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COMMUNICATION SYSTEMS
FOR MARKETING SUPPORT AND PRODUCTION CONTROL
IN FARM MANAGEMENT

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1. INTRODUCTION

The collection, processing and communication of information is presently the focus of a technological revolution which might have a fundamental effect on our view of management and on the management routines (management practices) that have been developed in the past.

While this emerging technology-based potential for developments in management practices does not necessarily result in such developments, it is presently our primary potential for the support of farm management in dealing with the increasing pressure on agriculture from environmental considerations and production regulations. These problems require a better control of production activities and a further market orientation of farms, i.e. an improvement of the farms' information on production, markets and marketing alternatives.

The new information and communication technologies have a potential for substantial farm management support by

- (a) improving the information basis for management decisions through
 - improved data base management and data processing capabilities on the farm and
 - improved communication between the farm and its institutional environment including (information) service institutions of various kind, market participants (potential trading partners) and other farms and by
- (b) facilitating the exchange of data (i.e. the communication of data) with service institutions or trading partners in conjunction with (e.g.) financial or trading activities of the farm.

The present emphasis of discussions on the utilization of the new technologies for farm management is on the collection and processing of information on the farm through the introduction and use of computers for management support in process control and data base management. However, for farm management with its dependency on outside information support for the farm's production control and market engagement, the communication of information and the improvement of its efficiency is of similar, if not greater, importance.

The paper, therefore, puts the main focus on the communication aspect and discusses ideas on principal present and future development alternatives for farm management. The utilization of the new communication technologies (also referred to as telematics) is not restricted to their application to already established communication procedures. On the contrary, those procedures were developed within the framework of the traditional communication technologies and leave only limited room for improvements through technological developments. The new technologies open, however, the way for new ideas in the design of approaches which fully utilize the technological potential and might initiate a major change in future farm management practices.

The paper will present some first examples of such approaches which are presently introduced to the farming community in various European countries. They concern the improvement of the farms' production management and marketing activity. First responses are very supportive but also indicate the need for further development based on a more intensive involvement of research in close cooperation with the farms as potential users.

2. TECHNOLOGY

The utilization of electronic communication technology requires the access to communication lines, the presence of terminal equipment on farms and the availability of off-farm

computer capacity which organizes the communication procedures and provides some data storage and processing capacity.

The technical realization might differ between different systems, e.g. the necessary terminal equipment might involve microcomputers, special purpose terminals or even television sets with an appropriate link to the communication line.

In agriculture, some prominence was gained by videotex systems which utilize telephone lines for communication and allow a sophisticated "userfriendly" screen design. The use of telephone lines facilitated access to the system but had its drawbacks like the limitations in communication speed. These limitations were partly responsible for the slow acceptance of the systems, but are gradually removed by the ongoing technological development (e.g. by the move towards ISDN systems which is expected to improve communication speed in videotex systems by a factor of 50).

However, the actual technological realization of an electronic communication system is of secondary importance in our following discussion as long as it is based on the principal elements listed above. The central issue are the conceptual approaches that are being used in the communication of information, not the specific technology used for its implementation.

Because of the prominence of videotex technology in activities for the development of agricultural information systems in Europe, the examples have been mostly implemented, however, on videotex-based systems.

3. PRINCIPAL FARM COMMUNICATION SCHEMES

A farm is usually involved in a variety of communication schemes which relate to different management activities and utilize various types of "technology", like paper, verbal communication, etc.

Despite its variety, there are, however, certain principal communication schemes which cover the most common communication situations in farm production and marketing. For a discussion of the suitability of introducing new communication technology into farm management practices, each of these schemes requires an individual consideration and might involve a different development direction.

The different schemes are represented in the following communication situations:

- (1) Communication between service institutions (e.g., extension services) and farmers
 - (a) Provision of "typical" or "representative" information to a group of farms (e.g., through magazines, radio messages, reference books, general telephone messages, etc.)
 - (b) Provision of individualized information ("advice") to individual farms (e.g., through personal visits, telephone calls, letters, etc.)
- (2) Communication among farmers (e.g., through meetings, individual communications, etc.)
 - (a) Exchange of information about individual market results
 - (b) Exchange of information about production technology and control
- (3) Communication between farmers and monitoring institutions
 - (a) Collection of farm information for political, statistical or general advisory purposes
 - (b) Collection of farm information for individual farm management support (e.g., in milk control, etc.)
- (4) Communication with trading partners in marketing
 - (a) Exchange of information with a group of trading partners through advertisements (billboards, magazines, etc.)
 - (b) Exchange of market information at market places with a group of trading partners for general information or in contract negotiations (auctions)

- (c) Exchange of information with an individual trading partner for general information or in contract negotiations
- (5) Communication with trading partners and service institutions about trading activities (documentation)
 - (a) Exchange of information about product specification and financial arrangements (bills, payments, etc.) with trading partner
 - (b) Exchange of information on trading activities with service institutions for documentation (e.g., bookkeeping associations, etc.)

This list might not cover all possible communication situations found in farm management, but it considers the range of principal communication schemes which evolve from combinations of a number of structural communication alternatives with certain relevance for the suitability of different technological developments:

- communication of general information (to farms) vs of individualized information (to and from farms),
- communication with a group vs an individual,
- communication as a two-way vs a one-way information exchange,
- communication of information from vs to the farm.

4. DEVELOPMENT IDEAS

The potential advantage of utilizing the new communication technologies derives, in principle, from its speed, its storage and communication capacity and its processing capability. However, the realization of the advantage is usually not just a question of simple replacing "old" technology (e.g. paper) by "new" technology (e.g. by data transmission lines).

It requires the development of appropriate approaches, i.e., approaches which are adapted to the specific features of the new technology and meet the communication needs of the farms and their communication partners. This is only partly possible through theoretical elaborations but requires tests with farms under real life conditions.

Most reports about the use of new technologies in farm communication refer to such more or less developed "prototypes" which use a trial and error procedure to further improve on a certain communication scheme. This does not mean that farms who participate in such a scheme would not benefit from their participation or that the schemes could not be successfully implemented on a broader scale but that they are still in a development process and are not yet considered to be stable enough to stay the way they are.

It is, however, encouraging to note, that most of the schemes discussed here have emerged in various European countries in a similar way, despite differences in the initial setup and the development process. We assume, therefore, that the examples represent development directions which will not only be continued in the near future but which can be considered as the principal development directions for the future.

5. DEVELOPMENT EXAMPLES

The examples are described and presented in accordance with the listing of the principal communication schemes on farms discussed above. A collection of papers with a more detailed description of some of the examples has been published in Schiefer (1988). A summary of experiments in electronic marketing support can be found in Mueller (1984).

Communication between service institutions and farmers:

- (1a) Provision of "typical" or "representative" information to a group of farms:

The provision of information in data bases for general use is the most widespread utilization of the new communication technologies. All efforts for the development of such data bases show a successive move from a "subject-oriented" to an "object-oriented" presentation of information and introduce various levels of information retrieval support. The development path can be demonstrated through various videotex systems representing different levels of development.

- (1b) Provision of individualized information ("advice") to individual farms:

An approach with initial success was the "clinic" concept initially introduced by the "Agriline" system in Ireland. It is a kind of clipboard where farmers can put questions which

are then answered by competent specialists. Both, question and answer are signed with the name of the farmer and the specialist, respectively, and are kept on the clippboard for a certain period of time for the information of other farms. The identification of the specialist responsible for the answer seems to be crucial for the success of the concept.

Communication among farmers:

(2a) Exchange of information about individual market results:

An approach which is widely implemented in videotex systems and considered to be one of the most attractive services lets farmers report about the conditions (especially prices) of their market activities (sales, purchases) and returns a "picture" on the general situation through the system to all participants. The most critical part is the design of the "picture". It ranges from a sorted listing about all reports to the identification of best and worst cases. None of the systems has gone much further yet. A further improvement of the information provided by the "picture" required the selection of "representative" farms and a strictly controlled reporting procedure.

(2b) Exchange of information about production technology and control:

The positive response of farms to the market reporting system has initiated trials by the "Tele-Agrar-SH" system to extend the procedure to the exchange of information about production, especially about actions in plant protection and fertilizing. The system collects reports from selected farms about their, e.g., plant protection activities on selected plots and crops and computes a "picture" about the plant protection situation which is then returned to interested farms through the system. This results in an extension related service where selected farms assume a leading role for others. A variation of this approach relies not on reports from farms but from experimental farms and demonstration plots supervised by the extension service.

Communication between farmers and monitoring institutions:

(3a) Collection of farm information for political, statistical or general advisory purposes:

It is a widely established practice to collect information from farms for various reasons. Electronic communication systems like, e.g., videotex systems have not yet been used for this purpose. But even if they were, the advantage for farms would be limited to an interactive data collection scheme which might help to avoid data entry errors. However, the system might be further developed to not only collect information from individual farms but to return a "picture" with general information about the situation or its difference to the individual situation of the farm.

(3b) Collection of farm information for individual farm management support:

In some countries, service institutions collect information from individual farms for various farm oriented analysis. An example is the collection of data about the milk production of individual cows. In one of the trials on the utilization of new communication technologies in farm management, such a service institution reports the data about individual cows back to the farms through a videotex system which, in addition, provides some computer programs for the use of these data in farm management (e.g., in the calculation of individual feed mix rations).

Communication with trading partners in marketing:

(4a) Exchange of information with a group of trading partners through advertisements:

This principal approach has been implemented in many systems through clipboards which allow the listing of sales or purchase offers and offer various levels of administrative support ranging from the simple removing of outdated sales or purchase offers to the provision of sorted listings or selective search procedures for clipboard readers.

(4b) Exchange of market information at market places with a group of trading partners for general information or in contract negotiations (auctions):

The clipboard approach has been extended in various experiments to distinguish between boards for sales and boards for purchases and to offer various levels of user support. Further discussions refer to extensions which allowed an interactive change of individual offers (e.g., sales offers) in response to the results of a clipboard analysis of purchase offers, etc. This approach leads to the establishment of "electronic" markets which have been implemented on an experimental stage. An analysis of agricultural markets suggests a great potential for such developments which coincides with substantial interest by farms.

(4c) Exchange of information with an individual trading partner for general information or in contract negotiations:

This type of communication has not yet been implemented in electronic communication systems. Telephone, telefax or other direct communication systems are still considered to be the prime choice for this type of individual information exchange.

Communication with trading partners and service institutions about trading activities (documentation):

(5a) Exchange of information about product specification and financial arrangements with trading partner.

(5b) Exchange of information on trading activities with service institutions for documentation.

Both of these approaches represent a "natural" development direction in the utilization of communication technologies. They form the electronic link between the electronic data processing systems that are gradually being introduced in farms and non-farm businesses. The utilization of such electronic links depends, however, on the use of electronic data processing systems in the communicating institutions, farms and businesses. They are already very common in communication schemes between non-farm businesses. As farms are still slow in the adoption of electronic data processing, electronic communication links are still rarely used in the farming community, a situation which does, however, not relate to the principal attractiveness of the communication approaches.

6. CONCLUSION

The utilization of new information and communication technologies in agriculture is part of a development process which needs to define appropriate formal information and communication schemes. With regard to communication approaches, a number of principal developments have been implemented (mostly on videotex-based technology) as prototypes which show the development direction but require still further improvement through research and communication with the users.

However, some of the applications have already reached a stage which makes them attractive for farms to use. Furthermore, a comparison of developments in various European countries indicates a certain stabilization in the development direction of some of the approaches which makes them the prime choice for a more widespread promotion in the farming community.

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Both of these approaches represent a natural direction in the utilization of communication technologies. The first approach is based on the utilization of communication technologies to provide information to the user. The second approach is based on the utilization of communication technologies to provide information to the user in a way that is more effective than the first approach. The first approach is based on the utilization of communication technologies to provide information to the user in a way that is more effective than the first approach. The second approach is based on the utilization of communication technologies to provide information to the user in a way that is more effective than the first approach.

CONCLUSION

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