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## THE EMERGING ROLE OF E-AGRIBUSINESS - STATE OF THE ART AND PERSPECTIVES IN GERMANY

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### ABSTRACT

The aim of this paper is to describe and analyse the emerging role of electronic agribusiness and the corresponding consequences in Germany. The study was carried out as a consecutive step by step procedure, including empirical surveys in farm and agribusiness small and medium size enterprises, accompanied by case studies in agribusiness firms, and a technology assessment expert survey. The results indicate that internet penetration on farm and agribusiness enterprise levels is rather high, but currently information and communication activities clearly dominate over commercial business activities. The case studies show that the internal communication changed significantly due to the implementation of internet applications like e-mailing, newsgroups, periodic information sheets and video-conferencing. Additionally, external communication changes according to the availability of internet features, e.g. suppliers of parts established internet networks for co-ordinated sales activities. The technology assessment expert survey indicates a gain in importance for pre- and after-sales services and communication activities by using internet technologies. Conclusions are - among others - an increasing importance of e-agribusiness and correspondingly an acceleration of structural change, but low or no expected effects on ecological parameters and on the labour market.

**Key words:** E-Business, E-Agribusiness, Technology assessment, Survey, Germany.

### INTRODUCTION

The agricultural and agribusiness sectors in Germany are dominated by large numbers of small and medium size enterprises. These enterprises are traditionally strongly imbedded in horizontal and vertical co-operation networks. Hence it can be expected that the introduction and implementation of internet technologies affect this structure and show potential of productivity gains.

On the other hand it cannot be expected that those small and medium size enterprises are independently able to assess costs and benefits, potentials and perspectives caused by the application of this novel technology. For that reason other authorities have to carry out such kind of research.

The baselines for this paper are the results from a 3-years-research project, financed by the German Ministry of Education and Science, which was concluded by the beginning of 2004. A comprehensive book publication is also available in German language (Doluschitz et al., 2004).

This paper will stress the research design, methodological approaches and data as well as the major findings and conclusions. The study was carried out in Germany where we find - as it is also the case in many other countries - the following situation: Small structured agriculture

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and agribusiness in wide areas, high requirements and intensity of co-operation (vertical along the agro-food-chain, horizontal at a regional scale), and linkages of individuals by information, communication and transaction activities. As it was mentioned before, internet features show potential to support these activities and to increase productivity (see also Hooker et al., 2001).

This background situation was met by the development and penetration of IT- and later on internet features as it is summarized in Tab. 1.

Table 1: Penetration of IT and Internet Technologies in the German Agribusiness Sector

Past	Present	Future
Preparation of technical requirements since 1980ies.	Consolidation.	Increasing importance.
E-Business boom end of 1990ies.	Completion of technical requirements and knowledge.	Acceleration of structural change.
Crash beginning of 2000.	Analysis of costs and benefits.	Shifts in transaction levels.

Electronic agribusiness includes by the definition chosen in this research includes all types of business activities (e.g. information, communication, transaction) carried out by using computer networks and internet features. Potential benefits of application of this technology include global market availability, competitive advantages, consumer oriented individual adjustments, cost savings, simplification of agro-food-chains and the creation of new business ideas (see also Ehmke et al., 2001; Thompson et al., 2000).

### Objectives, research design, partners and methods

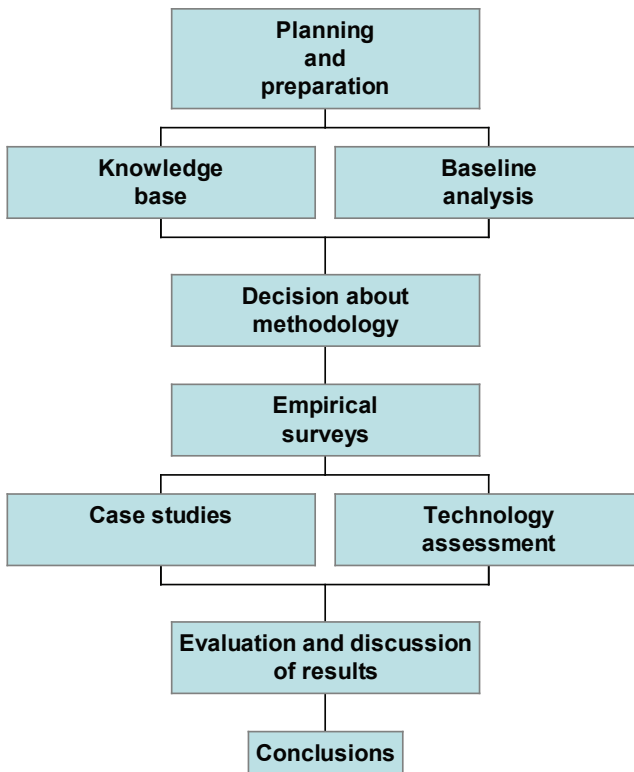
The objectives of this empirical research can be summarized as follows:

- Analysis of current situation: IT and internet penetration in farm and agribusiness enterprises; applications carried out by using these technologies; costs and benefits by applying these technologies.
- Derivation of future projections for the above mentioned parameters.
- Analysis of adoption: Driving and hindering forces and their future developments.
- Analysis of changes in operational structures, such as the organization of information flow, communication, and transaction activities.
- Assessment of long term future impacts on the economy (productivity, competitiveness, structure), ecology, technology and human resources (social and ethical aspects).
- Development of case studies.
- Evaluation of applicability of technology assessment procedures using expert surveys.

The study was carried out as a consecutive step by step procedure as it is shown in Fig. 1: After having received the required financial funds and having recruited the appropriate staff a knowledge base for that new field of research was established and some baseline analyses (preliminary surveys) were carried out. At the same time potential methodological approaches

have been screened and the final approach (empirical surveys accompanied by case studies and a technology assessments study) has been decided on. Several field surveys have been carried out in different branches of the agribusiness sector. The outcome of these surveys indicated sensitive fields in which case studies would be appropriate. Responds to major open questions about future perspectives have been covered by an expert survey in the frame of a technology assessment procedure. Results were then evaluated and discussed internally and in the context of other recent findings in the field and finally conclusions were derived.

### Design of the study



The partner network involved in the project included enterprises from selected branches of the agribusiness sector, such as traders, machinery suppliers, green food producers with direct marketing strategies, wine growers, food retailers and also representatives from public, research, federations/unions and enterprises. Also the German (GIL) and European Federation of Information Technology in Agriculture (EFITA) have been partners as well as the German federation of Mid Size Agribusiness Firms (Verband der Agrargewerblichen Wirtschaft, VdAW).

Overall, in the time frame between 2000 and 2002 ten field surveys have been carried out considering major relevant branches, such as shown in Tab. 2. More than 1.200 individuals have been included; the return quota averaged to about 35 %.

Additionally, six case studies have been carried out, including KWS seed, green food retailer, food trader (Kaisers), wine dealer (Weinmanufaktur Untertürkheim), traders association (ZG Raiffeisen eG, Karlsruhe), and machinery constructor (Claas Saulgau GmbH). The general approach of technology assessment (TA) procedures comprises the following consecutive steps



(see also Fink et al., 2001):

- (1) Identification and structuring of problems: Defining the problem field and finding factors influencing that problem field.
- (2) Description of future projections of these factors (theses).
- (3) Evaluation of theses by appropriate experts.
- (4) Evaluation, prioritisation and discussion of expert projections.

Tab. 2: Branches considered in the field surveys

Level in the Agro-Food-Chain	Branches and data sources considered in the surveys
Consumers	Literature analysis (Sinus-Studie, 2002).
Traders	- Food traders (one questionnaire survey; Morath und Doluschitz, 2002). - Wine direct traders (two questionnaire surveys; Angerer, 2002 and Emmel, 2002). - Green food producers and direct traders (one questionnaire survey; Jahn, 2002).
Farm operators	- Farm operators from different regions in Germany (four questionnaire surveys; Doluschitz und Pape, 2001 and 2002).
Suppliers	- Machinery suppliers (one questionnaire survey; Doluschitz und Benz, 2002 ). - Commodity suppliers (one questionnaire survey; Maier, 2003).

Focus fields of interest of the TA-procedures carried out in this research are effects on the economy (productivity, competitiveness, structure), ecology, technology and human resources (social and ethical aspects).

A comprehensive questionnaire was prepared and handed out to 36 experts, persons from all levels of the Agro-Food-Chain (suppliers, primary production, processors, dealers, retailers, consumers) with different backgrounds (science, enterprises, associations etc.). 15 (about 40 %) of the experts actively participated in the survey.

## RESULTS

### Field surveys

The results from the field surveys mentioned above can be summarized as follows:

- The internet penetration of farm and agribusiness enterprises is quite high, even higher in medium and large size enterprises in Northern and North Eastern part of Germany (Tab. 3).
- Up to now, information and communication activities, accompanied by home banking activities dominate the use of internet up to now; commercial activities (sales) are of minor importance so far.
- About one fourth of used machinery dealers already make use of internet features; another third intends to do so within upcoming years.
- At present, commodity suppliers use of internet features for transaction

activities is quite low. As the internet is used for information and communication in this branch; however, there is, however, considerable potential still available.

- Direct producers and traders of green food use internet features on a regional (not global) scale to accelerate transaction processes in niche markets for highly perishable goods.
- Wineries sales activities by internet are comparably high at the moment and are expected to increase within the next years.
- Food retailers' use of e-business features has a quite long lasting tradition; such activities have regional dimension, are mainly concentrated in metropolitan areas, and focus on a certain segment of goods.

Tab. 3: Internet access of German farmers (%) from different regions in 2000

	Internet access available	Internet access planned	Internet access not planned
Germany, north	69,0	24,8	6,2
Germany, north-east <sup>1</sup>	83,3	13,4	3,3
Germany, south <sup>2</sup>	63,8	29,0	7,2

1) Federal States Mecklenburg-Vorpommern and Sachsen-Anhalt;

2) Federal State Baden-Württemberg.

Source: Doluschitz und Pape (2000); Stricker et al. (2001).

### Case studies

An example of the case studies (CLAAS machinery factory Ltd.) shows that the internal communication changed considerably due to the implementation of internet technologies. E-mails, newsgroups, periodic information sheets and video-conferencing dominate those internet activities.

Also, external communication started to change according to the availability of internet features: Suppliers of parts established internet networks for co-ordinated sales activities.

### Technology assessment

The technology assessment procedure examined the experts' future projections for the following parameters: Further development of e-business activities, expected structural effects, labor market effects, ecological effects, technological effects, effects on human resources.

The major results can be summarized as follows:

- Experts indicate that particularly information services, pre-/after-sales services and communication by internet will gain importance (see also Kleffmann, 2002; Ehmke et al., 2001).



- Farm size and production structure will not or only in minor dimension be directly affected by the application of internet features. However, increasing competition will accelerate structural change according to the experts expectations (see also Thompson et al., 2000).
- Labour market effects are insignificant and - if any - will lead to a release of labour from agribusiness sector. It is, however, very likely that shifts will occur towards newly required qualifications.
- Consumer behaviour will be affected because, according to the experts' opinion, direct communication and marketing from both sides (enterprises and consumers) will increase.
- Ecological effects are of minor importance. Eventually an increase in transportation is to be expected due to globalisation.
- Concerning technology effects it can be expected that the number of agribusiness portals and (private) homepages will increase and therefore, security aspects (data and customer information) will gain importance.
- Social and human resource aspects include significant changes in structure and behaviour of communication; individual relationships between enterprises (dealers) and customers will remain pretty much the same as before.

## CONCLUSIONS

It can be expected that in future importance of e-agribusiness will gain in importance. However, there will be different developments according to branches and products. In general the agricultural sector features a high penetration with technical prerequisites (hard- and software, corresponding knowledge). It must be kept in mind that e-agribusiness might also cause problems particularly in small enterprises (lack of specific know how, responsibilities etc.). In consequence of increased application of e-agribusiness activities an acceleration of structural change (according to increasing competition) has to be expected. On the other hand there will be only very minor effects on the labour market and also minor effects on ecological parameters. An increasing market transparency will be a major benefit from application of internet technologies and accordingly an increase in direct marketing activities. Corresponding to the gain in importance of internet technologies in business, internet security will also gain much importance.

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