Change in Management of Information Systems in Czech Agriculture

Milan Slavik and Emil Kriz*

Abstract

The Department of Education of the Czech University of Agriculture, Prague conducted studies of the information systems for Czech agriculture, during 1994 – 1998. The farms studied were categorised as small-scale (average size about 50 ha) and large-scale (average about 500 ha) private farms, new cooperative farms and company farms. Conclusions were drawn about the farms, farmers, farming systems and sources accessed for information needs. It was considered that in 2003 a repeated study (with some new elements) would be useful to those currently concerned with developing the information system for farmers.

The 1998 conclusion that the farmers' educational and agricultural educational levels have a major influence on the number of information sources they use is confirmed by the 2003 study.

Farming in 2003 is shown to differ, in some important ways that affect the management of information from that seen in 1998. Small farms have more crop production, and a little less livestock and mixed farming systems.

The two studies in 1998 and 2003 have made a contribution to understanding the Czech agricultural information systems and what is needed to develop these further, and perhaps most fundamentally, an informative policy can only be derived from national and (increasingly) EU policies for agriculture and rural development. The article describes the main findings from this research study.

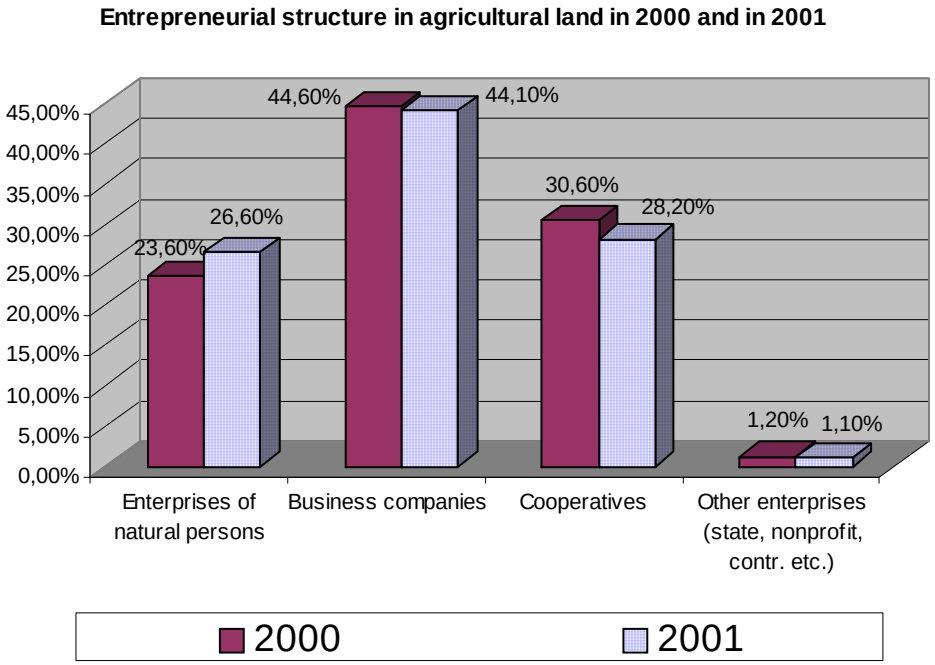
1. Introduction

1.1. The farming sectors in the Czech Republic

Changes in land ownership since 1989 have produced a structure of farming which, for the purpose of studying the information systems, can be considered tripartite. Private farms of widely differing sizes comprise about 26 % of the total farms, a proportion, which has increased only little in recent years. Company farms have substantially increased in number during 1995 – 2000 and now account for nearly 44 % of the total farms. The newly constituted cooperative farms have decreased as a long-term trend, declining from 47 % in 1995 to 30 % in 2000. Ministry of Agriculture statistics for 2001 show that there were then 35.219 private farms with an average size of 29 ha, 2095 company farms with an average size of 887 ha and 728 cooperative farms with an average size of 1464 ha. *(Green report 2001, Ministry of Agriculture Czech Republic)*

* Czech University of Agriculture in Prague, Department of Education. Slavik@chuchle.czu.cz Kriz@chuchle.czu.cz.

Fig. 1



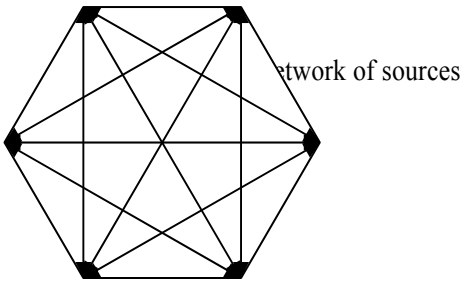
1.2. The study of information systems

Information systems are as old as agriculture itself: there has presumably always existed some degree of very informal sharing among people who farm of their knowledge, information, ideas and beliefs gained from experience of solving problems (some common and some more unusual) in farming. During the nineteenth century, however, formality entered into the arrangements made to expand and disseminate agricultural information through publicly funded research, education and extension work, with the farmers as recipients of information transfer to promote technological change.
Changes in concepts and models are following:

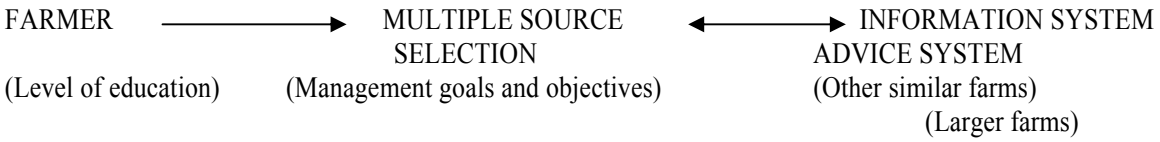
1. Transfer of technology model (1950 – 60s)

RESEARCH ⇄ EXTENSION ⇄ FARMER

2. Agricultural information and knowledge model (1980s)



3. Farmer information and advice system (1990s)



At the outset, in 1997, it was assumed that farmer-centred information systems would have three major components. These were:

- the personal characteristics of the farmers, including their experience of farming and their expectations for the future of their farms;
- the technical characteristics of the farms and the farming systems used for production;
- the adequacy of the supply of information for access by the farmers to meet their needs.

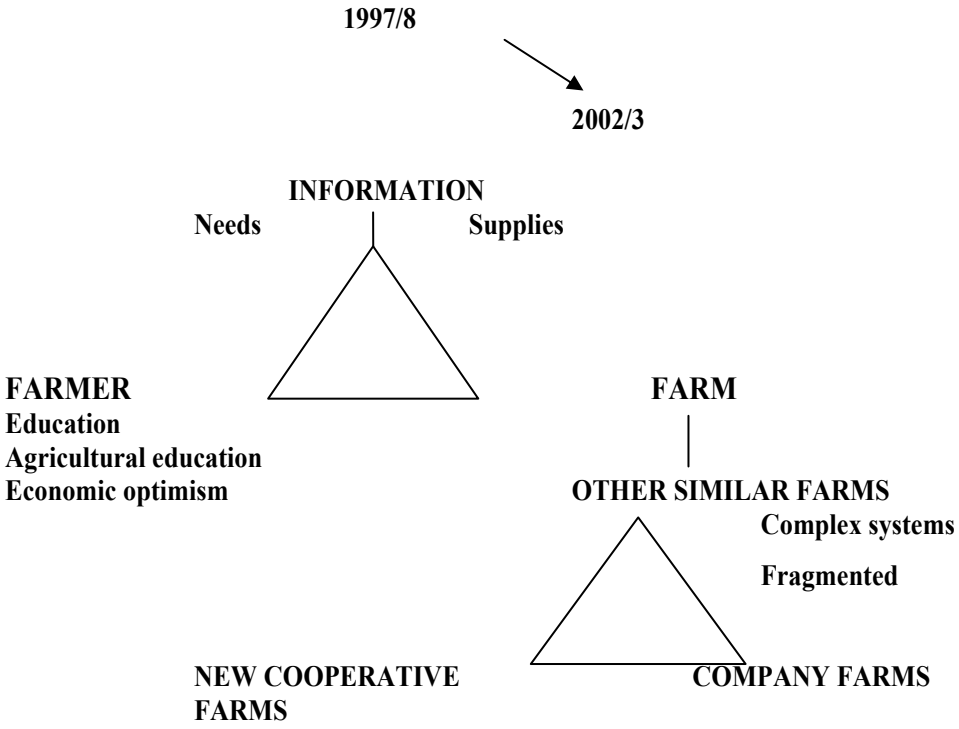
The research in 1997 – 1998 showed that some sources were considerably more important than others to farmers in general, and that particular farmers selected sources to construct individual information systems, and (somewhat different) advice systems. The number of sources in the systems (i.e. their size) was most closely related to the levels of general education and agricultural education of the farmers. As these levels increased from Basic Schools to Universities, so too did the acquisition and search for information. The farming systems and the kinds of information available appeared to have relatively little influence on the size of the information system. There was also a great deal of transfer of information between similar farms, and also with farms that were larger in scale.

2. Research Method

The aims of the study in 2003 were to:

1. repeat the 1998 study with the same categories of farmers, and the same respondents if possible, but with a larger sample, in order to assess the changes made to the information systems during 1998 – 2003;
2. give more specific attention to the use of PCs in managing information on farms;
3. include specific questions on the use of research results on farms, and the farmers' views on research priorities;
4. give more specific attention to the contribution made by consultants to Czech farmers;
5. explore the nature and extent of diversification of farm businesses, now and as anticipated in future;
6. appraise the level of economic optimism of the respondents, and their expectations of the effects of possible membership of the EU on their farming.

The model of the information system which was developed from the previous study, and used to plan the 2003 follow-up study, was as follows:



The study used a modified form of the questionnaire employed in 1998. It was discussed with officials of the Ministry of Agriculture, and with the 14 Agriculture teachers and 30 consultants who, later, conducted the interviews.

3. Some results and Interpretation

Because there were two kinds of interviewers, namely the teachers and the consultants, two questions immediately arise. The first step in data analysis was to answer these questions. First, did the two kinds of interviewers work with respondents whose characteristics differed in ways that could result in different data sets? Second, did the kind of interviewer influence the responses given by the farmers?
A comparison of the education levels of the respondents shows that, as may perhaps be expected, the teachers interviewed more farmers with Secondary School education as their highest level, and the consultants more farmers with University qualifications. The levels of economic optimism of respondents were not consistently different between the two kinds of interviewers.

3.1. The farmers and their resources

The majority of the respondents were male; 93,5 % for small-scale farms, 86,6 % for large-scale farms, 92,6 % for company farms and 87,9 % for cooperatives. These are similar to the numbers in the 1998 survey. The average age of all respondents (44,9 years) is notably younger than for farmers in some other European countries; for example, it is 58 years in the UK and continuing to rise.

Education
The importance of education as a factor influencing a farmer's information system has already been noted. It should be stressed that in this 2003 study the respondents are, in general, the managers of farms and their level of education is likely to be higher than that of the total agricultural labour force. However, viewed as managers (Table 1) the situation appears to be quite good, on European standards.

Table 1: Level of education of respondents by category of farm, 2003 (%)

Level of education	Small farms	Large farms	Company farms	Cooperatives
Apprenticeship School	37,1	15,2	4,0	4,6
Secondary vocational School	36,1	40,6	40,7	38,6
Academic School	1,5	2,2	0	0
University	21,5	42,1	54,2	55,7
Postgraduate	4,0	0	1,0	1,3

It is interesting that, whilst the number of respondents with Apprenticeship School education was highest among the small farm respondents, there was also a substantial number (21,5 %) of University graduates and all those with postgraduate qualifications (4 %) from this category of farm. The small farm respondents also differed from other categories of farm in respect of their specific agricultural education. The situation is shown in Table 2, and it differs markedly from that reported in 1998. Then, just over half (51,9 %) of the total workers on the farms had received some form of vocational agricultural education. The 2003 study indicates that, on the small farms, 69 % of respondents had some education in agriculture. This figure compares to the 56,3 % of such farmers who had received agricultural education in the 1998 study. It is understood that there have recently been Ministry of Agriculture initiatives to give more agricultural education to farmers (especially to newcomers), and it is possible that the 2003 data reflect this. About 90 % of the (mainly managerial) respondents on large-scale, company, and cooperative farms, had received agricultural education.

Table 2: Level of agricultural education by category of farm, 2003 (%)

Agricultural education	Small farms	Large farms	Company farms	Cooperatives
Yes	69,0	87,0	91,8	94,4
No	31,0	13,0	8,2	5,6
Yes, the higher level	65,9	89,2	87,2	92,1
Higher level of education not in agriculture	34,1	10,8	12,8	7,9

3.2. Current sources of information and advice

Relative importance of types of information

In the 1998 study, farmers were asked to rank in the order of importance to them, ten suggested types of information. There was a large degree of agreement in their replies. Marketing and processing/selling were most highly valued by all categories of respondents. EU policy, basic science and external (environmental) effects of farming were the lowest ranked types of information. The same question was asked in 2003 in order to explore possible changes. Three additional types of information were specified in 2003, namely legal/regulatory information, finance/accounting, and architectural/building. The initial ten types of information are discussed first. The data are shown in Table 3.

Table 3: Importance of types of information by type of farm by year of study

Type of information	Rank order of importance							
	Small farms		Large farms		Companies		Cooperatives	
	1998	2003	1998	2003	1998	2003	1998	2003
Marketing	1	1	1	1	1	1	1	1
Processing; Selling	2	3=	2	5	2	2	2	2
Investment	4	2	3	4	5	4	3	5=
Products; Resources	3	3=	4=	2	4	3	5	3
Czech Government policy	7	7	4=	3	3	5	4	4
Decision-making	5=	5	6	7	6	10	7	9=
Locale - specific	5=	6	7	6	7	8	6	5=
External effects	8	10	8=	9	9	9	8	9=
EU Policy	10	9	8=	8	8	7	9	8
Basic science	9	8	10	10	10	6	10	7

As can be seen, there is a striking stability in the rankings, which have remained little changed during these five years, for all categories of farms. To some extent this may be thought disappointing. For example, despite the generally accepted importance of limiting potential harmful effects of agriculture on the environment, the external effects type of information remains at a low ranking, and government policy information is perceived by small-scale farmers to be less important that its ranking by the other farmers. Processing/selling information appears to have decreased in importance for large-scale farmers, though the reason for this is not shown by the study. For company farms, basic science is now considered to be more important. This may be related to new food safety concerns and regulations. Decision-making information is now less important for companies: perhaps their use of technology is not changing.

3.3. The management of information

Information on farms is managed mainly by the farmers. An information 'specialist' was employed or functioned on 11,5 % of the small farms, 9,7 % of the large farms, 10,9 % of company farms and 11,3 % of the cooperatives. The information kept on farms was reported to be stored in the five ways shown in Table 4.

Table 4: Storage of information on farms by category of farm

Respondents' methods of storing information (%)	Small farms	Large farms	Company farms	Cooperatives
Library	31,7	26,2	18,9	19,2
Information centre	0	2,1	0	3,6
PC database	38,0	49,6	73,7	60,7
Technical office	14,8	30,5	72,9	78,4
Diary, Notebook	61,3	53,3	61,8	54,8

Use of computers

The use of computers was examined in greater detail. They were used by 68 % of the small farm respondents, 83,6 % of the large farm respondents, 100 % of the companies and 97,7 % of the cooperative respondents. The 141 small-scale farmers had 109 computers, 55 large-scale farmers had 78 computers, 126 from the companies reported having 745 computers and the 88 cooperative farm respondents had a total of 482 computers. Overall, 86,3 % of respondents stated that they used a personal computer.

Respondents were asked to state by whom the PC was actually used (Table 5). On the private farms, the users were mainly the farmers themselves or a member of their families: both farms and computers were essentially family concerns.

Table 5: Users of PCs on farms, by number of respondents (%) by category of farm

Users of farm PCs	Small farms	Large farms	Company farms	Cooperatives
Respondent/farmer	62,3	54,1	38,6	27,5
Spouse	24,0	29,0	0,6	0
Other family member	33,2	69,3	0,6	0
Employee	0	9,9	71,5	60,9
Other person	2,1	13,5	9,0	20,7

The PC is widely used for access to internet. Of those who have computers, 64,3 % of small farmers access the worldwide web, as do 70,6 % of the large-scale farmers, 62,8 % of companies and 77,3 % of cooperatives. A wide range of software was employed, both general (such as Word and Office) and special to agriculture (such as Zootechnic and Agronom).

Training in using PCs and information.

The last aspect of computers on farms to be studied in this Report concerns training courses. Data were obtained on the numbers of respondents who had attended a course, and on the numbers who wished to receive training (Table 6). No time frame was included in the question, but it is assumed that attendance was in the recent past, and that an interest in training relates to the near future.

Table 6: Courses of training on PC and information systems: attendance and interest to attend by respondents by category of farm (%)

Attendance and interest in courses	Small farms	Large farms	Company farms	Cooperatives
Have attended course on PC	21,1	24,0	42,8	33,8
Have attended course on information systems	12,7	6,9	20,9	22,1
Have not attended a course	66,2	69,1	36,3	44,1
Would like a course on PC	29,6	25,8	31,1	36,3
Would like a course on information systems	18,3	17,1	37,8	28,2
Would not like a training course	52,1	57,1	31,1	35,5

It is clear that there has been less involvement in training courses by respondents on the private farms, and that less than half of those on company and cooperative farms had attended a course. Where training had been undertaken it was most often on PCs rather than information systems. Presumably informal instruction and personal practice were the main ways in which farmers had learned to use PCs, and to develop their information skills. Interest in future courses was highest on the cooperative farms. More than half the private farm respondents had no interest in future courses.

4. Conclusions

Farming in 2003 is shown to differ, in some important ways that affect the management of information, from that seen in 1998. There is evidently an increase in ecological or organic production which has doubled on small farms, and increased more than four times on the large private farms, in the past 5 years. At the same time, integrated approaches to using inputs have decreased, making the polarisation between conventional and ecological farming rather stronger.

In terms of their personal characteristics, the new data re-inforce the 1998 evidence about the relatively low average age of Czech farmers – probably about 15 years less than farmers in the UK, for example.

In general, the 1998 conclusion that the farmers' education level has a major influence on their information system is re-affirmed by the 2003 data.

The actual sources of information and advice used, and hence the components of the information system, are evidently changing. In discussing the associations between level of education and the number of sources of information used, it was noted that the respondents using the largest numbers (11–18) of information sources are also associated positively with levels of education.

About half the component sources in the information systems have remained stable in their importance. The systems hence appear to be quite robust. Print media still dominate the ranking of importance.

The PC has now become an important aid to management on farms. As might be expected, on the

private farms the operators are mainly the farmers or members of their families, and on company and cooperatives it is the employed staff who mainly use the PC. There has been a large investment in PCs on farms since 1998; they are now (2003) used on 68 % of small farms, 84 % of large farms, 100 % of company farms and 98 % of cooperative farms. There is much use of the internet, especially by company farm respondents.

Diversified activities and income generation on farms is a feature of agriculture in Europe, and a major influence on the information system needed for modern farming. The data obtained in 2003 show that many farms have diversified, and that more expect to do so in future.

Future expectations, as stated by the respondents, are for increases in growing energy crops, ecological (organic) produce, tourist accommodation (agrotourism), horse riding, food processing and farm shops. Most of these changes (perhaps two thirds of the responses) are in activities that remain close to the traditional skills of biological production. There are also significant changes in the use of resources such as buildings for agrotourism or for business development.

Bibliography

Goonatilake S. 1991. **The evolution of information**. Printer Publishers. London.

Kaimowitz D. and D. Merrill-Sands. 1989. **Making the link between agricultural research and technology users**. ISNAR. The Hague, Netherlands.

Ministry of Agriculture of the Czech Republic. 1996. **Czech Agriculture in 1996**. Prague.

Ministry of Agriculture of the Czech Republic. 1999. **Czech Agriculture in 1997**. Prague.

Ministry of Agriculture of the Czech Republic. 2002. **Green Report 2001** Prague.

Rogers, E. M. 1995. **Diffusion of innovations**. Free Press. New York.

Röling, N. G. 1994. **Extension Science: Information systems in agricultural development**. Cambridge University Press.

Rolls, M. J., G. E. Jones and R. B. Tranter. 1987. **Information management in agriculture**. British Library. Research and Development Report 5931.

Rolls, M. J., M. S. Hassan, C. J. Garforth and M. F. Kamsah. 1994. **The agricultural information system for smallholder farmers in peninsular Malaysia**. Rural Extension and Education Research Report No. 1. AERDD, University of Reading. UK.

Rolls, M. J., N. Harford and M. Slavík. 1997. **The young agriculturist. Agriculture, careers in agriculture and the role of the Agriculture Secondary Schools in local farm development in the Czech Republic: a study of the students' perceptions**. Research Report No. 7. AERDD. University of Reading. UK.

Rolls, M. J., N. Harford, M. Slavík and I. Miller. Assisted by T. Frýbortová. 1998. **The new private farmers. Acquisition of technical information and business skills, and current sources of information, advice, education and training in the Czech Republic**. AERDD. University of Reading. UK.

Rolls M. J., M. Slavík and I. Miller. 1999. Information systems in Czech Agriculture. Research Report No. 11. AERDD. University of Reading. UK.

Rolls M. J., M. Slavík and I. Miller. 2000. **Informační systémy v českém zemědělství**. Ministerstvo zemědělství ČR, Institut výchovy a vzdělávání, Praha.