flow had low and positive impact where as document confidentiality has negative and high impact in the two components. Similarly people involved have high impact on the knowledge asset and knowledge performance.

The study has revealed a variety of potent relationships between knowledge asset and organisational elements with knowledge transfer performance. To have a successful knowledge management strategy, organisations should always see it as a total. Although technology platforms play an important role in developing and sharing knowledge, without the attention to the cultural and organisational context in which people are encouraged to share their knowledge, technology may not be able to stimulate the flow of knowledge.

The finding of this research can be interpreted in the context of farmers too. The governing factors in our case would be social structure, culture, technology available, people and resources with political directives being indirect and light influencing factor for the knowledge sharing. These four (five) factors have either negative or positive contribution in the knowledge sharing within a farmers' society. We can segregate these as social factors- social structure, culture and people and as technical factors- resources and technology, parallel to our analytical framework. The fifth factor, political directives and legal issues are out of scope of this research.

Another factor of applicability of this model is that it was designed for a developing country, considering that lot of knowledge is in tacit form and the organisation has strong social and cultural embedded values. This is the other reason for testing the suitability of this model in the farmers' case.

4.3.3 Model 3

Third suitable model to be discussed here is given by Lisa Beeslay. This paper is the output of 3 years long research on knowledge creation, diffusion and utilisation within a collaborative knowledge network, Australia.

It has been realised that social factors play vital role in the KS system and hence the theoretical model was presented to demonstrate the KS process and factors influencing the process. This model proposes personal cognition, communication mode and social contingencies are the three major factors that govern the KM/ KS process.

Cognition encompasses all issues like personal experience and cognitive ability. Social contingencies consist of social structure, culture, power, politics, education or similar factors. Similarly, communication issues refer to the mode of channel used, mutual

understanding, language, tools, techniques used to manage the knowledge. However, the breakdown has not been discussed in detail in the paper.

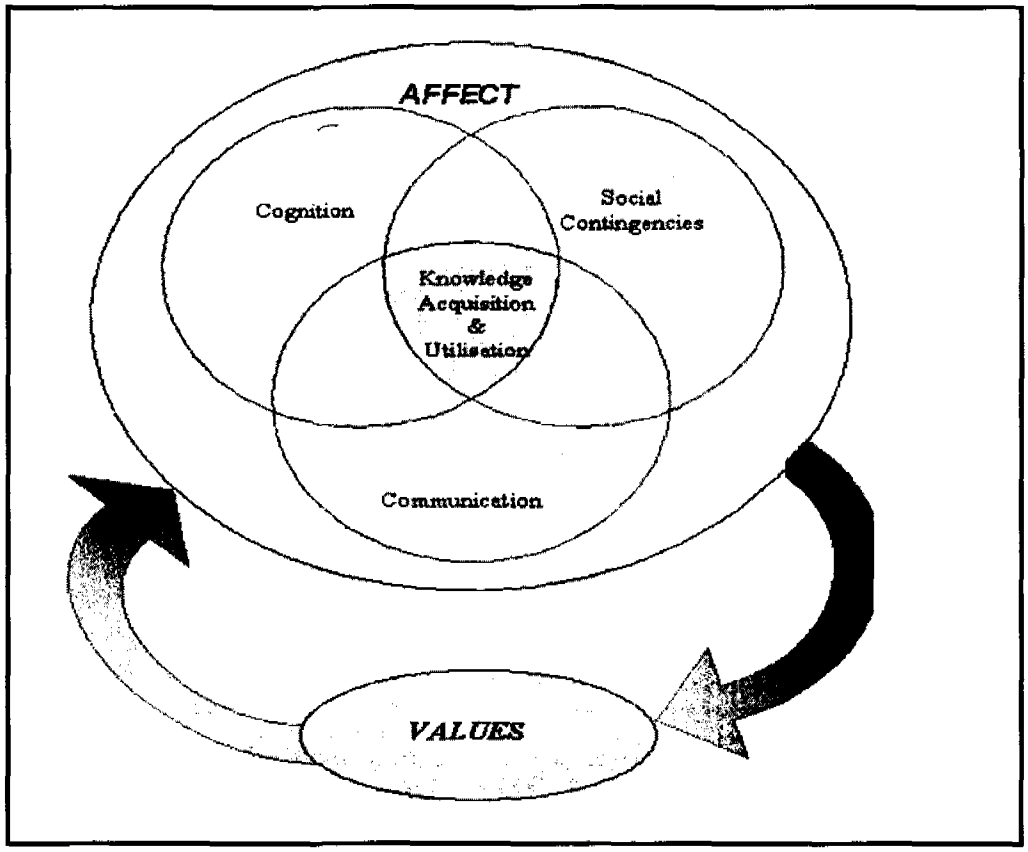


Fig 4.5 Factors affecting the KM process Source: (Beesley, 2004)

It is only when these three factors are acknowledged and managed effectively, depending on the local situation and specific needs accordant to it; there exists the potential for maximum knowledge gains. However, these factors are governed by human behaviour and the values. Values are observed to underpin the entire process since it can alter the cognition, social contingencies and the communication.

This model seems very relevant for the farmers' community too. We have already identified several socio-economic as well as technical factors governing the knowledge sharing attitude of a farmer and hence finally influencing the KM as whole (refer analytical framework at figure 3.4), the elements listed can also be observed in the Beesley's model. It has also figured out the importance of values dominating the personal KS attitude for an organisation. Since irrigation work includes combination of institutions; like water users' association, management committee, governments, stakeholders' platform, women's awareness group the KM process within an irrigation scheme should not be different from organisational learning process as given by Beesley, Therefore, it is relevant to test its applicability in the case of WUA.

4.4 Tool available

Although we have hundreds of tools to facilitate KM/ KS process, not all of them can be used in the kind of organisation of our concern. Therefore the tools that have been used in different WUA cases are clustered below into three categories. Since organisational sharing is not possible without individual sharing and the group sharing, it is convenient to cluster the available tools with respect to the type of sharing. Practically, we can diagnose each WUA society, in order to find out the suitability of certain tool.

4.4.1 Individual sharing

a) Dialogue/ speaking- This is most suitable tool for communicating in remote and illiterate society. Speaking one to one is very much effective in WUA farmers where social classes have wider gap, where the women do not or can not talk in mass meetings, where lower class people can not face the high class people. Moreover, it does not need any running fuel, whereas it needs qualified/ appropriate man power. The people who can share common language can share the best, therefore such a dialogue has to be in local language(Devenport and Prusak, 1998). It helps to share tacit knowledge in a tacit way.

b) Posters/ picture/ photos- Hanging posters or photos is another effective way of information/ knowledge sharing. For the illiterate society, posters with pictures and less text can be useful, which does not segregate the women, poor or marginal people from watching and learning from them. However for literate society, posters or pamphlets with texts and explanation can be used. It helps to internalise the explicit knowledge in the form of tacit knowledge. Similarly it helps to externalise the indigenous or tacit knowledge in the form of knowledge mapping.

c) Radio- Awareness telecast from radio is another convenient method for illiterate and remote society. Anybody who can afford radio can get awareness regardless of being marginal people, women or powerless people. (International Telecommunication Union, 2003) has shown that radio is the most suitable kind of ICT application in the region with least development of infrastructure. This can be effective in literate and illiterate, gendered and non-gendered or stratified society. This contributes in sharing explicit or tacit knowledge in tacit form, and comes under the category internalisation, as proposed by model 1.

d) Books- Books or magazines can be good means of explicit knowledge sharing, where the literacy rate is relatively higher. The awareness program can be included in regular text book, or can be published in magazines or newsletter. Rural agro-library are getting popularity in some of the pilot projects(Esharenana et al., 2003; Malthan and Gulati, 2003). Books and magazines are the means of sharing explicit knowledge in the form of tacit or explicit both hence it corresponds to Nonaka's combination and internalisation stage.

e) Telephone- In accessible places, farmers can get necessary information by telephone. For instance, flood warning or market price or some immediate information sharing is started in rural Bangladesh. Indeed, it needs proper infrastructure. However, at least one

PCO has been proposed in every village development committee in Nepal, which can serve for emergency means of knowledge sharing. This can be useful in any kind of society, irrespective of gender, class, indigenous or migrated society.

4.4.2 Group sharing

a) Documentary movies/ television- Television telecast or documentary movies on seed selection, discharge measurement, awareness for community participation for maintenance etc are very good means for group sharing. This is effective in both high stratified and less stratified society, provided that running fuel and operating manpower are available. For stratified society, separate show for women or marginal people or *Dalit* can be done to respect the ongoing culture (Chettri et al., 2005). It supports in internalisation phase as mentioned by Nonaka's model.

b) Demonstration show- This can be done by pilot project. Demonstration done by the farmer can be better communicating than the one done by an external or expert. This can be effective in both either high stratified or less stratified society. It contributes in the phase socialisation, externalisation and internalisation.

c) Focus group talk programme- This is a good means of group sharing where all like minded people can share knowledge within each other. It is specially done in the stratified society, where lower class people or women are made aware of the current issues/ knowledge. Van Etten *et al.* (2002) has shown that lack of focus group discussion targeting the poor and marginal farmers led to the failure of land and water allocation programme in Andhi Khola Nepal. Therefore, talk programmes for lower class people, women, tail end users, illiterate people or any other strata of society has to be conducted separately in order to flow enough knowledge and information. This helps in socialisation, internalisation of expert knowledge or externalisation of local knowledge.

d) Cultural/ awareness programme- Songs, dance or drama showing local culture and use of new technology, use of indigenous knowledge or similar sharing can be used to share information. Songs inspiring health and sanitation are very often heard from the rural women while in fetching firewood, cattle fodder or water. This can be a good means in illiterate rural society, where people can understand words but can not read alphabets. It internalises and externalises the tacit and explicit knowledge.

e) Use of computer model or internet- This can be a good means of knowledge sharing, if the society is rich in infrastructure and familiar with the tool. Computer models for frequency of irrigation, crop water requirement, weather forecasting etc can be shared with the farmers which helps them to use water efficiently. Similarly, market price, new technology, fertilizer or any other relevant information can be easily transferred through internet. The South Asian country Governments have started rural computerising at pilot projects. The sharing computers are placed at school or hospital or local PCO, such that all farmers can use in nominal fee and get necessary information(Division of Information Technology, 2006; HLCIT, 2006; Malthan and Gulati, 2003; Siraj, 2004). The use of computer and internet contributes in sharing explicit knowledge in the form of explicit.

4.4.3 Organisational sharing

Organisational sharing includes all the tools as mentioned above in individual and group sharing with some additional as briefed below.

a) Workshops- These are helpful in sharing inter-organisational or organisational knowledge, where farmers workout in group about their knowledge and share among themselves. Knowledge mapping or personal cognition of indigenous people has gained lot of popularities these days(Lawas and Luning, 1997). Specially, in developing countries, these kinds of workshops are very much useful to externalise the tacit knowledge residing in the mind of rural people.

b) Regular meeting- Regular general body meeting of WUA helps in communicating the recent status of irrigation scheme, problems encountered, arrival of new seed or fertilizer or technology. It also helps in conflict resolution, maintenance planning, fund raising, water theft etc. However, it may not effectively work where women or marginal people are not recognised as WUA members or are not motivated to attend the meeting due to social or economical problems(Merry and Baviskar, 1997; Van Etten et al., 2002; Zwarteveen and Neupane, 1996). Several of such regular meetings are dominated by men and high class people and they may not be able to reach all the general members hence the frequency of such meeting has to be planned according to the type of WUA society.

c) Awareness programme- Such kind of awareness programme might be organised by WUA or anyone else, which helps to share explicit knowledge in the form of tacit (internalisation). This kind of programme is effective in stratified society with gender, caste and education gap, such that target group is discussed with relevant type of awareness(Chettri et al., 2005; Zambani, 2000). These are mostly more effective than the regular general body meeting, since each group of people feel free to communicate in such meetings.

4.5 Conclusion

The above sub-chapters show that current KM and KS study has been observed dominating in the field of organisational level suitable for a developed country. Although there are separate model for separate organisations, they have some common features as personal issues, social issues and technology available. Based on this fact, three most suitable types of models are selected to test for their validity in the case of WUA. These common factors coincide with the elements mentioned in the analytical framework.

The most widely cited KM principle is the one given by Nonaka and Takeuchi (1995). It shows the role of social, cultural, personal, technical factors necessary for any phase of knowledge cycle. Next model is selected based on its key factors organisational culture, organisational structure, people concerned and technology (Syed-Ikhsan and Rowland, 2004). Final selected model has components like personal cognition, social contingencies and communication technology, all governed by values(Beesley, 2004).

We have already mentioned that KS is tool dependent, but all tools available in the world may not be feasible in the WUAs. Therefore this chapter also discussed about the various types of tools that are feasible in rural farmers' WUAs. The organisational sharing of WUA has to pass through the phases of individual and group sharing; hence the total available tools are clustered accordingly.

The move towards a knowledge-based society requires a fundamental shift in thinking about the methodology of managing information resources generated by society. Several KS models have been based on acquiring, organising and preserving recorded and codified knowledge, which is largely generated by researchers, laboratories and research institutions. The above models have been prepared for some other organisations with more homogeneity in nature. They have been selected after an extensive study of available models for KS and based on the elements mentioned in the analytical framework.

Chapter5. Data Analysis

5.1 Introduction

This chapter weighs the selected 3 models of KS against the influencing factors of WUA as mentioned in the analytical framework (figure 3.4). It evaluates the models for both the social and technical factors along with the breakdown of them as stated in chapter 3. The weighing of these models helps us to understand the knowledge procedure and the essential components of KS model to be used in WUAs. Based on data analysis, this chapter also proposes a comprehensive KS model with the essential components of KM model to address the society of WUA. It clusters total tools available such that selection of tool for proper purpose and proper target group becomes easy.

5.2 Evaluation of models

Model 1 is a theoretical model given by Japanese professors, in the context of Japanese organisations. While Model 2 is the application model developed to apply in a public organisation in Malaysia. Similarly, Model 3 is the application model developed to apply for inter-organisational sharing for the private companies at Australia. Let us analyse the models with respect to the social and technical factors governing the knowledge issues (refer to figure 3.4). It needs to be weigh the validity of the theories in the case of irrigation WUA of south Asian countries.

5.2.1 Social factors

Social stratification (caste issue)

The process socialisation as specified by Nonaka and Takeuchi (1995) describes close relation among the different class of people. It says different class of people should have close relation with each other to share the tacit knowledge. But since this model was developed in Japan where social class is not a big issue, this theory has not mentioned explicitly towards the knowledge asset of marginal or lower class people.

One of the governing factor for knowledge as stated by model 2 is organisational culture and structure. Therefore the issue of social class and caste can be referred under organisational structure. However, the original version of this theory has not mentioned about the different levelled people. Indeed, it tells that confidentiality has lot to do with the knowledge sharing and from our section 3.2.1; we have seen that knowledge is sometimes made confidential or secret by the elites and higher class people. This means, the lower class people or *dalits* are even more marginalised if not considered as one of the supporting class for knowledge asset and knowledge sharing.

Social stratification and caste is one of the important factors in South Asian continent, which falls under the social contingencies as mentioned by the model 3. Moreover, the author has mentioned values as the underpinning factor, which makes the position of social class issues more secure in the model. This model shows the relation of social class with respect to the knowledge process.

Inequity

Inequity between the rich and poor, between the men and women are another issue that governs the knowledge in WUAs. Model 1 addresses very little about the equity case, since the kind of organisations in Honda, Matsushita or Xerox is different from the WUA of Bangladesh, Pakistan or Nepal. Some indirect glimpse of equity can be categorised under socialisation and combination process.

Inequity case can be sensed in the factor organisational structure of the model 2. Though this theory directly does not address such kind of equity issues since, the purpose it was prepared for different kind of organisation having different kind of equity issue (refer 4.3.2). However, for a farmers' WUA which has large variation of equity cases, this theory has indirectly addressed within its components.

Social structure and social values are also related to inequity issues between the rich and the poor, between the large holder and small holder, between a formally educated and informally educated, between a high class and a low class farmer and they have been interpreted in model 3. These issues although might sound minor, are affecting the everyday life of the people in developing countries. This model seems to address this issue by the social contingencies and the social values. Also this issue can be represented by the personal cognition or individual cognition.

Indigenous knowledge/ education

Since model 1 is based on use of modern science or technology, it has not linked the importance of indigenous people or knowledge. However, it has been already discussed in section 3.3.2 that IKs are highly responsible for the irrigation work, and since it resides on every farmer, neglecting this section can not properly address the KS of WUA.

The model 2 has not addressed the need or role of indigenous people or indigenous knowledge. One thing to be mentioned here is that, this model was prepared keeping in the mind about the formal educated people and hence has no room for the indigenous knowledge education. However, it mentions that KS is dependent on people concerned and in a WUA community, there are people of various generations and various origins where the indigenous knowledge keeps important role. Therefore, this model can be interpreted to represent need of IK in a faint manner.

Sometimes, indigenous knowledge is residing in personal cognition and social values; in this context the third model has indirectly and slightly addressed this issue. However,

proper evaluation of indigenous people and indigenous people seems insufficient in this model as well. Here, the context where this model was prepared has vital role. Since the role of indigenous people and knowledge was not an important issue in Australian collaborative network; this model seems weak in addressing the importance, role and conservation of the indigenous knowledge and people.

Formal Education

The knowledge conversion cycle as given by the Japanese authors (model 1) has given high importance to the formal education. They have discussed that education helps in combination, internalisation and also in externalisation processes. For instance, research, pilot projects, case studies are often done with the help of formally education people and local people which eventually externalise the embedded knowledge of the local farmers. Similarly, for a research to be put into practice it becomes effective by converting into drama, documentary, manuals, oral stories; which is the phase of internalisation. This process can be made more easy and effective among the educated people than in the uneducated people.

The model given by (Syed-Ikhsan and Rowland, 2004) states that people or human resource has large influence on the knowledge asset and knowledge sharing. The way people are trained or educated or posted in work can determine the quality of work performance. This is also valid in the WUA society. However, for rural farmers, education should not be limited on the formal education. The practical or religious education sometimes provides immense knowledge than the applied science education

Education is responsible to change and quicken the personal cognition. Similarly it also facilitates the change in social contingencies that means finally it helps in change of knowledge acquiring and utilisation. It also supports in operating the KM tools, which means it helps in the communication factor too, as mentioned by the model 3.

5.2.2 Technical factors

Tools and infrastructure

Tools definitely help the knowledge at every phase of KM cycle. Its role is very important in the phase externalisation, where the knowledge of a local people has to be made more explicit or codified to convert into the usable form for other people. Tools also help in the internalisation and combination. The most important tool for the socialisation is the dialogue between the interacting people. Selection of tools however has to be done based on the end user, and this theory puts no restrictions on the tool use. All these aspects are explicitly mentioned by model 1, therefore we can consider this model has covered the technical factor to a sufficient level.

The model 2 supports the need of appropriate tool at different types of knowledge sharing and we have already discussed sufficiently about the need of supporting infrastructures to run or operate or install the tools. Therefore the need of tools and infrastructures are properly addressed by this theory. However, the original version of model emphasised on the use of ICT and internet, which may not be satisfactory tool in the WUA cases. The model has mentioned that role of technology is very important to create knowledge asset and to facilitate knowledge sharing. But it has not provided freedom to select different tools for different purpose; hence from this aspect we can conclude that model 2 has slightly addressed the WUA.

The third model has provided one third weight age to this factor both in the tool and infrastructure. The factor communication includes language, tools techniques, channel used, mutual understanding etc. These play an important role in transmitting knowledge, codifying and generating, hence overall KM process. To use and support tools, the proper infrastructure, fuel, manpower are necessary, which is represented by term communication in Beesley's model. Therefore, tools and technology are being well addressed by all three models also allows flexibility in their selection.

5.3 Limitations

The first model has addressed the most influential factor of WUA in a very faint mode. That refers to the social part. Since it was not developed to an organisation like WUA, it has very little room for social issues which need strong point in practice. On addition it does not meet the role, importance, contribution, abortion or reinstallation of indigenous knowledge or education. Some critics, who think KM is not much about social issues, have argued that this theory is not suitable for the application in the country other than Japan (Glisby and Holden, 2003: 32). But since our organisation needs more social issues to be addressed, this theory seems to be partially addressing a WUA. This model provides clear picture of the knowledge process within an organisation and the mode of conversion from one phase to another. This model can be considered in order to understand how KM works within a WUA. It also highlights the need of knowledge conversion from one form to another, i.e., tacit and explicit. Since different type of knowledge require different kind of tools, it is necessary to understand the utility of tools.

The second model seems more flexible with the scope of factors governing the KS and knowledge process. It has clearly focused the culture, society, technology and people concerned. However, it does not describe in detail about these factors in the same way as we have identified in section 3.3. The issues like gender, class, equity and indigenous knowledge are indirectly addressed in these factors. Since this model was prepared to apply in a public organisation which was different from our organisation, this created limited applicability in the case of WUA. Indeed, the model can be translated in the case of WUA with some amendment depending on the farmers' society and WUA type. The implication of using this model may result more emphasis on the tools and human resource management issues.

Other limitation of this model is that, it is an open loop system. That means the five factors can contribute the knowledge asset and sharing, whereas it does not show the relation that when knowledge sharing and asset are increased it also upgrades the five factors (refer chapter 4.3.2). Knowledge matters tend to be cyclic process, which never comes to an end however according to this model the continuous cycle is not necessary.

The last model seems to address WUA better than the earlier two, irrespective of the situation and place where it was developed. The author has provided high emphasis to the social factors, which are the key elements in organisation like WUA. However, the issue like role of indigenous knowledge and people has been least addressed by this model. It seems to be weak in the case of gender issue too. This model however needs more explicit breakdown in order to understand the underpinning factors and to prioritise the issues.

5.4 Summary

Table 5.1 Comparative assessment of the models with respect to analytical framework

Theory	Class	Equity	Education	Tools	Infrastructure
(Nonaka and Takeuchi, 1995)	+/ -	+	+	++	++
(Syed-Ikhsan and Rowland, 2004)	+/ -	+/ -	++	+	+
(Beesley, 2004)	++	++	+	++	++

Legend

++: strongly addressed
+ : addressed but with less emphasis
+/-: indirectly addressed
-: faintly addressed
--: not addressed

The model weighing has been done on the basis of extent of discussion in the original models and their applicability in our context of WUA. If the issue which has been identified by analytical framework has been exactly mentioned by the model then weight ++ has been assigned. While if the issue has been mentioned but with less weigh then + is assigned. Similarly, +/- has been assigned if the issue is not mentioned in the component explicitly, but we can presume the issue to be one of the breakdown of the component. Likewise, if the breakdowns are mentioned and the issue listed is not present in the original model, then value – has been provided. Lastly, if the component as well as the breakdown has missed then the weight -- has been assigned.

The above table illustrates about the validity of selected three models with respect to the analytical framework. It shows that the model 1 given by Nonaka and Takeuchi (1995), despite of its large citation and use, has least addressed the WUA. It is a good model to

understand the knowledge phenomenon within a society but does not clearly discuss about the social aspects as per our requirement. Although it has emphasised the processes taking place in a society (socialisation, internalisation), but it does not mention the components involved in this regard. It has not specified the extent of social issues in the process of socialisation. It sounds good in terms of technical issues since the authors have discussed about the role of tools and technology in each four steps of knowledge transfer.

Similarly, model 2 mentions about the organisational culture and organisational structure, which can be interpreted towards the social issues as mentioned in analytical framework. But it does not show the breakdown of these structure and culture. It sounds strong in addressing the technical factor but it explicitly mentions the use of modern ICT. But in the case of WUAs of south Asian region, use of ICT is limited. Moreover, it points out the influence of people concerned and organisational culture which should in our case refer to the social issues as listed in analytical framework. But since this model was created for a more homogenous organisation than WUA, the kind of social issues meant by Syed-Ikhsan and Rowland (2004) was different that what is prevalent in south Asian farmers' organisation. The implication of this model to be used in WUA needs refining and defining of the issues related to social and personal values.

The third model has been able to cover the factors to the maximum extent among all three. It gives equal weight age to personal, social and technical issues, which is a strong aspect in itself. In addition, the importance of value embedded in personal, social and technical aspects is another strong point in this model. The breakdown shown by the author is slightly different than what we are looking for (refer chapter 4.3.3). Therefore, it is also not the best model to be implemented in the WUA for knowledge management/ sharing. However, some minor improvement on this model can provide sufficient space for indigenous people, gender issues and social stratification.

Since all of these models were not prepared specifically for irrigation WUA, they have relatively small room for the social issues which is deep rooted in farmers' organisations. The above table 5.1 shows that none of the available theories are ready to be used as theoretical model for farmers WUA in south Asian belt. However, now we already know the key factors to be addressed by such model. Beesley's model is good but it needs to be more explicit in the breakdown of the personal and social contingencies. Therefore, proposed model developed for such type of organisation, however has to be similar to the model 3. The proposed model serves as base for the application of KM/ KS process and becomes the basis of application model derivation. The application model can be prepared in order to implement sharing programmes and to choose correct tools for the correct purpose and it will be specific to each WUA.

5.5 Discussion

The proposed KM model has to include three key factors as personal cognition, social contingencies and technical factors. Under personal cognition, issues like personal value, sharing attitude, patent right, indigenous knowledge, and type of education are to be

addressed. Since personal or individual sharing is the first step of organisational sharing, it needs equal weight age with all other factor.

The second issue in proposed model is the social values and contingencies. This should essentially contain social as well as economic issues like gender, equity, power, classes, castes, religion or law. The model has to have enough room for high stratified to less stratified societies in the sense of power, equity and gender. It has to consider formal educated or indigenous/ informal educated people who can possess agricultural knowledge within the WUA. Similarly, the issues addressed by local law, customary law and religion also becomes a part of social factor that govern the knowledge sharing, which are however out of scope of this thesis.

Lastly, the issue related with communication tool is another equal weight factor in KM/ KS model. The technical factor has to incorporate wide range of tools available and their suitability in specific WUA. Each tool has specific utility and can work for certain kind of knowledge either tacit or explicit or sometimes both. Therefore all tools are not appropriate in every situations, hence there has to be clear understanding of the tools and the local situation. The tool selected should obey the local social aspects and sometimes separate group of people has to be dealt with separate tools in different ways. The use of tool has to follow the kind of society, i.e., high stratified or low stratified conditions. The following table helps us to understand role of each tool in each type of knowledge and the process occurring in the society.

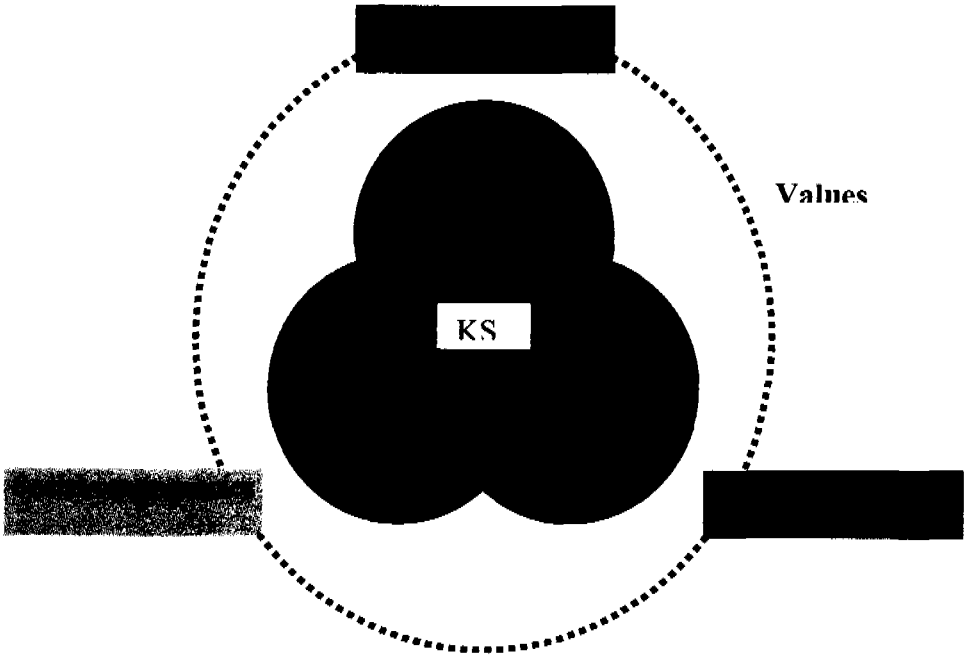


Figure 5.1 Proposed KS model for WUA

The above figure 5.1 shows the proposed model which has been inspired by Beesley's model for the components. However, the breakdowns of the components have been proposed as discussed in the chapter 3.3. Such a model is proposed to address all the issues relevant to the WUAs of south Asian. It has incorporated all the issues that occur due to the various kinds of stratification like social, economical, educational and technological.

However, the intensity of these social factors is different in each WUAs or farmers' organisation. For instance, education might be an issue in Nepalese highland WUA, but may not be issue in Sri-Lankan scheme. Women and men working together might be difficult in Islam culture but may not be a strong issue in other WUA cultures. Likewise caste issue may be important in WUA in Hindu society and not so much in other society.

Availability of tools and infrastructures are also different in different WUAs. The types of tools used in physically accessible WUA can be different than the tools in physically inaccessible place. Likewise, availability of electricity also limits the use of tools in various WUAs.

Chapter 6 Conclusion and Recommendation

The main objective of this research is to explore the work done in the field of knowledge management which is suitable for the farmers' organisations of south Asia. In addition, finding the factors governing the knowledge procedure within a WUA society is second part of this study. The following sub-chapters have tried to answer the issues raised in the research questions.

6.1 Knowledge Management/ Sharing

Since KM is a relatively new concept, dominantly being used in business organisations, it lacks a common agreed concept, definition and methodology. A detailed study in this sector shows that there is relatively very less work done for the context of developing countries. And for the farmers' organisation of developing countries, no much attention has been paid. However, need of such kind of activity has been realised in WUA community (Abbott, 2000; Cleaver and Elson, 2005).

Organisational knowledge is the result of series of knowledge activities both in individual and group effect. Therefore, to achieve organisational sharing one should also look at the individual sharing and group sharing. The current practice of KM has been observed in the organisational sharing/ learning and have realised the effect of individual and group sharing/ learning(Beesley, 2004; Jashapara, 2004).

The organisational knowledge sharing being used in business organisations differ to a large extent from each other, however lot of them have common features as the issues related to people and technology.

6.2 Social factors

The other issue raised in research question was to find out the factors that govern knowledge process (generation, evaluation or sharing) in an organisation like WUA. Knowledge in a society is the output of spontaneous social interactions(Kuhn, 1970). It is governed by socio-economic factors and some other like the tools and global development(McMichael, 2000). The social factors are deep rooted within the society and are difficult to change within a limited time frame. These can be categorised under the issues related to power and technology. Power in a society comes from economic class, social class, gender, equity matters, education and indigenousness. These are linked with each other and are very difficult to segregate.

Since KM is highly dependent on tool, the kind of tool available and its effectiveness has huge effect on the speed of knowledge sharing (Price, 2004). Indeed, tools are also dependent on other factors like running fuel, transportation facility, operating manpower,

spare parts, maintenance etc, therefore globally available all kinds of tools can not serve the rural developing countries.

The theoretical KM /KS model for developing farmers can be generalised to a common model which is influenced by Beesley's model. Such a model consists of three components: social contingencies, personal cognition and technical factors. The breakdown of these three factors is based on the sociology of knowledge. Personal cognition refers to personal attitude, education type and level. Second factor social contingencies include social stratification, economic stratification, gender issues and culture of the WUA society. Finally, technical issues includes the facts related to type of tool feasible depending on the infrastructure available, type of knowledge and type of society of WUA. However, the implementation model shall be different for each WUA, since each WUA is different it its own way. Each WUA is different in its role, responsibility, legislation, culture, composition, technology and various other factors. Therefore, the KS implementation will need further work done based on specific WUA.

6.3 Recommendation

This study can be considered as the starting point in the field of suitability of KM in the context of farmers' organisations. Some of the recommendations that can lead to the actual implementation of this work are listed below.

1. KM can be one of the various ways to develop the water management such that the rural life gets better from its application, but it needs special attention to use KM in such societies.
2. Knowledge and its management has to be realised to be important in all fields and attempt to put into practice has to be started. This is basically important for the developing countries in order to compete with the global effect of the development.
3. Application of KM and KS has to be realised by the concerned Government, non-government departments, river basin authority or the WUA societies themselves.
4. The weight age of the social factors as mentioned in the proposed model (refer figure 5.1) will be different for different societies and it needs to be worked out during the application of the model.

6.4 Recommendation for further study

1. The concern of social and technical elements raised by this research has to be checked for their completeness through some case studies from different WUA of south Asian countries. However, some miscellaneous factors like legal issues and religious aspects, which were not considered at this time has to be incorporated.
2. The proposed final model comprising of three components as personal cognition, social contingencies and technical issues needs to be validated through field data. The breakdown of these elements as presented by this research should be valid to all kind of WUAs.

3. More work can be done regarding knowledge creation/ generation and knowledge utilisation, such that all phases of knowledge management is dealt with the case of such organisations.

These steps can lead to the development of a gendered-KM model appropriate to use in a WUA to create an effective knowledge society as recommended by (Cleaver and Elson, 2005; Long, 2001). Thus, such model can be helpful for the effective operation of WUA and ultimately efficient use of water resource in the irrigated agriculture.

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