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Internet and its potential role in the development of multifunctional agriculture

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Abstract

The concept of multifunctional agriculture is discussed, including the production of 'non-commodity' as well as commodity goods. It is argued that the internet has considerable potential in facilitating the development of multifunctional agriculture, particularly in the field of marketing. However, this potential is limited by growth rates in use of internet, particularly in the farm sector, due to differential development of telecommunications infrastructure, and to factors relating to development of human understanding and capacity. Coordinated policy is needed at national and supranational level to ensure that rural populations are able to participate in the digital society, and to harness the internet effectively in the development of multifunctionality.

Introduction

As countries around the world retreat (albeit slowly in some cases) from protectionist measures supporting the price of bulk agricultural commodities, their farmers are increasingly turning to other forms of income generation in order to maintain profits, and in many cases just to survive. The increasing volatility of product prices provides another incentive to diversify, in order to spread risks. At the same time, the mainly urban populations of those countries are expecting the farming population to provide public goods such as beautiful landscape, unpolluted water, and diverse wildlife habitats, usually in return for some form of public funding.

It is the contention of this paper that the use of internet technology has much to offer the agricultural community as it struggles to make the transformation from commodity-domination to multi-functionality. Although the latter has implications for other parts of the supply chain, the paper concentrates on issues at farm level.

Multifunctional agriculture

The term 'multifunctional agriculture' does not have a unique definition. The call for papers for this conference uses terms such as 'multi-cropping', 'multi-use' and 'multi-user', focussing heavily on land as the primary resource. I would go further than that, looking at other resources of the farm unit, especially the entrepreneurial and other skills of the farmer and family, and other people involved in the business. Thus I would include the production of speciality food products for niche markets; the provision of services (for instance haulage or fieldwork) to other farmers and rural businesses; the use of agricultural assets (the farmhouse, the farm animals) to attract paying visitors); and the employment of the farmer and/or members of the farm household in other occupations such as teaching or consultancy. In some ways this movement represents a return to a situation that was common before the Second

World War in the UK and elsewhere, when a farmer and his family would have quite naturally participated in a wide variety of income-generating activities, irrespective of whether they were 'farming' or not. However, in the highly-subsidised economic environment of the West, and the command economies of Eastern Europe, post-war agricultural policy has focussed heavily on bulk commodity production: farming and farmers have specialised accordingly.

Increasingly, society is looking towards agriculture to provide protection of the environment, opportunity for non-market recreation, and other benefits for the wider community. Within the European Union, at least, such activities are supported by funding, and so are becoming another part of the 'multi-function' of the industry. Thus 'multifunctional agriculture' embraces production of commodities other than just food and fibre, and of non-commodity goods, such as protection of the environment, which may or may not be paid for by society through government.

Indeed, the thrust of rural policy in the EU and elsewhere suggests that concentrating on multifunctional agriculture is too narrow, and that we should be concentrating on agriculture's role in a broader function of rural development: building a multifunctional rural economy of which agriculture is only a part. The Agenda 2000 reforms of the Common Agricultural Policy (CAP) recognised the challenges for a multifunctional agriculture as 'to produce food, fibre and energy sources; to protect rural environment and landscape; to contribute to vitality of rural areas and to balanced regional development' (Vazzana 2002). Another attempt at a definition, referring to OECD, describes a multifunctional sector 'producing multiple and interconnected (joint) outputs or effects. These effects or outputs may be positive or negative, intended or unintended, complementary or conflicting, valued in existing markets or not.' (OECD, quoted in van Huylenbroeck 2002).

Komentář: See Murdoch and other comments on original notes

The 'new' functions described above require new processes, which in turn demand new skills on the part of those engaged in the industry. In particular, diversification of production away from mainstream agricultural products usually brings the farmer into contact with a different kind of marketing activity, where markets have to be created in the face of strong competition, and where meeting the needs of the consumer applies much more directly to the producing unit. In such activity information and communication are key, in order to identify markets, source new types of input; inform and persuade potential customers, and establish price levels. Similarly, diversification into production of non-commodity goods needs ready access to information about appropriate environmental management techniques, non-market performance benchmarks, the availability of grant aid, and so on. In countries where there is still a public-sector extension service, the increasing breadth of knowledge required places heavy burdens on advisors: elsewhere, farmers are faced with increasing costs of private consultancy, or have to look for ways of accessing the knowledge directly. Because of the complexity and variety of the knowledge required, social and professional networks are likely to substitute for some of the more formal, hierarchical methods of communication.

In the context of these challenges, I contend that the internet has an important role to play.

The internet

Most readers of this paper will be familiar with the internet as a 'network of networks', which allows ready transmission of information via the 'world-wide web' (WWW); rapid intercommunication via electronic mail, or 'email'; and a variety of interactive

transactions by a combination of the two (e.g. bulletin boards, newsgroups, chat rooms, multi-user domains). These processes support in turn a growing range of functions, including retail and wholesale trading ('e-commerce'), interaction with public services and departments ('e-government'), social communication, chain management, political influencing, electronic voting, and so on.

The most common method of accessing the internet is via a personal computer equipped with a device ('modem') that will link it into the network, usually via a conventional telephone line. Alternatives to the latter include digital cable, digital interactive television, digital satellite transmission, fixed and mobile wireless transmission, and ADSL (asymmetrical digital subscriber line), all of which have the potential for carrying 'broadband' services (European Commission 2001:5-41). Not only are the latter far faster than the narrowband access possible through conventional phone lines, but (possibly as important) they allow continuous desk-top access without having to worry about call charges accumulating.

A role for internet in multifunctional agriculture?

The functionality of internet in information provision and communication appears to give it a high potential for assisting the process of developing multifunctional agriculture (or the multifunctional rural). Possibilities include:

A source of information for new activities

At its most basic, the technology provides, through the world-wide web (WWW), access to a huge repository of information: technical (e.g. guidance on environmental stewardship), economic (e.g. prevailing market prices), political (e.g. government policy), administrative (e.g. terms and conditions for application to a government grant scheme). Thus a producer could, to some extent, compensate for the lack of advice from conventional channels, and/or the lack of specific advice for an unusual economic activity, by seeking scientific and other information direct from the source. Similarly an extension officer, faced with questions concerning an unfamiliar activity, might piece together the necessary knowledge to be able to give some help to his or her clients. As well as increasing returns and/or reducing costs, this would be helpful in reducing risk levels.

A tool for marketing

One of the most potent areas for application of internet technology is that of markets – for both outputs and inputs. On the output side, this can be as simple as using the WWW to search for ideas for new products, and new marketing channels for existing products. Where substantial barriers to free trade exist (for instance where local markets are dominated by monopolistic or oligopolistic buyers), pricing information obtained via email or WWW can help to influence local prices and reduce the exploitation of small producers.

Moving from the passive to the active use of internet in marketing brings us to 'e-commerce': business-to-business (B2B) and business to consumer (B2C) (Schiefer 2001). E-commerce allows businesses to improve their market reach (for instance by geographical distance, by market sector, by marketing channel) with limited investment, and can facilitate the development of new supply chains for differentiated products (Wilson 2000). Wilson identifies distinct differences between farm businesses and those up and down stream. He suggests that farm businesses are more likely to initiate B2C e-commerce (often in niche markets) than B2B, given a limited web presence and the lack of capacity (capital, labour, expertise) to set up and run the sophisticated systems required for direct dealing with retailers or

processors. However, many farm businesses are already participating in e-commerce operations set up by businesses up-stream or down-stream from farming, in the hope of benefiting from reduced transaction costs, better prices for inputs and/or outputs, more active participation in chain management, and better, quicker feedback on product performance (Helbig 2001). The latter is particularly important with the increasing emphasis on food safety and quality, and stringent requirements for traceability in the food chain.

An opportunity for pluriactivity

Outside the farm business (but within the farming family) internet can bring opportunity for developing alternative sources of income. At the least it can make it easier for those in remoter settlements to identify employment opportunities. Given specific skills (website design, word processing, accounting, language interpretation, financial trading) it can also allow sale of services to others at a distance – 'teleworking' – on a local, national, or even international basis.

Development of skills and attitudes

New functions bring new demands on people, implying capacity building. Where this is not available in a form suitable to farmers (by virtue of time, place, and pace) distance learning can play an important role. The ability of the internet to carry interactive, multimedia learning processes is still limited in most rural areas due to poor telecommunications infrastructure, but even the use of email and discussion groups could add significant value to conventional paper-based approaches.

A reduction of pressure?

We live in an age of bureaucracy, with high levels of monitoring imposed on businesses (especially in agriculture and food) from government and its agencies. Use of internet will not make this go away, but the current push towards 'e-government' *may* help to reduce its impact by allowing online application for subsidy, submission of statistical data, tax returns, and so on. The same may apply to supply chain management. This in turn may release time and energy for the development of new activity, and/or reduce the disincentive to entering new, highly-regulated markets.

A vehicle for collaboration

Many of the activities in 'multifunctional agriculture' imply a collaborative approach between businesses in order to achieve their full potential. Examples might be the preparation of a countryside stewardship programme for an area of land with multiple occupation, or the creation of a strong market presence for small producers of a regional food product. The internet can assist in the process in a variety of ways, involving simple email, user groups, shared file space and information systems. Its informality can help to bypass normal communication barriers and encourage a more free-wheeling, open development of new social networks – even perhaps online communities (Rheingold 1993; Smith and Kollock 1999; Keeble and Loader 2001)

Closer to the business is the concept of virtual co-operation (Helbig 2001:22). This term describes the situation where several small or medium enterprises can use the internet to combine the products they are offering to meet the conditions of the purchaser. Helbig uses the example of a group of farmers co-operating to make an offer to a buyer who needs a large quantity of product at a particular quality. However, it requires trust that the farmers can and will deliver if called on, so cannot be instigated just by putting calls out on the WWW, and is likely to have to build on existing good relationships created on a face-to-face basis. Moreover the purchasing

business will not want the responsibility and risk of checking quality of the lots and combining them, so a third party will have to be involved.

A clear potential?

It thus appears that the internet has the potential to be a contributory force in developing multifunctional agriculture. Conversely, the development of multi-functional agriculture should create conditions for faster adoption of information and communication technology (ICT) by agricultural businesses. Further, the internet appears to becoming the default mechanism for knowledge transfer in advanced societies, and so is becoming a crucial element in maintaining and increasing competitiveness in market-led activities.

Realising the potential – how close are we?

The dangers of futurology

The scenario presented in the previous section contains an implicit assumption that the technology, and the capability to use it, are readily available to those who might benefit. Before going further, it is essential to put that assumption into the context of trends in ICT development.

General trends

Tables 1 and 2 indicate business penetration of PCs and internet access (not necessarily use) in selected Western countries. The data relates to 1999, which in such a fast-developing market is a long time back, but nevertheless it is clear that penetration in these countries is generally very high.

Table 1: Business with PCs, % (Department of Trade and Industry 2001:10)

	% businesses
UK	96
France	97
Germany	98
Italy	92
Sweden	96
US	95
Canada	95
Japan	97

Table 2: Percentage of businesses with internet access, 1999 (Department of Trade and Industry 2001:13)

UK	90
France	80
Germany	87
Italy	74
Sweden	91
US	93
Canada	93
Japan	85

Internet use requires telecommunications infrastructure, and Table 3 shows the relative availability of telephone landlines and mobile telephones in selected

European countries, including some Central and Eastern European countries (CEEC). The data will be underestimates for metropolitan areas, and overestimates for rural areas. The further development of mobile technology may enable CEEC users to overcome limitations of the quantity and quality of landlines available, though its expense will be a deterrent to some.

Table 3: Fixed and mobile phone lines, 2000 (EITO 2002:83)

	Main lines per 100 inhabitants	Mobile subscribers per 100 inhabitants
Western Europe	57	63
Denmark	71	64
Finland	55	74
France	59	49
Germany	62	59
Netherlands	65	68
Norway	76	72
Portugal	43	65
UK	58	67
Czech Republic	38	42
Hungary	38	31
Poland	29	17
Russia	19	2

In comparing the proportion of Gross Domestic Product (GDP) spent by countries on information technology, Table 4 gives an impression of the relative potential of those countries to develop their capacity in the next few years. Generally speaking, the richer countries spend a higher proportion than the poorer ones: as in a household, basic needs have to be met before money can be spared for high technology, especially if it has to be bought with costly foreign exchange.

Table 5 suggests that some of that imbalance will be remedied by rapid growth in the near future, particularly in Eastern Europe. Figure 1 helps to put the user numbers into perspective by showing the percentage of the populations of selected Western European countries using the WWW in 2001: only in the Nordic region are rates above 50%.

Finally, Table 6 shows one estimate of the growth in e-commerce in Western Europe up to 2005: even if one discounts for the effect of recent upheavals in the world economy, this is a very fast-growing activity. If even half these growth rates were achieved, it would imply that businesses which are not able to participate in the e-economy will find their sphere of trade increasingly limited.

Table 4: IT spending/GDP, %, 2001 (CEEC) and 2000 (remainder) (EITO 2002:81,91)

	2000
Western Europe	**3.9**
Denmark	4.5
Finland	4.4
France	4.0
Germany	3.7
Greece	1.7
Netherlands	5.0
Norway	4.4
Portugal	2.6
UK	5.2
US	**6.4**
Japan	**4.1**
	2001
CEEC	**2.3**
Czech Republic	3.8
Estonia	3.7
Hungary	3.0
Lithuania	1.8
Poland	2.1
Romania	1.3
Slovenia	2.0

Table 5: Internet users (wire-based), thousands, 2000-2004 (EITO 2002:453) (EITO 2002:453)

	2000	2004	Compound annual growth rate 2000-2004 (%)
Western Europe	99684	218982	21.7
Eastern Europe	13164	42977	34.4
Total Europe	112848	261958	23.4
USA	132374	197525	10.5
Japan	33950	69832	20.1
Rest of World	104719	306873	30.8
World	383531	836188	21.5

Figure 1: Web users as percentage of population, (EITO 2002:28)

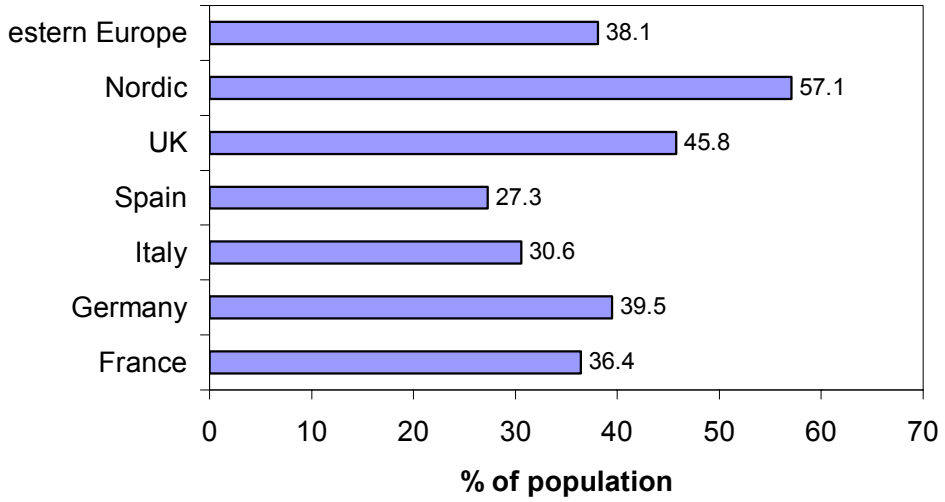

Table 6: Internet commerce in Western Europe, 2001-2005, €million (EITO 2002:28)

	2000	2004	Compound annual growth rate 2000-2004 (%)
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Agricultural

Where the agricultural situation is concerned, it is difficult to get a clear picture due to the lack of reliable statistics in most countries. Figure 2 indicates the position of agriculture, construction and mining (ACM) in the European IT market, showing small size, low relative market position and low growth. Looking to farm-level adoption, we have to rely on indications from the United States[1] and the United Kingdom (Tables 7 and 8). In each case, it is clear that the level of business use of PCs in farming is generally low (even lower in the US than in the UK), and, inevitably, level of internet use is even lower (note that Table 7 shows internet access, while Table 8 relates to *business use* of internet).

[1] There is a valuable warning for researchers and statisticians in the way that the USDA's own publication reports the data (Hopkins and Morehart 2001). This article states that '…the use of computers on farm has grown from 38 to 55 percent since 1997, while Internet use has grown from 13 to 43 percent.' Table 7 make it clear, however, that these figures apply to *access* to a computer and internet, not their *use* in the business. Similar errors have been made in recent years in reporting UK data – always in an upward direction..

Figure 2: European IT vertical market, 2001 (EITO 2002:84) (EITO 2002:84)

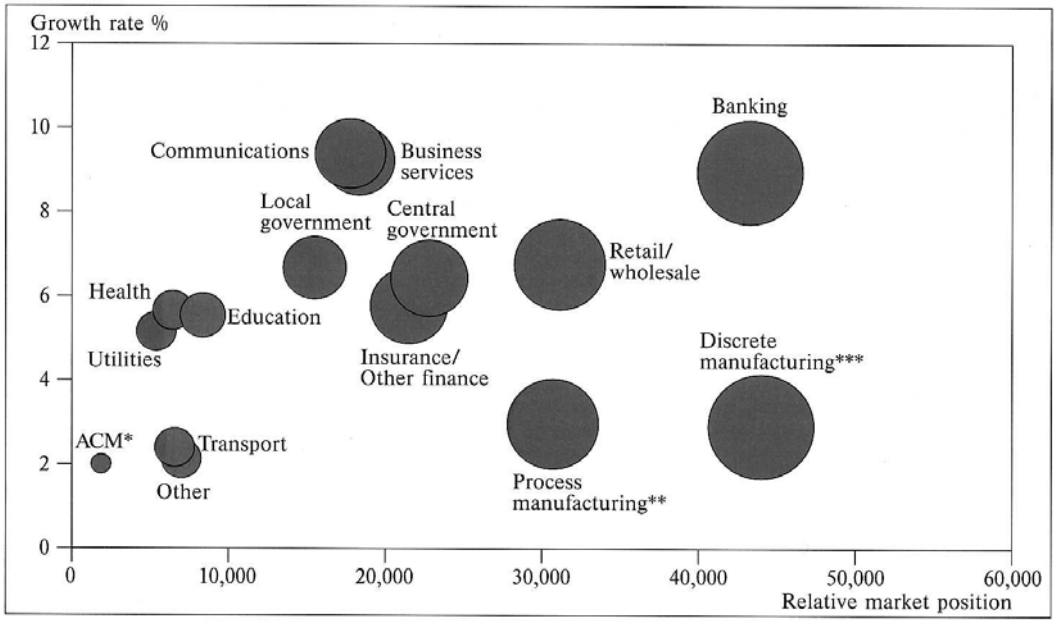


Table 7: US farm computer use 2001 (%) (NASS 2001)

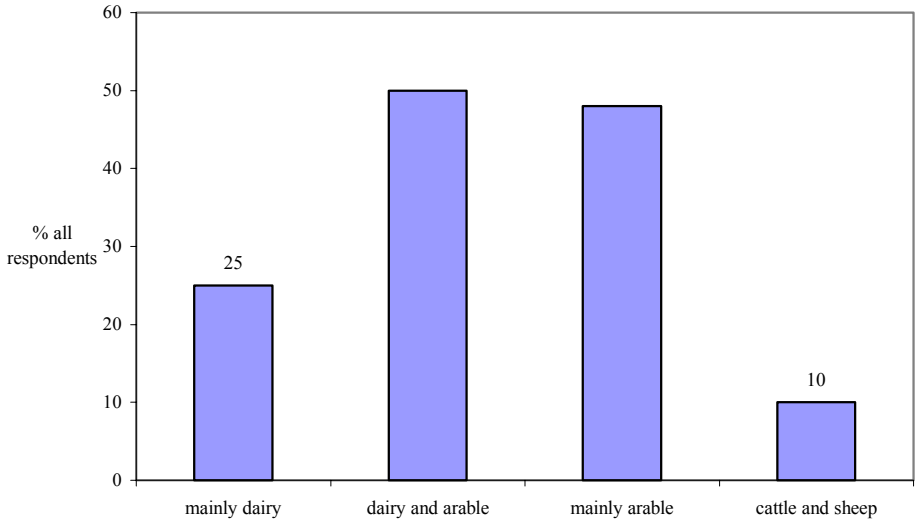
	With computer access	Using computer for business	With internet access
US total	**55**	**29**	**43**
<$10,000 sales	50	20	40
>100,000 sales	73	30	39
Crop farms	57	31	44
Livestock farms	55	27	42

Table 8: UK farm computer use 2001 (DEFRA 2002)

	Have access to a computer	Use a computer for the farm business	*Use* internet for business purposes
All holdings	**60**	**37**	**26**
very small	53	22	16
medium	67	50	37
very large	94	88	66
General cropping	68	53	n.a.
Dairy	65	47	n.a.
Lowland cattle and s	53	27	n.a.
Mixed farms	66	47	n.a.

Figure 3: Use of email/WWW in the business by type of farm, sample of UK farmers

(% all respondents, N=177) (Warren 2000)



Unsurprisingly, use of ICT shows a strong association with business size in both countries. In the UK in particular, there is also a strong relationship of PC use with type of farm: national figures for internet use by type of farm are not published, but Figure 3, based on a sample of UK farmers, suggests a clear divide between the low-intensity cattle and sheep producers and the larger-scale arable and dairy farmers[2]. Given that these data arise from two of the more advanced nations in ICT use, it is reasonable to hypothesise that a similar, or worse, picture would be found in other Western European countries, excluding the Netherlands and the Nordic countries. Further, it would be a reasonable assumption that adoption in CEEC countries is significantly lower, with the Czech Republic likely to be at of near the head (high ICT spending generally plus large average farm size).

What factors limit penetration?

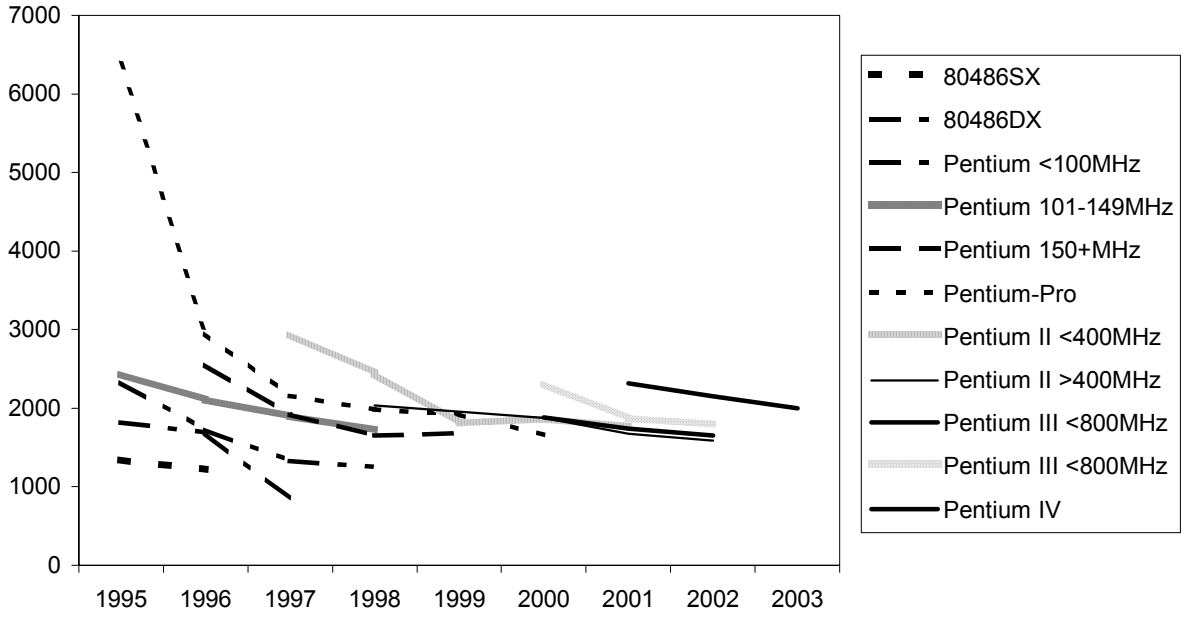
Technical factors

One of the reasons for low internet connectivity is, as we have seen above, the lack of suitable on-farm hardware. Even in relatively advanced countries such as the US and UK a significant proportion of farms still do not have a PC (still the default base technology), and in many of the others the computer is old and too slow to allow effective use. In poorer countries, and particularly in the developing world, the initial investment required is prohibitive, unless the use of the PC can be shared amongst many activities in the same business, or between many users in the same community (through, for instance a local 'drop-in' telecentre, or internet café).

[2] This theme is developed further in *Adoption of ICT in agricultural management in the United Kingdom: the intra-rural digital divide* (Warren 2002a)

It is true that the price per unit of computer processing is constantly falling, but this is not reflected in the price per discrete computer unit. Figure 4, for instance, shows how the European price per PC unit has hovered around the €2,000 point for some years. This is due to a steady increase in the demands for processing power and storage capacity of new-generation software. The development away from text-based web pages to those carrying multiple, dynamic photographic images is just one example. In contrast, telephone charges and running costs of services supplied by internet service providers ISP) have generally fallen in real terms, though in the EU they are still not as cheap as in the United States (European Commission 2002:6-7).

Figure 4: Evolution of average selling prices for PCs, Europe, €, 1995-2003 (EITO 2002:449) (EITO 2002)



Further, in most countries, poor rural telecommunications infrastructure is a major barrier. High capital costs of infrastructure, combined with low density of potential subscribers, limit the incentive for existing providers to operate in rural areas, and thus new initiatives tend to be in metropolitan/urban areas. This affects the quality even of conventional telephone lines, but in particular limits rural access to high speed ('broadband') communication links – essential where a business wishes to host a website, particularly if it is intended that the latter will be used for processing transactions. ADSL is asymmetrical – uploads are slower than downloads – and carries a tradeoff between distance and speed. The latter generally requires users to be no more than 3km from a suitably adapted telephone exchange (i.e. from an urban settlement). The laying of fibre-optic cable is prohibitively expensive for dispersed populations. Satellite transmission offers more freedom, but is asymmetrical, requiring terrestrial lines for uploads (European Commission 2001:29-31). The next generation of mobile telephone networks (3G) will allow a laptop computer coupled with a suitable cellphone, or a PDA (Personal Digital Assistants – palm-sized miniature computers) to transmit and receive data at far greater rates

than have been possible so far. However they will still be relatively slow, and will be expensive (in order to allow the companies which own the 3G licences to recover the huge investment (around €110bn) they made in them). Fixed Wireless Access (FWA), using transmissions from a fixed aerial to communicate with PCs installed with appropriate network cards) is cheap and flexible, but has problems related to security (BBC News 2001)and to serving hilly areas (BBC News 2002). It is also not popular with quasi-monopoly suppliers of infrastructure and telecommunications services, as its flexibility and ease of entry pose a potential threat to their markets.

Even for those businesses that overcome the technical problems, there may still be difficulties in engaging in e-commerce, such as lack of consumer confidence in the process (European Commission 2002:13-16), and the unwillingness of companies with a strong conventional business-to business market presence to open up electronic access to that market. (Schiefer 2001)

Human factors

It is not enough, however, to focus on technological factors without considering the relationship between the technology and people: those who make the investment decisions, and those who are required to operate the equipment. One issue is simple lack of awareness of information and communication technology (ICT) and its capabilities. Unlike many agricultural innovations (for instance an improved version of a crop harvester), the first-time adoption of a business computer represents a quantum leap. Innovation theory (Rogers 1995:204-249) suggests five characteristics of an innovation which may affect its rate of adoption: *relative advantage* (e.g. economic, comfort, time and effort); *compatibility* (with existing practices, values and beliefs, etc); *complexity* (a negative relationship); *trialability* (the opportunity to test the technology before adoption, or during a phased introduction); and of *observability* (producing visible evidence of advantage). On all these counts the initial adoption of ICT in a business meets difficulties. This has led one commentator to propose a 'chasm' in high-technology adoption between early adopters and the majority, risking a fatal stalling of the adoption process (Moore 1995). In farm businesses, potential adopters face additional problems. Geographical factors can imply considerable journey times in order to test and observe. The status of many farmers as craftsman/manager/owner makes it difficult to spare time unless the relative advantage is already clear.

Typically, the average farmer's level of educational attainment is lower in farming communities than that of the urban-based business manager (Gasson 1997:19-20). Most adoption studies show a pronounced positive relationship between education and propensity to adopt, this being a combination of lack of the necessary skills to operate the technology, and a lack of confidence in the abilities that he or she does possess. In most countries, training programmes exist to help those in rural areas to overcome these problems, but there has been a tendency to locate such training in centres such as regional agricultural colleges, requiring some trainees to travel long distances and to be away from their work for long periods.

Even those who are able to overcome the above difficulties may find the incentive for them to use email and the WWW limited by its poor utility and convenience relative to other communication technologies (including magazines and journals, TV, books, fax, telephone). This is partly due to characteristics of the hardware (for instance the need to interact through a keyboard; the ease of reading and organising information on paper rather than via a computer screen; the slow speed of reaction of most on-farm computers; the ease of reading paper-based communication at the kitchen table or in the living room). It is also a result of a lack of user-centred design in the

creation of websites and other interfaces, and lack of services with local relevance (a need that the Czech agricultural WWW portal 'Agris.cz' was set up to meet (Vanek and Jarolimek 2001)).

What can be done to accelerate the pace of adoption?

Should we be concerned about the limitations to adoption of ICT in farm businesses, and if so, what are the options? From the point of view of a free-market economist, the answer to the first question is likely to be 'no', except perhaps with regard to monopoly or near-monopoly elements in the supply of infrastructure. Given some corrective legislation to remedy these effects, the market should take its course. In general this could be expected to reinforce movements of working population from country to town. In the particular context of this paper it is likely, if my argument of the importance of internet is tenable, that development of a multifunctional agriculture and rural economy will be retarded.

However, most of us live in societies which have, through policy, expressed a clear concern for the particular needs of rural communities through, for instance, the EU 'eEurope' programme. Speaking in February 2002, the European Commissioner for Enterprise and the Information Society, Erkki Liikanen, described the core priorities of eEurope 2005 thus:

- "First, we need to promote attractive content for all Europeans;
- Second, we have to provide public services online;
- Third, we have to pursue digital inclusiveness for all Europeans;
- Fourth, we have to promote faster internet, that is, broadband;
- Fifth, we have to ensure trust and confidence in cyberspace" (Liikanen 2002).

Given that all the member and accession states have subscribed to the eEurope ideals, there is a clear justification here (particularly in the third point) for national and supra-national policy to improve internet adoption in the rural areas of Europe. With respect to supply factors, this may include countervailing action to overcome monopolistic restrictions on alternative delivery methods (such as corporate resistance to supporting fixed wireless access (FWA) systems). It may also include the funding of research and experimentation which cannot be justified by the private sector in terms of return on capital, but which is needed to test innovative alternatives to the current infrastructure. For instance the use of FWA appears highly promising for rural populations, but needs work to allow it to work effectively in hilly areas, and to deal with issues such as data security and 'free riders'. The UK government recently launched a £30m (€47m) scheme to boost the roll-out of broadband services. Most of the projects funded are located in urban areas, though some of the results will be transferable to rural settings (Department of Trade and Industry 2002). One, named the Buckfastleigh Broadband Community Network, is located in a small rural town 10km from my own place of work, and is currently the subject of intensive investigation by the University of Plymouth with the University of Newcastle. Though welcome, these projects are still pilot projects, and there will be many institutional and financial problems to overcome before the benefits can be felt by the population as a whole.

Other policy measures can include incentives to businesses to acquire necessary modern hardware (such as tax allowances in the UK for small and medium enterprises investing in information technology). Another option is to invest in 'telecottages' or 'telecentres' in villages and small towns, allowing local people access to modern equipment and assistance with its use. Reliable evidence about

the success of telecentres is sparse. Some notable examples exist, particularly in Scandinavia, but doubts persist about their ability elsewhere to contribute to a sustained development of ICT in rural areas (Cornford, Gillespie *et al.* 1999:33-34), particularly if not developed with and by the community, rather than imposed by a well-meaning donor (Koutsouris 2002).

On the human side, issues of attitude, comprehension and skill will continue to inhibit the use of internet technologies in rural areas without a determined effort to provide people with the same opportunity to learn and to understand as their urban fellows. Development programmes should be flexible and user-centred, going to where the people are, providing training in the specific context of the trainees' work, using group processes and peer support wherever possible (Errington and Nolan 1998:641-645; Warren 2000:49-54). They should also concentrate on those who are most likely to use the technology and/or act as a catalyst for others: farming women, for instance, who can be more likely than their farmer husbands to use the internet (Singh 2001:403-407). There are many examples of good practice, often supported by EU Structural Funds or the LEADER II initiative (see, for example, the nine case studies described in the LEADER Observatory Dossier 4 (Anon 2000)). A recent review of rural ICT learning classifies such approaches thus:

- Community resource centres [telecentres] providing opportunities for 'tasting' ICT;
- Personal and entertainment activities [e.g. internet cafés and video games] as tools for removing 'entry barriers';
- Service delivery beyond fixed locations [e.g. by use of mobile workshops or laptop kits];
- Use of ICT capabilities in the delivery of general services [i.e. creating a utility in the use of internet that goes beyond specific business purposes] (Huggins and Izushi 2002:114).

An example in the South West of England is the South West Agricultural and Rural Development (SWARD) project, based on small self-selected groups of rural people, sharing a computer and an ISDN line to an information 'hub', in order to achieve collective business goals (Warren 2001). The success of this project emphasises that for rural businesses to benefit from the internet, they do not necessarily have to be connected themselves, as long as they have effective communication with an internet user (in this case the group leader).

Another example is the AgriNet programme, using mobile computer laboratories converted from secondhand minibuses (Warren 2002b; 2002c). The original principles of this project stand as valuable criteria for any rural ICT project:

1. For maximum takeup and effect, the training and equipment has to go to the learners, rather than vice versa;

2. Workshops have to be flexible, i.e. delivered anywhere, any time, any day of the week (except Christmas day) to suit the clients;

3. Training materials and internet workshops have to be precisely relevant to the business needs of farmers, growers, and landbased industries (Warren 2002b:2-3)

However successful, these and similar projects all over Europe tend to suffer from short-termism in funding, and from being localised (and patchy) in their effects.

There is scope here for a more coordinated approach from national and even regional governments to ensure that the benefits accrue on a wide front.

Conclusions

The development of multifunctionality offers new opportunities for a European agricultural sector facing declining and increasingly volatile bulk commodity prices, and growing public demands for agriculture to supply non-commodity goods. Not least, it will allow the smaller rural entrepreneur to make the most of a variety of income streams, using the skills and resources of the farm family, in order to create a sustainable business unit.

This will require engagement with new processes, new complexities. In this context there is significant potential for the use of information and communication technologies, particularly in markets. The ability of internet to transcend geographical and political barriers offers particular hope to those living and working in remoter rural areas, where travelling times have been a major barrier to obtaining information and extending trade. Its informality allows those in poorer countries to engage in markets where in the past they may have been unable to reach due to inadequate institutional development, and enables the micro-producer to reach a global market, whether individually or as part of a collaborative effort facilitated by WWW and email.

The *potential* exists. But the irony is that those who have most to gain are often the least able to benefit. The opportunity for effective use of internet varies from country to country – some better equipped than others by virtue of infrastructure and training. Even in countries which are well advanced in ICT, such as the USA, rural telecommunications infrastructure is poor compared to that in towns and cities, and is likely to lag even further as broadband services are concentrated on areas of high population density and high return on investment. Even *within* agricultural sectors, as we have seen in the UK, larger and arable-based farms are likely to be more able to take up the new technology than the smaller pastoral farms.

I contend that, if development of a multifunctional agriculture is important to society, and if 'digital inclusion' is a priority, governments must be prepared to intervene in order to adjust, or compensate for the way that markets concentrate the supply of internet services. That is not to say that use of internet should be universal – there will still be many who choose not to engage with the new technology, on perfectly rational grounds. I merely propose that rural populations should have the capacity to decide whether and where to deploy the technology, the opportunity to learn how to employ it, and the means of accessing it.

There is much to be done.

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