ANALYSIS OF PRINCIPLES FOR ADAPTIVE KNOWLEDGE MANAGEMENT ON PILOT FARMS

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ABSTRACT

Knowledge management offers a great opportunity to farmers to grow on the market, be more flexible for market needs and develop new products or services for their production. Information systems are a crucial part of Knowledge management referring to all the interactive technology needed to store and manage information. Farmers have a wide scale of possibility to acquire knowledge in their daily decision making process within the farm. That also means that information can be processed in many different ways by farmers or computers, depending on the best suitable way for every farmer. Generally, differences exist regarding tradition of each country, structure of support for farmers by government, educational sector or market services and others. In the near and far future there is a significant development and growing influence of the last two mentioned. These external drivers play and will play an important role in the adoption of Knowledge management in the farm. Educational sector, farm services and farms start to use computer and internet connection more and more not only for data processing, but also for the rising communication with other people through the internet. Basically, farmers need to be innovative to find the best solution for growing their opportunities and improving their business process in the market.

Keywords: Knowledge management, farms, education sector, MapServer

INTRODUCTION

What is adaptive Knowledge management? The rapidly growing economies and changing environments define the emerging need for new resources that will endow businesses with higher value. Knowledge has been recognised as a valuable asset in today's economies, as when managed properly can add value to the firm. Consequently, the acquisition and management of knowledge are of major importance issues. Businesses that have adopted knowledge management practices outperform in today's knowledge-based societies and gain a significant asset, enhancing their

competitive advantage. The increasingly competitive marketplaces and the growing business world have signified the intrusion of knowledge. The amount of time is restricted to activities that are cost-effective and keep the firms competitive while at the same time workforce is reduced, resulting in the loss of knowledge held by them. The complex systems and the constant need for long life training depict urgency of acquiring, sharing and managing knowledge. 'Knowledge management represents the ongoing relationship between people, processes and technology systems involved in designing, capturing and implementing the intellectual infrastructure of an organisation. Also, it encompasses the necessary changes in management attitudes, organisational behaviour and policy. It is what enables people within an organisation to develop the ability to collect information and share what they know, leading to action that improves services and outcomes' (Petrides 2004). Knowledge management should create value to the customer and turn profit to the firm. It is clear from the definition that knowledge management goes one step further from the simple concept of information systems and entails other two factors, people and processes. The relationship of those should be ongoing, constant and changing which take us to the concept of adaptive knowledge management. Economies grow, develop, and change incessantly. Also, national or regional differences which occur from different culture, sizes, needs, and infrastructure demand adaptive knowledge systems which will be flexible enough to adjust to variable situations and circumstances. Consequently, knowledge management is not a standardised process that can add value to all organisations or is effective to all cases but should be adapted and customised to reflect different units.

SMES Prevailing Environment And Culture

After we have developed the concept of knowledge management and its adaptive nature we will elaborate on the distinct characteristics of farming industry. Farms, with some few exceptions, can be either small or medium size businesses according to the number of people they employee and thus, differ significantly from the large organisations in the way they are organised, managed, the quality of workforce and infrastructure. The close employee relationships empower knowledge sharing during the frequent face-to-face meetings. Managers acquire knowledge about the tendencies in the marketplace as well as innovations and new product developments within firms-competitors from the close contacts with customers. However, even if SMEs environment can facilitate knowledge management in some ways there are also factors that impede the successful implementation of such practices. On the one hand, managers of SMEs have limited time to deal with knowledge management issues and they are restricted to day-to-day activities necessary for the survival of the business. The mindset of the manager which leads and orientates employees does not promote the acquisition and sharing of knowledge as it is considered of minor importance. On the other side, employees don't acquire task-specific skills as their variable duties and tasks to accomplish thus, that knowledge is difficult to be captured and systemised. Moreover, systems and procedures are not formalised restraining the adoption and insertion to a formalised knowledge management system. Also, personnel is inadequately qualified for the operation of information systems and needs training, a time consuming and costly option. Finally, the high rates of

resignation, faced by small and medium size businesses lead to substantial loss of knowledge, as employees take it with them and thus, it's lost from a business asset if not previously be captured (Wong and Aspinwall 2004).

The dominant culture of farms combined with the unwillingness and fear to share knowledge, make knowledge management difficult to occur. On the other hand, knowledge management can help in decision-making, learning, innovation, efficiency, improved competency and value creation that is why farming should reconsider the long-term advantages of adopting such a system and invest more time and funds in that direction. In addition, the tacit of knowledge held by farmers is another characteristic that should be treated carefully. Tacit is the knowledge that cannot be verbalised and derives from personal experience, insight, beliefs and values. It remains in people's head and should be externalised in order to add value. Explicit knowledge on the other hand can be articulated and is usually stored in databases. While explicit knowledge can be easily captured and stored the case differs for tacit knowledge (Barclay and Murray 1999). But what are the principles for an adaptive knowledge management in the rapidly changing environments? Specifically, we should find ways that farm businesses will remain flexible enough to adjust whenever resources, circumstances, technology availability, culture and needs differ. Also, our main focus will be the strategies that should be implemented to accomplish tacit knowledge capture and externalisation.

Strategies For Implementing And Adopting Adaptive Knowledge Management

Culture of the business can play a significant role in the management of knowledge. Internal norms and values must be renewed and reconsidered based on new frames. Managers must inspire employees to the new environment and give the example through their devotion and commitment to knowledge practices. An open and receptive culture should be nurtured where communication and dialogue between the employees will be enhanced. More importantly, a culture that undertakes an error admissible orientation and abstains from the ordinary way of doing things promotes the development of new processes, procedures, structures. Trial and error as well as experimentation lead to innovation and ensure long-term success in contrast with the short-term results of the secure roads followed (Jashapara 2004, Wong and Aspinwall 2005). An environment of willingness to promote and accept new ideas makes employees feel comfortable to share ideas and ask for advice when faced with a problem. Employees in the farms that have a feeling of security and trust facilitate the flows of information. Employees need honest, correct and timely information. Managers should ensure that employees are self-confident to express their ideas, feel useful for the organisation and have a sense of mutuality in their personal relations. Keeping and supporting morale work groups offer a friendly environment for knowledge practices (Barachini 2009). The externalisation of ideas, information and knowledge advances the transformation of tacit knowledge to explicit. The point where knowledge becomes verbalised and easily articulated is crucial as it demonstrates the overcome of the main difficulty of knowledge management (Jashapara 2004). The externalisation of tacit knowledge is usually impeded when managers are unwilling to share it for fear of losing ownership, their unique qualifications, experience and superiority. Also, due

to restrained time and lack of rewards the difficulties increase. Therefore, managers' strong support towards knowledge management practices can be reflected to the time and resources given for the acquisition, creation and management of knowledge. On the other side, the stickiness of knowledge sharing is attributed to the ignorance of the source that this knowledge might be useful to the recipient. From the recipients' side the unwillingness to accept ideas produced outside the firm or the difficulty to exploit and acquire the available knowledge restricts the success of the system. Therefore, the manager's behaviour and openness to exchange of ideas and communication will establish a collaborative environment and this kind of culture will be embedded in employees' everyday attitude and routine (Baalen et al. 2005).

Managers should clarify and spread a clear organisational strategy where knowledge management issues are directly and visibly connected. The maintenance of a clear orientation towards knowledge as a main resource of value creation and profit for the farms endorse employees with the notion of knowledge creation and sharing. It is apparent that beliefs of managers and generally of those who set the organisational aims and priorities are the prime mover of the organisational focus and function. As a result, when they are opponents of a knowledge culture, this is transmitted to employees, who are made to support such practices and get involved (Jashapara 2004). The expression and exchange of ideas become part of their daily routine, especially when employees feel that they contribute to organisational goals. Farmers will be more receptive to changes when they believe that the organisation really needs them. Employees get attached to organisational values and feel part of a team where all should work to the same direction, each from his position, to acquire a beneficial result (Smith 2004). Managers can actively participate and give their support to incite employees' personal motivation and opportunity to learn. By allowing a reward and incentive system farm businesses entice employees to adopt and seek for communication and dialogue about the projects they participate, their experiences, problems and solutions found. In that way information and knowledge is dispersed in all parties of the farm and at the same time people are rewarded for their conformance (Hasgall and Shoham 2008, Beijerse 2000). Rewards can be increases in salary, bonus or indirect rewards such as appreciation and recognition. Indirect rewards give morale support to employees and are considered as better ways for successful implementation (Hasgall and Shoham 2008).

Adaptation means that farms should be in the position to change and to respond effectively to new situations faced. Innovation is the key to that direction and can provide a sustainable advantage. The close relations with the customers that small and medium size businesses have give insights to tendencies in the market, new product developments, competitors' way of doing things so new ideas and propositions are coming to the organisation that can change the structure, orientation and strategy. Innovation derives from the combination of previous and new incoming knowledge. In order to achieve it, farms can capture and store the previous knowledge through keeping records of previous knowledge, having the employees writing small reports about the process of the job and creating small databases. Small reports can be case studies that cover project problems, trouble shooting, lessons learned and best practices. So, employees of the farm can help in knowledge storage by developing guidelines, best practices, expert notes, work flow charts which will be easily accessible as accumulated wisdom in future projects (Hasgall

and Shoham 2008). The result will be a strong organisational memory, having the entire infrastructure to acquire and record previous experience, exploit it and integrate it with new knowledge, the stage where innovation process has been successful. However, the vast majority of information is irrelevant to organisational needs, that why farms should establish a feedback system to measure the relativity and importance of information. The greater the diversity of information the more possible new knowledge to be extracted is. Organisations accomplish it through creative thinking, reflection on past experience and combination of knowledge from different fields. The capture of expertise, knowledge assets reuse and tagging of assets are the prime mover of the innovation process and allow the firm to respond to change (Sherif and Xing 2006, Taminiau at al. 2009).

Socialisation must be embedded in daily routine. The externalisation of tacit knowledge requires dialogue, communication and expression of ideas within and outside the farms. Managers can establish lunchtimes or regular meetings of the employees where informal discussions will create a friendly environment for knowledge sharing. Also, organisation of work groups to deal with specific projects enhances the cooperation, trust and feeling of contribution (Jashapara, 2004). It is clear that an adaptive system needs new ideas able to be captured, evaluated and adapted according to the situation. Time allocated to meetings within the farm such as project debriefings, brainstorming sessions with the managers can lead to long-term benefits. Outside the firm, socialisation can take the form of meetings with external speakers, experience swapping sessions, participation in local organizations. The interaction of farmers within groups of common interest opens new horizons, widens perspectives, combines experiences, creates new knowledge, innovative. Finally, exhibitions, cultural fairs, conferences as well as periodicals make widely accessible and distribute the tendencies of the market, new technologies and new ideas. It is clear that collaboration between firms and advisors, centre of innovation and universities provides a constant exchange of information and facilitates the development of science. The co-alignment of theory and practice can explore new paths and at the same time provide feasible solutions in practice (Beijerse 2000).

Availability and accessibility to information is another concern farms must take into account. The introduction of intranet and information technologies enables the successful knowledge sharing implementation. Links to discussion forums and interest groups facilitate the exchange of ideas between people living in different regions and countries. People with the same interests can insert into chat rooms, whiteboards, instant messaging services, shared calendars, discuss and give and take responses on their topic of interest. It is a method that simplifies the discovery of a solution, shortens the time lost and broadens employees' perspective as different opinions are heard and new explicit knowledge is created by combining previous and new knowledge. A person finder technology can also prove valuable as people will publish their information (name, contact number, phone, expertise) and can be found when needed (Smith 2004). However, farms need to create the appropriate infrastructure to support availability of information. Thus, the establishment of an intranet and extranet system should be attached to the whole alteration of strategy and culture. Communication and collaboration can be expanded to customers and suppliers by allowing free access to some information which will improve collective action, successful product development, service of

delivery and innovation management. Also, farms can have regular internal magazines, journals and newsletters to provide a knowledge culture and orientation to a knowledge-based success (Hasgall and Shoham 2008).

Adaptive systems require a decentralised power system where employees will be given the prerogative to act independently and not under the constant restriction of the power units within the firm. Namely, employees are free to express their ideas, follow the paths of their own imagination and constructive thinking, take initiatives and explore new ideas. In such a system the hierarchy of power does not restrict or interfere with the development of personal interests. Therefore, such a system should empower employees' abilities and their access to resources and ensure the parallel achievement of organisational goals, needs, abilities and use of available technology within the firm. Furthermore, knowledge should be renewed and updated constantly in order to create value for the firm. Computerised information systems might offer a critical tool for updated information sources such as documents, experts and sources from out of the organisation (Wong and Aspinwall 2005, Ang and Massingham 2007). So, in order to make the system work employees are responsible for their self-training, self-improvement and a constant updating of professional and organisational knowledge and on the other side, managers are responsible for the synchronisation of the process, the general control and coordination of resources and experts. Both managers and employees should consider and evaluate the environment, culture and availability of resources offered within the firm and follow a suitable solution for adaptive knowledge systems (Hasgall and Shoham 2008) .

Training opens the way for constant updating, capture and sharing of skills. Usually, businesses do not take advantage of the knowledge accumulated in older people. On the contrary, older people do not get good treatment from employers who are seeking to replace them with new young employees who are eager to learn, work hard and maybe are better trained according to market trends, new technologies and organisational needs. Therefore, the experience and knowledge held by these people can be lost in the spirit of this business 'narrow-mindness'. Apprenticeship offers a way of training where older can train the newcomers. The explicit and tacit knowledge that older people have acquired during their working life is transmitted and ready to be explored from the new ones. Job rotation gives also an opportunity for acquiring knowledge from different jobs. As farmers rotate between various tasks, responsibilities and roles, they capture new knowledge. Furthermore, visits to other farms are a form of training. By seeing the way other farmers do things, farmers get new ideas, get in contact with new technologies, compare with their way of doing. Rewards and performance appraisals can be inserted as an incentive for training which will change the whole culture of a farm knowledge oriented and constantly updated (Jashapara 2004, Ang and Massingham 2007). However, the possibility of farmers involved in knowledge activities depends significantly on self-motivation for continuous learning, self-actualization, need for recognition and personal development (Hasgall and Shoham 2008).

As a result, adaptive knowledge management systems require flexible practices that can be adjusted to each case and circumstance and according to the availability of resources given to the farms. Innovation is not completely independent and can be influenced when designing and controlling the right environment within the firm that will implement a culture friendly towards

communication and sharing of ideas and will ultimately lead to the desired outcomes and performance.

Practical Experience

Generally, Knowledge management in agriculture production is adopted on many different levels of using Information technology and professional services supported by universities or service organizations (through government or private sector). Precision farming plays important role on this adoption. Farmers involved to precision faming technologies are more flexible to work with computer or use high technology level in crop production, animal production or farm management.

Every farmer wants to increase his productivity, increase yield in crop production and keep a good quality of production. But, the conditions on the field are not homogeneous! Precision farming system monitor a farm condition with GPS system for crop production and according to data analysis prepare a variable rate application for specific place in time. So, farmers want to monitor conditions by data collection and analysis, than prepare fertilizer in variable rate and apply fertilizer according to soil conditions, nutrient content in the soil and crop needs.

The description of Knowledge management - precision farming tools adoption on the farm start step by step as follow:

- Farmer expect for profit from all above mentioned objects, he must decided, which one is the most feasible for his farm.
- Farmer does not have to spend big amount of investment in the first year, than depreciate a part by part every year investment and wait for result.
- Precision farming tools can be adopted on the farm during three to five years, but first result must be seeing exactly a first year of adoption.

Today, many precision farming tools and information technology systems exists, which are more or less present practical results. Farm central database must be based and a lot of information can be stored in farm database, which are processed and used for decision making process. Practically, farmer becomes use computer not only for calculation or managing some work process, but to find important information on internet - web services.

Futurefarm - project supported by 7th Framework program organized a validation workshop in Prague University of Live Sciences for farmers and people from research and service organization to present common results of project and to collect a comments from discussion forum. Workshop attended a people from four different countries (Czech Republic, Slovakia, Poland and Latvia). Discussion notes a follow:

- many farmers are skeptical to farm KM via information technology
- from the farmer point of view: investigation to machinery than KM
- first goal of farmers is stability of farm with common tools, than new technology
- changing generation, survival game
- size of profit, what is interesting size of increasing profit?
- crop rotation - crop focus on marked needs

- different regions, find right segments for farm development
- different production, different knowledge management (food, energy and bio-fuel, sport- culture), definition and focus
- efficiency of energy from bio-mass, new developed tools and technologies with higher profit
- stile of living farm family or farm owners
- different character of farmers in US and Farmers in Europe, big different in profit approach and creation
- taxis on fertilizer and chemicals in different locations, stimulation by government to use KM on the farm

CONCLUSIONS

An open and receptive culture must be nurtured, especially inspired and motivated by managers and leaders, where farmers will be willing to share ideas, experiences, to give and accept new knowledge and dialogue and socialisation will take the first place. The change of culture must be attached to incentives given to those adopting and implementing Knowledge sharing. This can be an increase in salary or some other facilities that the employees require. Also, a culture which accepts the possibility of mistakes instead of the safe and ordinary way of doing things as it leads to innovation through experimentation must be enforced.

Individual farmers could produce knowledge through observation of their own farms or employees can be asked to write small reports about their project keep record of their progress and create in this way a small and cost-effective database. It is necessary to make the information acquisition available through the use of networking, access in journals and conference proceedings, use of data bases. On the level of farms has to be supported training which may include visits to competitors to see their way of doing it, job rotation or an experienced employee show the job to the apprentice one. The managers have to participate in discussion forums and interest groups. It is necessary to organise experience swapping sessions, conferences, exhibitions, seminars with external speakers and distribute the results of them and also, organise informal meetings or lunchtimes. For adoption of new knowledge's is important to involve advisors, innovation centres and have close relations with universities. Important role has also play journals, informal interviews, conference proceedings can help in knowledge capture and sharing.

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