THE UPTAKE OF INTERNET-BASED COMMUNICATION TECHNOLOGIES IN UK FARM MANAGEMENT

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ABSTRACT

The results are presented of two surveys of actual and potential use of new communication technologies (with special reference to those based on the internet) in UK farming: one in the South West of England, characterised by family farms and pastoral enterprises, and the other in the Eastern counties, associated more with large farms and arable farming. Conclusions are drawn concerning conditions for increased exploitation of the Internet in agriculture, and recommendations made for overcoming some barriers. The paper also reports on the establishment of a trial within a farmers' production/marketing group, comparing experiences of a group of internet users with a similar-sized group of non-users, and monitoring the pattern of use of the technology within the user-group.

INTRODUCTION

Among the problems frequently identified with respect to farm business information provision and training are those of the wide dispersion of businesses in an area where travelling to events can be troublesome, and of the difficulties of finding time to attend activities off-farm (see, for instance, Errington *et al*, 1994). The latter is especially true of the small, family-run farms which characterize many areas of the UK. New communication technologies, and especially the internet, appear to offer a means of overcoming some of these problems.

This paper reports on a project, supported by the Louise Ryan Stowford Trust, whose objectives were to determine the actual and potential adoption of the new communication technologies in farm businesses, and to identify opportunities for their development in that context. It takes for granted an understanding of such terms as 'internet', 'e-mail', 'World-Wide Web' (WWW), 'bulletin board' 'service provider' and 'video-conference', which are explained elsewhere (e.g. Harrison and Williams 1996, Goff 1996, Warren *et al* 1996).

The investigation comprised three stages. In the first instance, a telephone survey was made of a random sample of farmers in the far South West of England, to test the degree of awareness and use of various electronic media. The

geographical area was determined primarily by the terms of reference of the funder, the Louise Ryan Stowford Trust. As a second phase, focus groups were held in various locations in the region, to demonstrate internet technology, and to identify both its potential and barriers to uptake.

These first two phases were reported in Warren *et al* 1996. The survey was replicated during late 1996 and early 1997 in the areas of Peterborough and Cambridge in the East of the country, chosen for the maximum contrast of farming types to those typical in the South West.

THE SURVEY RESULTS

The South West survey was conducted between February and the end of March 1996, with 206 farmers being selected by stratified random sampling from the relevant Yellow Pages business telephone directories. A high percentage (27%) of responses were unusable, 45 because the respondents were no longer in farming to a significant extent, and 11 through respondents refusing to answer. 150 useable responses were obtained: 93% of eligible contacts. The Eastern survey was conducted between November 1996 and February 1997, with a sample of 180 being drawn from the Peterborough and Cambridge Yellow Pages directories. 129 useable responses were obtained, with 17 no longer in farming and 45 refusals: 72% of eligible responses. Thus the total number of respondents was 268.

Associations between variables were tested using chi-square tests: any associations reported here were significant at $p<0.001$.

The respondents

All but two respondents were engaged in managing a farm business. On average they had been in their present position for around 15 years, with a range from 1 to 60 years. Their median age was around 44 years, with 73% being between 30 and 59, and 24% being 60 years or over: 68% were male. 19% had a Higher Education (HE) qualification (HND, Degree or postgraduate qualification) and 26% had some form of Further Education (FE) qualification. 51% respondents had no HE or FE qualification at all. There was a significant difference between areas in this respect: in the South West, only 39% respondents had had some form of HE or FE qualification compared to 52% in the East.

10% had had some form of computer tuition during their education, and 24%

had received some other form of tuition in computer use.

The farms

Farm size ranged from under 40 hectares to well over 480 hectares (ha), the median being around 200 ha. There was a significant tendency for smaller farms to be managed by people with lower educational qualifications. In the South West, 21% were above 160ha and 18% below 40ha: In the East, 46% were above 160ha, and only 9% below 40ha. The South West sample was dominated by livestock farming, with 58% involved in dairy production and 25% mainly sheep and cattle, while 68% of the Eastern sample were specialist arable producers. 54% of specialist arable producers had HE or FE qualifications, while 74% lowland cattle and sheep producers had none. 72% respondents obtained 90% or more of their income from farming.

Current use and awareness

Respondents were asked about their use of various forms of technology as aids to the management of their businesses. More specific questions, including purchasing plans, were asked about three forms of hardware: the fax machine (a form of electronic communication which has already established a strong foothold in general business use), the personal computer and the modem (both essential prerequisites for use of the internet):

	Currently using in management			Planning to buy in next 5 years*
	Total (n=268) %	*South West (n=149) %*	*East (n=119) %*	*Total (n=268) %*
Television	60	71	45	
Video	54	54	54	
Teletext	46	44	50	
Cable TV**	1.5	2	1	
Satellite TV	13	11	15	
Fax	43	28	61	17
Computer	47	38	59	30
Modem	15	8	26	11
Bank link	5	3	8	
Email	7	2	14	
Internet	7	2	14	

* only applies to those not currently using the technology concerned.

** rare outside major towns.

The figures above show significant differences between regions with respect to use of television, fax, computer, modem, email and internet. Some of this variation will be due to the lapse in time between the two surveys, but the major part is likely to be due to the geographical influence.

Further questioning was designed to test further awareness of the newer internet-based technologies:

	Heard of	*Used*	*Seen demo*	*Know of someone using*	*See benefit in own business*	*Planning to get access*	*Like to find out more*
	% response (n=266)						
e-mail	80	13	18	38	26	17	36
internet	94	12	19	38	25	17	35
WWW	47	10	13	25	21	15	34
bulletin board	30	8	12	23	21	15	34

Note: responses include those of people already using the technology in their management.

There were significant differences in awareness between regions: 92% had heard of email in the East compared to 57% in the South West: equivalent figures for

the World-Wide Web were 71% and 27% respectively (but no difference in awareness of the term 'internet'). Some of the variation could have been created by the time separation of the two surveys. It is also important to note that awareness may be exaggerated: those who feel they 'ought' to be aware of a technology may have been tempted to give the answer they deemed to be expected.

Fax machines

114 respondents (43%) possessed fax machines, of which 90% had been bought in 1993 or later: 10% were able to use someone else's machine, and a further 17% were intending purchase. 25% were using their second or third machine. The reasons for purchase were wide-ranging: the most commonly-mentioned were the need for speed (30%), a general desire to improve communications (25%), and the demands of another, non-farm business (7% both regions, 20% South West).

Further analysis confirmed a highly significant association with of fax ownership with age and educational qualification (the older and less well educated respondents being less likely to own a fax), and with size and type of farm (the bigger and more crop-oriented farms being more likely to own one).

Computers

126 respondents (47%) used computers in management. 95% of these computers had been purchased since 1993: 48% of these were first-time purchases. There was a highly significant association between education and computer ownership, 82% of those having HE qualifications being computer users compared with 26% of those with no qualifications at all. This is likely to be linked with age: those in the 40 to 49 age bracket were more likely to own a computer (65% respondents) than those both younger and older, and particularly than those in the 60+ age group. The bigger the farm, the more likely it is to have a computer (88% for farms over 480ha, compared to 26% for those below 40ha), and arable farms are more likely to use a computer (62%) than livestock farms (42% mainly dairy, 25% specialist dairy, 23% lowland sheep and cattle).

The main reasons for the purchase of the current computer are summarised below, together with the main uses to which the computers are now put. This suggests a distinct change in approach after the computer is bought, which may reflect an increasing realization of the business potential of a machine once bought.

	Reason for purchase		Present main use
	%	% excluding upgrading	%
Education (for children)	15	23	3
Education and business	2	4	4
Financial records	14	22	19
Upgrading existing computer	34	–	–
Keeping stock/crop records	6	8	14
Word-processing only	1	1	7
General business records	16	24	47
Other	12	18	4

Those who have not yet purchased a computer gave their reasons as summarised below. The categories used arose from the pilot testing of the questionnaire. Respondents were asked to give two reasons, a major and a minor:

	major reason	*minor reason*
	(% of computer users: n=142)	
Lack of knowledge	27	20
Untrained and too old	15	9
Too expensive/profit insufficient	11	7
Manual records sufficient	8	2
Owner refuses	7	4
Too busy to input data	6	8
Farm too small	5	6
Fear of unfamiliar	4	3
Records done elsewhere	4	1
No interest	3	5
Retiring soon	2	1
Deferred decision	–	7

There was a significant relationship between education and intention to purchase a computer, those with further education qualifications being more likely to consider purchase. There was a similar association with youth of respondent, but no association with type of business.

Modems

Forty respondents (15%) used modems, most bought in the last year, but one as early as 1992. In ten cases the main incentive had been the possibility of a direct

bank link; in three cases the attraction was the establishment of a direct link between milking parlour and a computer in the farmhouse; and ten simply bought a computer including a modem (this is will be increasingly common, with a presumption developing that any new computer should have both modem and CDROM facilities).

Of the vast majority who had no modem, most (60%) had no computer to connect it to; 22% felt no need; and the remainder had been deterred by a variety of reasons, although cost was hardly mentioned.

THE FOCUS GROUPS

Focus groups were conducted in the South West region only, in the Spring of 1996. Seven focus groups were convened: three established farmer groups, (including a dairy discussion group and an arable/vegetable group), two extra-mural farm management classes (Bicton College, Devon and Duchy College, Cornwall), one cooperative pig buyer, and one group drawn from the survey respondents.

Each group session included a combination of demonstration and discussion: participants were first asked questions to establish their familiarity with the technology, then shown how it worked. Finally discussion was opened on the potential for them and others in the industry. Most had some prior knowledge of concepts such as 'internet' and 'e-mail', but little understanding of the idea of an electronic 'bulletin board'.

The main problems initially perceived by group members were:

- slowness of response, particularly at peak times and with old equipment;
- reliability of searching process - finding out who is connected, and what is on offer;
- cost of operation: phone charges, service provider fees, cost of modem;

Some of these impressions were reinforced by the experiences in one or two of the demonstrations. In particular, the use by the research team of a laptop computer and digital portable telephone was variable in its success, due to poor reception in some areas. However, when demonstrations were under way the typical response was enthusiastic. The main potential, in the short term at least, was seen as being use by groups of farmers, rather than farmers operating

individually. This group activity could be formal and highly organised, particularly when driven by a large organisation such as the pig processing company. At the other extreme, it could arise from an informal grouping of like-minded farmers, as long as they had sufficient commitment to the idea.

One constant theme was the relative difficulty of locating information of specific use to the participants' farm business, and the fact that the opportunities for electronic commerce were as yet limited for farm businesses. It was the more interactive uses of the technology that excited most interest: e-mail and bulletin boards. These methods allow private communication within a group of individuals, so have more potential where information is sensitive to competition, and/or is costly to provide.

The overall potential was felt to be highest with high-income enterprises, and for producers who were most market-oriented (such as vegetable growers, potato marketing groups, quality pig-meat production) and thus could get a good return on rapid access to, and sharing of, market information. Within one focus group were members of a farm holiday accommodation group who were already exploring the possibilities of e-mail. The advertisement of the group on the internet, with the possibility of a WWW server, was also a possibility.

Some of the highest potential was seen in the pigmeat production area, where supermarket-driven quality concepts such as 'total traceability' and the consequent need for life-long pig identification were likely to create increased demands for data processing and transfer both on farms and at the factory. The use of a bulletin board both for feedback to specific farmers and to share information between members of a group, as well as for intergroup trading, was anticipated to be particularly useful. Vegetable growers were also enthusiastic about similar potential benefits.

DISCUSSION

So far, the uptake of internet-based technology is low in UK farming. Only 15% respondents owned a modem, and 7% used email and internet. Given that most areas of the UK are closer in character to the South West than the arable-dominated counties used in the Eastern survey, and given a possibility of exaggeration in the responses, the actual use across the UK is likely to be over-represented by these figures (even allowing for the time lapse between the two surveys).

On the other hand, there are signs that future growth could be rapid. Participants in the focus groups anticipated significant growth in use in the next three to five years, whatever their own personal reservations about the current state of the medium. Of the survey respondents, 25% could already see a potential benefit to their business from access to the internet; and around 35% expressed a desire to learn more.

The rapid growth in use of fax machines since 1993 indicates an increasing interest in (and dependence on) electronic transmission of data and information. More to the point, on-farm computers are rapidly gaining a higher profile, after a long, slow gestation period. In 1984 one study estimated that 9% of farmers in England and Wales had a farm computer (Produce Studies Ltd 1984); seven years later another suggested a figure of 16% overall, but less than 10% in the South West (Gibbon and Warren 1991). In the current survey (1996/7), 47% of respondents currently owned computers (38% in the South West), and another 30% were actively considering purchase. Over 80% of computers currently in use were bought in 1994 or later: the more recently a computer has been acquired, the more likely it is to have the speed and memory requirements for effective use of the internet.

Having the hardware is not everything. Concerns raised by the focus groups included ease and speed of access, availability of useful information, and the perceived difficulty of getting started. *Ease of access* in general has been improved enormously by software developments, especially World Wide Web browsers such as Netscape Navigator. In rural areas, however, quality of telephone line can be severely limiting, incurring long and frustrating waits for even the simplest information.

Even if access is satisfactory, it is vital to have *appropriate and useful information* available. At the time of the first survey in 1996 it was easier to obtain agricultural information from the United States than from the UK. Although global communication is a laudable and marvellous phenomenon, the prime need for a business is often nearer home. At the time of writing, much valuable information is available on a national level, involving organisations ranging from the Ministry of Agriculture, Fisheries and Food and other government departments, through commercial suppliers and produce traders, to professional organisations connected with farming (including a fledgling Institute of Agricultural Management WWW site (http://sealehayne.plymouth.ac.uk/iagm/iagm.html)).

At least one commercial agricultural service is available through Farming Online, a subscription-only provider offering secured information on major markets, press releases and bulletins from major organisations, meteorological updates and so on. In late 1996 the National Farmers Union, the Country Landowners Association and the Agricultural Development and Advisory Service joined forces to form the Rural Business Network, providing information through Farming Online for those who are prepared to pay the subscription.

Getting started remains a difficulty for many. The very geographical isolation which the internet can help to overcome also limits the opportunity for individuals to check what the new technology has to offer, and to test the facilities. Thus ignorance of the potential is a barrier, but one which we have found to be easy to break down: enthusiasm is far higher after having seen a demonstration of constructive 'surfing the net'.

Some of the most potent opportunities from the internet, however, arise from active, rather than passive use, such as collective marketing, information gathering and sharing, learning and training, even political lobbying: the network becomes a powerful instrument for effective cooperation where conventional forms of cooperation may be hampered by distance. This can be limited by internet service providers, who often appear to be solely interested in securing a subscription, rather than helping users learn how to make best use of the services. Moreover, they can be reluctant to offer bulletin board and conference services, and/or do so at a high cost, with inadequate support. They could be missing an important point. The conventional model of the internet user may be of an individual accessing very remote points of information provision. In farming, though, with a strong existing tradition of local group activity, the opportunity to build on and enhance that activity may be the most attractive aspect to farmers of the new technology, and thus the strongest selling point.

Our report on the first survey (Warren *et al* 1996) suggested the encouragement of chosen farmer groups in developing capability in using new communication technology, acting as 'trailblazers' and rôle models for the rest of the farming community. While acknowledging the irony of proposing local, even parochial group activity to promote the use of a world-wide communication medium, we felt that working in groups would help to overcome many of the difficulties identified above.

We have since started on an experiment to test, in a small way, this idea. Results are not yet available at the time of writing, but preliminary findings should be available for verbal reporting at the Congress in July.

This project involves the establishment of a trial within a farmers' potato production/marketing group in one of the few good arable areas in the South West of England. Between eight and ten of the potato marketing group, none of them currently users of internet, are being supplied with subsidised internet facilities. Some technical backup will be supplied by the service provider: other help, including some on-line assistance, tuition and management of bulletin boards, will be provided by the University of Plymouth.

After a initial set-up and 'run-in' period, all communication traffic from the user group modems will be logged and mapped to identify volumes and direction of information flows, both within the group and between individuals and the outside world. This monitoring will take place for at least three months, with the possibility of extending the period if significant changes in activity are still apparent, and if resources allow.

Periodic focus groups and questionnaires will be used to monitor changes in perceptions, problems and successes, and recommendations for improvement. The non-adopting colleagues of the user group will also be subject to questionnaires during the project period.

By this process, we hope to gain some insight into:

- the adoption process;
- the most popular uses for the technology;
- the most common frustrations and difficulties in use;
- the real value, if any, of using internet facilities;
- the potential for improvements to service provision;

in order to identify effective methods of encouraging adoption of the new technology. Whether or not we have succeeded will be revealed at the Congress.

Biographies

Martyn Warren is Head of Land Use and Rural Management in the Seale-Hayne Faculty of Agriculture, Food and Land Use, University of Plymouth, UK. He is a Council member of the Institute of Agricultural Management, and Chairman of the Editorial Board of the journal *Farm Management*: The fourth edition of his book *Financial Management for Farmers* is currently in press (Blackwell Science). Mark Stone and Richard Soffe are Senior Lecturers in the Department, responsible for Seale-Hayne's internet and multi-media work respectively, including development of the Faculty WWW server (http://sealehayne.plymouth.ac.uk/).

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