Diffusion of usage of knowledge technology in an agricultural extension service organization

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Abstract

This paper presents the results of a survey conducted in the Extension Service of the Israeli Ministry of Agriculture and Rural Development (IES). The organization has extensive internal knowledge of its organizational processes, and is characterized by information-intensive, knowledge-intensive processes. IS implementation, as part of the innovative culture of the organization, has long been an area of interest for both researchers and practitioners, with much emphasis on identifying the factors that lead to more and to less successful outcomes. Though it is easy to appreciate the important role culture plays in making an innovation successful, it is very difficult to change culture. Diffusion of usage of knowledge technology in agricultural extension service organizations is important because organizational culture is an important determinant of sustained innovation. In this paper, we examined two elements of organizational innovative culture in the IES. We believe that assimilating these elements of organizational culture will enable organizations to support and sustain innovative activities.

Keywords :

Agricultural-extension-service-organizations, organizational processes, KM initiatives, organizational innovative culture, diffusion of usage of knowledge technologies

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Introduction

The IES is deeply involved in the diffusion of usage of knowledge technology in Israeli agricultural. Lehman and Regev (2008) review in detail the particulars of Israeli agriculture and list areas of successful technological innovation efforts. They include, for example, water technology, genetics, environment management, and information and communication technologies. On the other hand, decades of research have identified the issues that are essential for the successful implementation of knowledge technologies, yet delays and failures continue to be reported. Despite more than 30 years of experience, organizations still face an uphill battle implementing information systems (Brown, Chervany and Reinicke 2007). A 2002 KPMG (U.S.) study reported that 56% of firms had to write off at least one IS project as a failure during the previous year. A 2003 Hackett Group study (U.S.) reported that 30% of IS projects fail. Further, according to KPMG, the average cost of failed implementations in 2002 was roughly $15 million, a significant increase from the $4.2 million average per failure in 2000 (Nash, 2000). A high percentage of management decisions regarding knowledge transfer within the organization fail to have any real impact, for one reason or another (Gal, 2004). Therefore, attention has been paid to the reasons for non-fulfillment of these initiatives, but this has rarely revealed anything about the inability to adopt such decisions and to implement them successfully in the organization. Overall, this paints an alarming picture of the extent of loss that organizations incur due to failed systems and technology implementations each year. In addition to the direct monetary costs of a failed implementation, indirect missed opportunity costs are also associated with failed or delayed implementations.

The present conclusions are based on the findings from one case study. Additional research is still required, which would involve comparisons among several agricultural research organizations, in order to validate these conclusions and to confirm that they represent a behavioral pattern and are not limited to only one case study. The findings are not yet meant to be regarded as a "law of nature" but as the result of examination of a hypothesis that was found true in one extension service organization. Nevertheless, the importance of the findings rests in their possible contribution to the development of a management tool that could help other service organizations to improve the management of successful IS implementation.

Background: Israel's agriculture

Situated on the Eastern shore of the Mediterranean Sea, Israel lies between the temperate zone in the North and the sub-tropical zone in the South. With big topographical variations and a wide range of soils, a very large variety of crops and animals can be successfully grown and raised, respectively: from cherries, apples and pears to loquats, fejoyas, bananas, and papayas; Holstein-Friesen dairy cows, beef cattle, sheep, goats, and buffalo. Rainfall ranges from almost nil to 700 mm per annum, all in the winter months, with half of the total country area of 21,000 sq km receiving less than 200 mm. Thus, agriculture is almost entirely dependent on irrigation. With the very limited water resources available, even with utilization of brackish water sources and a high degree of recycling of effluents, today less than one half of the 400,000 arable hectares of land is under irrigation. Rapidly increasing urban and industrial demands for high-quality fresh water coupled with three consecutive drought years have further drastically reduced water supply to agriculture. Unique forms of farm communities have developed in Israel, which were quite revolutionary. In addition to a once traditional private sector to which some 20% of Israel's farm units belong, there is the collective sector which was first created 90 years ago, called the Kibbutz, and its offspring, the cooperative village of family farms called the Moshav. The average farm unit is small, ranging from 2 to 4 hectares.

Israel was characterized by a large increase in population immediately after independence in 1948, requiring fast increase in food production through a rapid modernization process. Research and extension facilities and services multiplied several-fold in size and numbers during the first decade, resulting in surplus production by the year 1962 (except for food-grains, oilseeds and sugar which always had to be imported for lack of sufficient land). A strong move toward export then began, which is increasingly characteristic of agriculture today. A variety of intensive, protected agricultural systems were developed, enabling year-round production, but geared mainly to meet foreign market demands at off seasons. Since the introduction of modern agriculture to Israel 130 years ago, it has undergone revolutionary changes. From its start, it was accompanied by research and extension. IES, the government extension body, underwent many changes since its establishment in 1965: in level of specialization, in level of education of its employees, in its working methods and priorities, in the tools it uses, in numbers of staff and in financing sources and mechanisms. Surprisingly, however, few changes in its basic organizational structure have occurred. IES's "founding fathers" undoubtedly were people of vision. That vision enabled them to create a structure that could adjust itself to changing needs, to such an extent that even today IES serves as a basis for study and emulation by many organizations in agriculture and outside of it. It is indeed a unique and original model (Elkana 2001).

Literature review

Diffusion of usage of information technology is often linked in the literature with knowledge-sharing issues and knowledge-sharing is often linked with incentives. Results from studies in service firms indicate that an incentive must be considered sufficient when it promotes full knowledge sharing regardless of the incentive's type (monetary or non-monetary). However, it was found that the non-monetary incentives were not deemed sufficient when participants self-determined incentive sufficiency. Additionally, when the peer environment promoted knowledge hoarding, knowledge sharing dropped the most when incentives were initially deemed sufficient. It was also found that competitive individuals are active sharers of valuable, proprietary knowledge only when their competitiveness is team-oriented. To promote knowledge sharing, careful monitoring of perceived incentive sufficiency is suggested, especially in the case of non-monetary incentives, and a culture that directs employee competition between teams (Wolfe and Loraas 2008). Knowledge-sharing is an innovative process of being aware of knowledge needs and making knowledge available to others, by constructing and providing technical and systematic infrastructure. The literature reveals that innovation studies in service firms are still in their infancy. One of the primary causes for this situation is the perception that services are different from manufacturing, particularly with respect to the intangibility of service outputs, making it difficult to identify the existence of innovation. Furthermore, while this does not necessarily mean that service firms lag behind manufacturing firms in innovation, it could be expected that the impact of innovation on organizational performance in services would be different than that in manufacturing sectors (Prajogo 2006).

Trust is one of the primary factors of successful performance in services. Any organization is based on multiple relationships, and therefore mutual trust, shared values and ethical standards are becoming critical success factors in the new relationship-based business environment. To be trustworthy is to behave in a predictable manner, and to do what you say you will do, when you say you will do it. In management surveys (Preiss et al. 1996, p. 174) most organizations acknowledge a trust gap of about 40%, on average. In the pyramidal structure of an old-fashioned organization, a few top managers make decisions for everyone in the organization. However, as organizations evolve and adapt to the concept of encouraging more people to think and make decisions, there is a tendency to trust only those workers who are at the minimum level for retaining control. In addition, under the traditional type of structure, many employees worked in a managerial atmosphere of: "Don't think, just do your job", etc. For them, doing what they are told to do is less risky than learning how to achieve a set of goals.

Although trust resides in individuals, organizations can cultivate trust through policies that demonstrate respect and integrity, actions of chief executives and managers who carry out these policies, and information and communication practices that are fair and responsible. Elements of a favorable environment or climate for knowledge management are based primarily on collaboration and trust. (McInerney and Mohr 2007). Numerous studies have addressed issues related to knowledge-sharing at various levels within organizations and between types of organizations. The results show that perception is the most influential factor in knowledge-sharing, and reward systems are the second most influential factor. This was found true for knowledge-sharing amongst faculty members in an institution of higher education. Respondents did not consider other factors such as Trust, Openness in Communication, Collaboration, and Communication Channels based on IT Infrastructure to be principal factors. (Kim and Ju 2008).

Innovations rarely happen by chance, sustained innovation even less so. Drucker (1993) contends that he knows of no 'flash of genius' that turned into innovation. Innovation requires a systematic, disciplined approach. The characteristics of innovative organizations are therefore different and distinguishable from those of non-innovative companies. Organizational culture is an important determinant of sustained innovation and financial performance. As noted above, though it is easy to appreciate the important role culture plays in making an innovation successful, it is difficult to change culture. One way of changing culture could be to identify elements of innovative culture and then introducing the germane ones to a given organization. Dombrowski et al. (2007) have identified eight elements of organizational innovative culture: innovative mission and vision statements; democratic communication; safe spaces; flexibility; collaboration; boundary spanning; incentives; and leadership. They believe that assimilating these elements of organizational culture will enable organizations to support and sustain innovative activities.

An organization in which information is tightly coupled to its decision-making processes and to its activities is a complex system. Therefore, a decision that appears optimal according to local parameters may lead to a non-optimal global decision, or even failure of the entire system (Armistead 1999, Axelrod and Cohen 1999, Dixon 1999, Sherman and Schultz 1998). Consequently, sub-optimal functioning occurs in many organizations, a subject widely covered in the literature (Gal 2004, Armistead 1999, Dixon 1999). Literature on the subject of coupling organizational processes indicates that successful coordination depends on the support and commitment of senior administration, the level of support by outside consultants, avoidance of unattainable expectations, planning, and similar considerations (Ptak and Schragenheim 1999, Brown, Chervany and Reinicke 2007). Therefore, when a knowledge transfer initiative does not succeed, there is often a tendency to attribute the failure to weak organizational support (Van-Wegen 1996), even though the technological systems are technically viable, capable, stable, user-friendly, use mainstream technology, and may even be of central importance to the organization.

Rogers (1995) was the first to develop the concept of diffusion of innovations. In this concept, innovations were defined as ideas or practices perceived as new by practitioners. Diffusion was seen as the spread of ideas among individuals, largely by imitation. Later, various experts came to use this term as a synonym for knowledge sharing. In addition to Rogers's authoritative review, there are a number of more recent empirical studies of service innovations (see Greenhalgh et al. 2005 for complete references). Research that examines the attributes of innovations in service organizations should address some of the following questions (Greenhalgh et al., 2004): How do innovations arise, and in what circumstances? What mix of what factors tends to produce adoptable innovations? What is the interaction between humans and computers as it applies to the adoption and assimilation of information and communications technology innovations? What is the nature of interpersonal influence and opinion leadership in the range of different professional and managerial groups? How are key players identified and influenced? What is the nature and extent of the social networks of different players in the service? How do these networks serve as channels for social influence and the reinvention and embedding of complex service innovations? Who are the individuals who act as champions for organizational innovations in the services? What is the nature of their role, and how might it be enabled and enhanced? Who are the individuals who cross boundaries? What is the nature of their role, and how might it be enabled and enhanced?

Champions, for example, emerge as a key determinant of organizational innovation, but no amount of empirical research will provide a simple recipe for how champions should behave that is independent of the nature of the innovation, the organizational setting, the sociopolitical context, and so on. The adoption of an innovation by individuals in an organization is more likely if key individuals in their social networks are willing to support the innovation. There is very little direct empirical evidence on how to identify and systematically harness the energy of organizational champions (Greenhalgh et al., 2004). Information is obtained from various sources, and besides the direct impact from professional training sessions, the knowledge can be greatly shaped through face-to-face 'transfers'. This flow of concepts and practices through interpersonal communication channels is mainly initiated by individuals, so-called Opinion Leaders, who fulfill a gate-keeping role within their respective communities (Rogers 1995). These opinion leaders, who are sought by their peers for information or advice, can also facilitate widespread adoption of suitable technologies. The diffusion of innovations benefits from intensifying face-to-face interaction in highly interwoven social networks. (Wyckhuys and O'Neil 2007).

Most of the research on the diffusion of innovations focuses on simple, product-based innovations, for which the unit of adoption is the individual, and diffusion occurs by means of simple imitation. However, adoption is a process rather than an event, with different concerns dominant at different stages. An innovation that fits the organization's existing values, professional norms, strategies, goals, skill mix, supporting technologies, and ways of working is more likely to be assimilated; in fact, these characteristics serve as a determinant of successful assimilation. The decision by an individual within an organization to adopt a particular innovation is rarely independent of other decisions. Also, innovations that are perceived by key players as simple to use are more easily adopted; and if the benefits of an innovation are visible to the intended adopters, it will be adopted more easily (Greenhalgh et al. 2004, Gustafson et al. 2003, Rogers 1995).

The vast majority of knowledge-based positions require individuals to interpret, analyze and/or synthesize information. Today, these terms can be used as synonyms for managing the organizational process, a process in which humans are responsible for inferences, diagnoses, judgments and decision-making, often under severe pressure of time limits (Dixon, 1999). Previous studies have recognized the importance of coordinating the organizational processes, but they did not define the principles and theory required to do so when the organizational processes and information flow are regarded as a single linked or coupled system (Bhatt 2001). Most studies relating to the coupling of organizational processes focus either on the human factor and its responsibility for the organization's success, or on the engineering factors of hardware and/or software. In the few instances in which the coordination requirements were addressed, the discussion revolved around solving the problems of socio-economic factors, or referred to organizational and cultural issues in general terms (Pliskinn et al. 1993, Pliskinn and Shoval 1989).

Discussion of IT adoption in the literature usually addresses availability of information technology. The published discussion (Brown, Chervany and Reinicke 2007, Storey and Barnett 2000, Swan, Newell, Scarbrough and Hilsop 1999) of the process of combining organizational processes and information systems refers to information technology, while disregarding the complexity of the organizational processes (Sherman and Schultz 1998). The general approach is that the technology can be regarded as an organizational resource (Burgelman, Maidique and Wheelwright 2001), similar to other organizational resources that rely on organizational capabilities, on development policy and on accumulated experience. Another view is that technology is embedded in the organization's outcomes, and converts capital and information inputs to higher-value outputs (Christensen 1992). However, focusing exclusively on the information technology or the information system leads to a supply perspective, characterized by the assumption that if information is made more easily available and accessible, people will use and share it. This is a dubious assumption, since most managers suffer from oversupply of computerized information, with the result that the existence of information technology does not ensure coordination among the organizational processes.

The present study was based on the assumption that an organizational system consists of a technological infrastructure, an organizational infrastructure, an organizational culture, and the employees who are involved with them (Meso and Smith 2000). This is, in effect, a single, tightly coupled system, and should be analyzed as such. An analysis that treats the organizational processes as separate or loosely coupled will lack an important attribute, since the effects of coupling among the organizational processes would not then be addressed.

The findings

IES's role is to promote agricultural production by various means: gathering and analyzing information, developing new technologies, transferring knowledge and technologies and applying know-how. The IES officers collaborate with researchers, growers, growers' organizations, service providers and others, in order to reach those goals. The IES has a long and successful history of promoting technological innovation in agriculture, in many cases serving as the facilitator of technology transfer from research to the field and feedback to research. The findings are in accordance with the theory presented previously and with the findings of the literature review. Apparently, within the IES, socio-economic factors form part of the cultural structure of the organization. Furthermore, knowledge technology can be regarded as a high-level organizational resource.

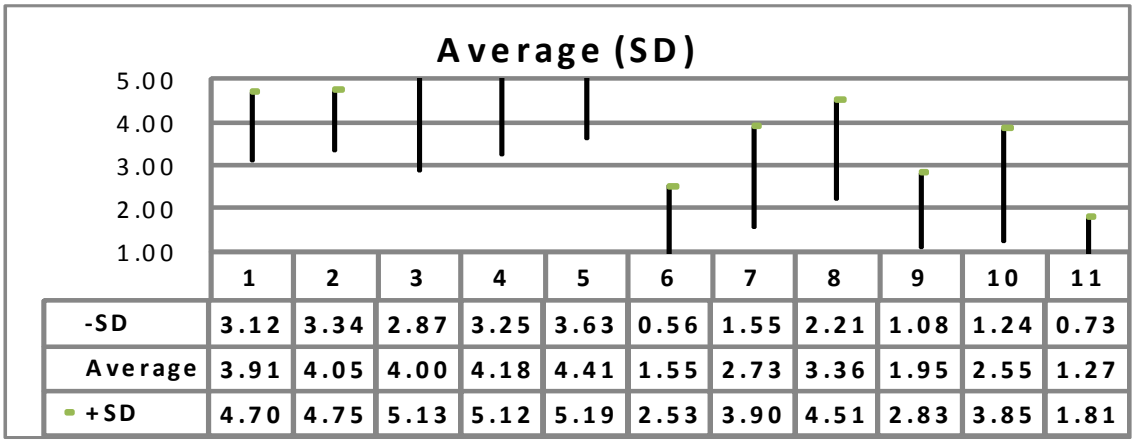
Israeli agriculture underwent extreme changes over the years, undergoing transformation from an almost traditional sector to a knowledge-intensive and sophisticated one, at the forefront of technology. IES has been working with the agricultural sector for many years, and has experienced a similar process of increased specialization, devoting more of its time and resources to generating technology. The average extension officer is invariably a specialist with a large degree of individual academic freedom, guided mainly by professional considerations. A large variety of innovative activities are incorporated in the everyday work at the IES, including innovations that are related to information technology. Two factors primarily characterize the work of the IES officers: sharing knowledge, and lack of fear of innovations. These two factors seem to be an inseparable part of their routine work.

The data were all collected within the IES and the data used for this analysis were obtained from an internal review during January 2009. The survey was conducted through questionnaires administered to 22 IES employees who were part of the organization during the last decade of the 20th century, from 1990 to 1999. The questionnaires were distributed and returned by e-mail. Of 30 potential respondents, 22 returned the questionnaires, for a response rate of 73%. None of the responses were incomplete, nor did any contain skipped answers. To test the assumptions, the authors used a correlation coefficient. The correlation coefficient measures the relationship between variables through degree of association. Table 1 shows the correlation coefficients.

This study sought to address the following research questions: 1. What were the attitudes towards knowledge-sharing in the organization during the decade examined? 2. Were there any feelings of fear of innovations?

The authors used these two major factors as cultural indicators that influenced the successful as well as rapid adoption of new knowledge technologies in the IES. The adoption of a new technology was an innovative procedure, especially in comparison to other governmental establishments, that had been commonly identified in previous studies. There were 11 questions, in which the first five were designed to examine factor 1 and elicit attitudes towards knowledge-sharing; questions 6 to 11 were directed at factor 2, and examined feelings of fear of innovations. The respondents rated their answers to each question on a Likert scale, with 1 as very low and 5 as very high. The averages are presented in Figure 1.

Figure 1: Average Answer to Each Question on the Questionnaire



	1	2	3	4	5	6	7	8	9	10	11
-SD	3.12	3.34	2.87	3.25	3.63	0.56	1.55	2.21	1.08	1.24	0.73
Average	3.91	4.05	4.00	4.18	4.41	1.55	2.73	3.36	1.95	2.55	1.27
+SD	4.70	4.75	5.13	5.12	5.19	2.53	3.90	4.51	2.83	3.85	1.81

In figure 1, the results of the questionnaire are presented in a stick diagram. The center of the stick is the average of the answers to each question, to which the standard deviation was added and subtracted to form the extremes. Visually, it is clear that the sticks are longer for the questions regarding innovation (6 to 11) than are those regarding sharing information (1 to 5). This visual depiction reflects that fact that the IES officers are more unified in their perception of teamwork and sharing knowledge, while their perception regarding innovation is not very focused.

The IES experienced many changes over the years. Although the questionnaire clearly states that it relates to the 1990s, the present situation may have had an effect. Nevertheless, the finding that IES officers believe that it is very important to consult with other extension officers in their everyday work accords well with similar conclusions in the literature. Acquiring knowledge is an important process of studies, trials, exchanging ideas and sharing information. The respondents rated this statement as the one they most agreed with, at an average of 4.38. The findings also show that the officers highly valued teamwork, which scored 4.05. Therefore, it is not surprising to find that the average answer to the statement: Innovation can be very dangerous and therefore I am cautious about innovations, received the lowest average, only 1.24.

The following are the questions and their scores:

a. To what extent are new ideas shared within IES?

   This question was a straightforward examination of whether extension officers share ideas. The responses averaged 3.91, with a standard deviation of 0.79: the respondents agree that new ideas are shared.

b. To what extent do extension officers participate in teamwork?

   Teamwork is a tool for sharing knowledge, and high participation in teamwork would indicate a high extent of knowledge-sharing. The average response to this question was 4.05 with a standard deviation of 0.71. Indeed, teamwork is one of the fundamental elements in IES's work.

c. To what extent, in your opinion, does professional competence serve as a criterion for promotion?

d. To what extent is an ability to generate new knowledge a criterion for promotion and professional recognition?

The two questions, 3 and 4, examine the extent to which creating and acquiring knowledge are appraised as positive values by extension officers. The average responses to these questions were 4 and 4.18 respectively, with respective SDs of 0.71 and 1.13, i.e. they are perceived as positive values.

e. How often and to what extent do you consult with other extension officers in your everyday work?

One of the means of sharing knowledge is through consultation. Theoretically, one can consult without sharing, limiting the interchange to asking questions, but that cannot last long. This question received the highest average, 4.41, with a low deviation of 0.78, which means that there was overall agreement regarding this issue.

f. Knowledge is power and therefore I share knowledge sparingly or I refrain from sharing my knowledge.

A high score on this question would mean that knowledge is not shared. However, the average response to this question was a low 1.55, with an SD of 0.99. Officers who were interviewed after completing the questionnaire said that this finding certainly makes sense, because extension officers who put a lot of effort into creating new knowledge believe that they receive recognition for sharing it.

g. To what extent do you consider IES to be a formal organization? According to the literature, formal organizations do not usually allow their employees much freedom, especially not academic freedom. Such organizations do not tend to innovate or encourage innovations. The average response to this question was 2.73, with an SD of 1.17. This was a higher score than expected, probably because it is a government organization and therefore bureaucratic, and its behavior and structure entail a number of formal elements.

h. How open are IES officers to adopting new working patterns?

This was another straightforward question like Question 1, but this time, regarding feelings of fear of innovations. The average response to this question was 3.36, with an SD of 1.15, i.e. not a very high score, with quite a high deviation. A possible explanation for these findings is that the responding officers interpreted the term "working patterns" to refer to internal structural reorganization, performed to achieve formal promotions in the governmental hierarchy.

i. Past experience teaches that "you should be very careful in disseminating new technologies to farmers". To what extent does this sentence reflect reality as you see it?

The average response to this question was 1.95, with an SD of 0.88. The question was designed to find out how the extent to which the IES officers felt that care should be applied in disseminating new technologies. The fact that the average was not very low indicates that some filtering of new ideas is needed, and new technologies should be thoroughly investigated before they are applied.

j. To what extent is an extension officer, who is perceived to be innovating, a threat to his/her contemporaries?

In an organization that regularly with innovation, it could be expected that an innovating officer would be appreciated and not considered as a threat, so a low score is expected. In fact, the average response to this question was 2.55, with an SD of 1.3. This result is surprising, and the high value of the standard deviations shows that perception by the respondents varies widely. A possible explanation may be the organization's continuing efforts encourage innovation on the part of its officers, and not fear it. Those who are not innovative enough may envy those who are.

k. Innovation can be very dangerous and therefore I am cautious about innovations.

Unlike question 9, which calls for being careful about innovation, this question makes a very clear statement: Innovations are dangerous. Consequently, there is no doubt that the IES officers believe it's not true. The average answer to this question was 1.27 with an SD of 0.54. That was the lowest average, with the lowest deviation. The response is very logical, and was expected, given that the organization's *raison d'être* is the introduction of innovations.

A significant negative correlation was found between the responses to questions 1 and 7. Extension officers who thought that ideas are shared among employees did not think the organization is formal. This correlation makes sense, because in formal organizations, it is expected that employees not discuss their jobs. A significant correlation was found in the responses to questions 2 and 4. Officers who believe in teamwork also tend to consult their colleagues; this also seems obvious. A significant negative correlation in the responses to questions 2 and 7 was found. Officers who believed in teamwork did not think the organization is formal: formality is contradictory to teamwork. A significant correlation was found between the responses to questions 2 and 8. Officers who believed in teamwork also believed in openness to the adoption of new working patterns.

In general, the responses to question 2 have the highest number of significant correlations, which corresponds to the fact that teamwork is an important component in the life of the IES. A significant correlation between the responses to questions 3 and 4 was found. Professional recognition can derive both from vast knowledge and from new knowledge. Similarly, a significant correlation was found between the responses to questions 7 and 9. Results regarding formality were in harmony with care regarding innovations. Officers gave relatively low ratings to both questions; the finding that an officer who does not perceive his/her organization as formal is not very careful in disseminating new technologies. A significant correlation was found between the responses to questions 7 and 10. That is, in a formal organization, an innovative officer is perceived as a threat. In formal organizations innovative workers stand out, and don't conform to the organization's limiting culture. Similarly, a significant correlation was found between the responses to questions 9 and 10. Being careful in disseminating new technologies corresponds to the perception of an innovating extension officer as a threat to his/her peers. If being innovative is a threat, then one must be very careful regarding new technologies, so as to reduce or eliminate the threat.

Table 1 below summarizes these correlations:

Table 1: Correlation Coefficient Among Factors

		Attitude towards knowledge sharing					Feelings of fear from innovations					
α=0.05 (0.4143)												
n=22		*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Attitude towards knowledge sharing	1	1										
	2	0.333	*1*									
	3	0.203	*0.400*	*1*								
	4	0.145	**0.538**	**0.818**	*1*							
	5	0.355	*-0.034*	*-0.052*	*0.085*	*1*						
Feelings of fear from innovations	6	0.005	*0.095*	*0.122*	*0.040*	*-0.054*	*1*					
	7	**-0.466**	**-0.424**	*-0.274*	*-0.327*	*-0.325*	*0.128*	*1*				
	8	0.236	**0.708**	*-0.175*	*0.065*	*-0.115*	*-0.255*	*-0.263*	*1*			
	9	-0.071	*0.003*	*0.275*	*0.065*	*-0.106*	*0.343*	**0.429**	*-0.209*	*1*		
	10	-0.172	*-0.224*	*-0.124*	*-0.267*	*0.049*	*0.369*	**0.483**	*-0.314*	**0.498**	*1*	
	11	0.058	*0.207*	*0.225*	*0.082*	*0.059*	*0.319*	*-0.242*	*0.060*	*0.411*	*0.306*	*1*

P < 0.05

Conclusions

This paper makes an argument for focusing on attitudes toward knowledge-sharing and fear of innovation as key elements in creating a favorable climate for knowledge-sharing efforts. These two factors are indicators for the successful diffusion of usage of knowledge technology in the IES. The authors' intent has been to use examples from a real case study and interviews with officers who were employed by the organization during the years 1990 - 1999.

Knowledge-sharing cannot be presumed in a context of competition. With adequate environments of trust, however, learning can take place to help organizations achieve satisfying alliances and to function innovatively and productively. Management leadership can play an important role in the willingness of associates to share knowledge. This can be done directly through expression of support, deployment of appropriate supporting rewards and recognition programs, and through establishing the necessary organizational and technological infrastructure that would enable knowledge communities to flourish. Many problems inherent in sharing knowledge can exist, especially if the organizational culture is more competitive than collaborative. For much of the business world, competition is a way of life, often associated with business behaviors. However, if employees, executives, and departments are all in competition with each other, little motivation exists to share knowledge. The assumption is that knowledge is power, so on the surface it may seem counter-intuitive to share knowledge in an organization, because by doing so, the competition gains more power. The long term benefits that everyone derives from sharing knowledge make such knowledge-sharing strategically advantageous to the organization.

The most valuable resource in any organization, but especially in an agricultural extension service organization, is its employees, and especially, those dealing in professional agricultural knowledge. Their value derives from their skills, knowledge and expertise; the information they can provide; and the profitable relationships they form. The purpose of this study was to examine and analyze the major factors influencing some elements of organizational innovative culture and to provide useful and practical insights for agricultural extension services. Two crucial factors from previous related studies were identified and defined. The factors thus utilized were knowledge-sharing and fear of innovations. Unsurprisingly, the IES officers are fully aware of the importance of knowledge-sharing and its related benefits for themselves. In contrast to other public sectors or business settings, they appreciate the value of knowledge-sharing for mutual benefit.

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