Conceptual framework for the design and conception of an electronic trade platform in agribusiness

Tobias Hausen
e-mail: t.hausen@uni-bonn.de

Ralf Helbig
e-mail: helbig@uni-bonn.de

Gerhard Schiefer
e-mail: schiefer@uni-bonn.de

Conceptual framework for the design and conception of an electronic trade platform in agribusiness

Tobias Hausen; Ralf Helbig; Gerhard Schiefer

Chair for Business Management, Organization and Information Management,
Meckenheimer Allee 174, University of Bonn, Germany
Email: t.hausen@uni-bonn.de; helbig@uni-bonn.de; schiefer@uni-bonn.de

Abstract

This article gives an overview of a conceptual framework for the designing and implementation of an electronic trade platform. The trade platform prototype is the basis of a general conception for the design and implementation of internet-based trade platforms in agribusiness. The main platform focus related to the concept are to convert traditional business relationships and transactions into an electronic system. The conceptual framework provides clarification with regard to the benefit of trade platforms and the individual requirements of different value chains and chain levels.

Keywords: *trade platform, interorganisational relationship, e-business*

I. Introduction

Besides the ongoing process of concentration that takes place in the agrifood sector since several years, new turbulences arose from the emergence of the so-called "new economy". New economy enterprises started conquering the agrifood sector and claiming the e-business. This generated the interest of brick-and-mortar enterprises to participate in e-business. However, the past last year revealed that there lies a peril in moving into e-business, considering the brake down of the new market and insolvencies of so-called "dot-com" enterprises. But there is still the question of how e-business will impact the agribusiness sector as well as what the core competencies are to derive benefit from e-business in the future. New initiatives to take part in e-business should be well planned and executed. This paper will demonstrate a conceptual framework to benefit from e-business and show requirements necessary to realise this concept.

The concept shows a major criteria which influences all characteristics of a traditional business relationship. The characteristics influence parameters of an electronic trade platform. An overview is provided in the appendix.

In the following section, the dependencies and influence of the major and minor characteristics of interorganisational relationships are described in detail. The third section looks to the parameters of a trade platform which are dependent to the concept of the interorganisational relationship characteristics. The parameters are linked to characteristics. This linkage builds the basis for developing an electronic trade platform. The fourth section depicts the trade platform prototype developed at the Chair of Management. This prototype will be employed to evaluate and verify the concept.

II. Concept of the characteristics of Interorganisational relationships

In the agricultural sector there exist many different value chains and a large variety of different products processed and traded between these levels. Each constellation and relationship between two chain levels or even between two single enterprises is determined by a specific set of rules and characteristics. The major criterion which influences the characteristics of an interorganisational relationship are the processed or traded goods. The kind of product and the dependent product features determine the characteristics and factors of an interorganisational relationship.

The product is the major and overall key factor that characterises a specific value chain. Inherent features like the chemical, physical, technical, and functional nature play an important role as well as "invisible" features like the purpose and grade of utilization, the produced number, the allowance of procurement, and the level of intangibility.

In the agricultural sector product features are particularly important and strongly related to all aspects of commodities production, trading and processing. Parameters influencing the goods are the endangering potential, different quality aspects like the measurable quality of a good and the subjective quality mentioned by different chain levels or the consumer. Also the implementation of concepts such as HACCP or GMP influence the product.

The product features mainly determine the dependent characteristics of interorganisational relationships. The characteristics of an interorganisational relationship are

- the trading process,
- the information relationships,
- the socioeconomic relationships,
- the type or nature of the market participant or trading party,
- the trade functions,
- the organisation of the market, and
- the region.

A concept for a trade platform that intends to be successful and create value for its users has to and consider all these characteristics. The visualisation of the concept is shown in the appendix. These characteristics of interorganisational relationships are now described in more detail.

The first characteristic influenced by the product is the *trading process*. Each good is has a different intra- and interorganisational trading process. The trading process includes three trading phases according to the concept of the transaction phases by WILLIAMSON (1985). The phases are the information phase, the negotiation phase and the realisation phase. These are distinct for different goods.

The trading process also includes the coordination mechanism that determines the product price by specific rules. This price mechanism, e.g., is dynamic in the case of auctions for grain or cattle as opposed to the case of pesticides. Prices for plant protection are much more static. In consequence, buyer and seller can be coordinated by an electronic catalogue on trade platforms, thus without further negotiation.

The second characteristic is the *information relationship* between the chain levels. This relationship describes level, state, and quality of information with regard to an eventual imbalance. According to AKERLOF (1970), asymmetric levels of information could lead to market failure or prices that are not justified for buyer or seller. Some goods require additional information or possess potential risks, like plant protection. This must be considered in the interorganisational relationship.

The third characteristic reflects the *socioeconomic relationships*. It refers to trust, opportunistic behaviour or long term relationships between trading partners or different chain levels. Some goods need a very deep relationship in order to allow a efficient trading process.
This characteristic includes existing business relationships which play a major role in business processes. Enterprises are interested in transferring existing customer relationships with their specific conditions and discounts into forms of electronic business.

The *type or nature of participant* of a specific value chain reflects the fourth characteristic. It includes the size of the enterprise with regard to turnover, number of employees or transaction volume. In addition, the type of participant mirrors the value chain level in which the enterprise acts. This clearly defines an enterprise's position in the industry and describes business relationships with upstream and downstream partners. The role of the enterprise, thus if the enterprise acts in the trading process as buyer or seller, also is included in the characteristic type of the participant.

For example, a farmer acts as vendor for the trade level by selling agricultural commodities. In the second way, the farmer acts as purchaser by buying inputs required for production. The trade level of the value chain holds a special position. By taking the trade procedure into consideration, the result are four single processes of business, which can be executed by these middlemen. More precisely, the trader buys and sells both to the downstream farm level and to the upstream industry level.

For the industry level, two roles or processes can be identified similarly to the farm level. An industry player vends the farm level's inputs and purchases agricultural commodities for industrial production from the trade level. Business partners acting on the same chain level must not execute an identical recursive function. For instance, a trader (A) sells plant protection to crop farmers (A, B) and fertilizer to crop farmer (C). However, the crop farmers (A, C) sell their crops to another trader (B) and only farmer (B) sells crop to trader (A).

The fifth characteristic refers to the classical and general *trade functions* executed by trade companies. These are the function of time that refers to the provision of the right goods at the right time. The function of quantity refers to the right amount of a good. The function of quality refers to the degree of quality needed for a transaction. The function of credit refers to the delivery of a good which is not yet paid.

These functions described by OBERPARLEITER (1955) give an overview of the specific influences and impact the type of good has on the overall trading process. A specific type of good requires a particular set of functions to be fulfilled for a trading process to be successful.

The sixth characteristic represents the *specific organisation of a market*. This characteristic refers to the whole value chain and provides an overview of the market

structure related to types of goods. It determines the level of concentration or fragmentation, the absolute number of buyers and sellers and cost structures of enterprises on the value chain levels. This characteristic also includes special parameters of the market which results from the policy of the government such as regulations, antitrust policy or price controls. These sets are slightly oriented at SCHERER and ROSS (1990) and their industrial economics theories.

The seventh and last characteristic is the *region* in which enterprises act or a specific good is traded or processed. Some goods are handled world wide, others are only of regional interest. In other words, this can either be the operating radius of an enterprise or the radius, in which an enterprise is able to fulfil an order for a specific product type, if there is a dependence of the product type on a specific type of logistic. For example, a small enterprise with only one truck is merely able to deliver goods in a 100 km radius. Referring to a product type, it is not cost efficient to transport milk over a long distance. The characteristic region so reflects an enterprise's small market segment in combination with different product types.

The seven characteristics are essential for the development of a trade platform that meets the requirements of a specific market. Only an electronic system that takes into account the characteristics of interorganisational relationships can be successfully implemented into a market.

III. Parameters of an electronic trade platform

In order to complete the conceptual framework for an electronic trading system, this section describes different parameters of a trade platform with regard to their dependency on the interorganisational relationship characteristics. The parameters to describe an electronic trade platform are

- the type of ownership,
- the organisational form,
- market specifity,
- the mode of implementation,
- the degree of openness,
- the coordination mechanism between buyers and sellers,
- the value added services,
- the revenue model,
- and the ergonomics of the system.

In the following the parameters are described in more detail and the different levels of dependency are pointed out.

The first parameter is the *type of ownership*. This parameter describes the differentiation between platforms controlled by
- buyers,
- sellers,
- a third party
- or a consortium build by buyers or sellers.

Each type of ownership leads to a distinct course of action or different strategic goals. For instance, the main focus of buyers is a reduction of the purchasing costs, whereas vendors seek for new distribution channels and consortia intend to improve their

market power (GLASNER and PASSENBERG, 2001). The platform parameter ownership depends on the characteristics region, information relationship, socioeconomic relationship in the market, and nature of participant.

The *organisational form* is the second parameter to describe a trade platform. It takes into account initiative and ratio of buyers and sellers.

According to SCHIEFER (2000), four different organisational forms depending on the initiative of the organisation exist,

- a "one-to-one" ratio (1-1),
- a "one-to-many" ratio (1-m),
- a "many-to-one" ratio (n-1), and
- a "many-to-many" ratio (n-m).

For instance, the (1-1) ratio describes the classical buyer-seller relationship which can be found in the context of EDI, long term relationships with strong dependencies (TERRY 1999). The (1-m) ratio reflects a trade platform used as distribution or procurement system, depending on the initiative of the trade platform.

The (n-1) ratio describes a purchasing community often found in agribusiness or a distribution community often found on catalogue orientated platforms. The (n-m) ratio represents the classical picture of a marketplace with many buyers and sellers.

The organisational form depends on the region, the information relationship, the socioeconomic relationship in the market, the nature of the participant and the form of market organisation.

The third parameter is the *market specifity* which refers to the differentiation between horizontal or vertical electronic trade platforms. Horizontally orientated platforms deal with goods which are not specific for a particular value chain. Vertical trade platforms mediate goods required by specific industries. (KAPLAN and SAWHNEY, 1999). The market specifity only depends on the main criterion, the product.

The fourth, the *mode of implementation* distinct between

- the so-called top-down approach and
- the so-called bottom-up approach.

These terms result from the field of process analysis (GAITANIDES; SCHOLZ; VROHLINGS, 1994).

The top-down approach could possibly be realised by newcomers, which move into the market by providing rules for business partners. This type of platform is often paired with high market transparency that is, however, rarely aspired by many market participants and can be presumed for traditional trade enterprises in the agrifood business.

The bottom-up approach could be initiated by existing business relationships in the branch. This mode takes existing rules and policies of business and also existing relationships into account. Each participant is able to decide which quantity of transparency he is willing to admit in the business process. This initiative starts with a single market participant that connects his suppliers and customers to an electronic environment such as a trade platform. In this paper, the bottom-up approach of trade platforms is focused. (HAUSEN; HELBIG; SCHIEFER, 2001). The mode of implementation depends on the information relationship, the socioeconomic relationship in the market, the nature of the participant and the form of market organisation.

The fifth characteristic is the *degree of openness*. The openness describes whether market participants have free access to or only a part or specific group of participants is allowed to act on the trade platform.

The openness depends on the information relationship, the socioeconomic relationship in the market, the nature of the participant and the form of market organisation.

The sixth characteristic is the *coordination mechanism* used on the electronic trade platform. It includes a large variety of classical mechanisms and rules for price determination. The coordination mechanisms can be dynamic, static or a mix of both.

The dynamic mechanisms are auctions and exchange models. The static one is the catalogue. Mixed forms are tenders and sub forms like bundling. The coordination mechanism directly depends on the type of good and trading process.

The seventh characteristic are the *value added services* which provide a higher level of functionability and comfortability for participants. Typical services can be instance logistics, clearing, catalogue management or the integration of participants' in-house systems. The value added services depend on the functions of trade, the trade processes, the region and the type of participant.

The eighth characteristic is the *revenue model*. It refers to the way participants pay for the platform's services. The revenue model can, e.g., be transaction based, a monthly fee or a fee for the above described value added services. This characteristic directly depends on the product, on the functions of trade, the trade processes, the region and the type of participant.

The last and the ninth parameter describes the *ergonomic features* of the electronic trade platform. This includes the system's multimedia support, the structure and content of the product catalogue or the navigation system. System ergonomics depend on the trading process and the type of participant.

IV. Platform prototype

This section describes the platform prototype which has been developed based on the conceptual framework described in section two and three.

Knowing and regarding the conceptual framework, a prototype for a trade platform for the agrifood sector, which translates these framework into action, has been developed at the Chair of Management. The concept includes a prototype for a database-driven web application, which can be used over the Internet. The characteristics of the socioeconomic relationship, the information relationship, the type of the participant and the region are primarily realised by the creation of a unique and personal trading profile for every platform customer. The details of the profile concept will be explained later. The characteristic of the trading process is realised by coordination mechanisms that are offered by the electronic trade platform. The platform in context with the characteristics will be described.

1. Functions of the trade platform prototype

The developed trade platform is employable by every enterprise, independent of its value chain level. The platform can be carried out by a single enterprise with its related business partners or a third party, usually with differences in several

functionalities. For instance, a value chain player running the platform is able to limit a number of customer functions, while a third party can offer full functionality to both buyers and sellers. In addition, the accessible functions depend on the value chain level, as some functions merely fit a specific chain level. Various possible functions will be illustrated in the next paragraphs.

Every enterprise that employs the trade platform has the option to act either as vendor or as purchaser. For larger companies, these two roles are formed in separated modes, reflecting an enterprise's departments. For smaller companies, the two modes can be switched. Hence, the roles of the buyer and seller accords to characteristic of the type of participant.

The basic functions for sellers are to make a focused offer to customers or to provide purposeful information. The offer can be a single product or a supply contract for a specific time or amount. A further, more sophisticated seller function is for instance a sort of the so-called "power shopping" or the set on of an auction in definite style. The seller makes an offer with a fixed amount of a product and a fixed price per unit. The customer, if interested, chooses the amount or the units he intends and the amount is subtracted from the total. The offer automatically renews with the product amount left.

The basic function for the buyer is to make a tender for a required product. This can be done as single or framework contract, for a single or for multiple products, and by using one or multiple shipping addresses. An auction mode, which is similar to tenders made by public institutions, is also available for the buyer.

As enterprises usually buy or sell a definite range of products, product types can be selected in the trading profile. This selection sets the standard for "daily use" and can be broadened at any time. The product types are correlated to the role and the employee alike. Beyond this, product types can furthermore be correlated to a specific region. This is especially important for picturing particular market segments for a specific product type or for defining the enterprise's operating radius. Connecting the selected product type with either a regular supplier or a regular customer could also be done. In this case, when tendering or offering a product, only the regular supplier or customer receives the tender or offer, if nothing else is desired. By this option, enterprises that are running the trade platform can easily transfer their traditional business relationships into the application. Hence, these features realizes the characteristic the region and the socioeconomic relationship and the participants derive the full benefit from using the electronic tool in their traditional relationships.

2. Creation of the business/trading profile

The application's basis – realizing main parts of the framework and gaining the full advantage out of electronic trade – is the creation of the unique and personal trading profile for participating enterprises.
The trading profile is created in two or three steps, three if the option for regular suppliers or customers is chosen. In the first step the user selects the product types his enterprise buys or sells with the according source of supply or the maximum radius of shipping that is possible for a specific product type with or without defining a set of regular suppliers or customers.
In addition the user selects languages he accepts for tenders and offers, in order to have access to a wider range of tenders or offers if the trade platform is carried on international level.

The second step lists the selected product types with the according radius of supply source or shipping. In this step, the user can redefine his choices and, if a regular supplier or customer was chosen, the user selects their source. In the optional step three, a list with available regular suppliers or customers, which were matched by the choices of step one and two, is given and sought after suppliers or customers can be picked out.

With the above-described trading profile, not only parts of the framework are achieved. The trading profile is a potent filtering device for all kind of purposive information on the trade platform. It functions as a strong routing mechanism. That means that the filter or the routing mechanism does not merely work to direct the offers and tenders. The trade platform provider can as well provide any kind of marketing information to the platform's customers what reflects the information relationship between enterprises.

3. Networked trade platforms

The latter paragraphs predominantly described the implementation and use of a trade platform for a single value chain level. The next few paragraphs will illustrate the realisation of a network of trade platforms in agribusiness in order to picture a whole chain level and represent it by an electronic media. Building a network of trade platforms permits all participants a greater spectrum of functions for business, thus, a value-added component for their business independent of the chain level.

One example for a trade process over the entire value chain in the agrifood sector could be the building of a "virtual stock". By this the trade function characteristic is realised. Farmers of the farm level make offers for crop they have on stock or they will harvest in the near future with a fixed price, a fixed amount and a fixed period of validity. The offers will be routed by aid of the platforms trading profile to traders of the trade level. The traders themselves connected by a trade platform to the industry level can make an offer to the industry level up to a total sum of crop from the virtual stock of the farmers' offers (traders know the price, amount, and date and can calculate with these offers) and their own real stock. In this example farmers benefit by the higher price of their crop and traders benefit from the better forecast and the possibility to make according offers to the industry.

V. CONCLUSIONS

The impact of e-business is fundamentally altering the mode businesses and transactions are accomplished. E-business will streamline business processes across the value chain. Obviously, e-business will not leave the agrifood sector untouched. One example of deriving benefit from the tremendous changes and modifications caused by e-business applications is the deployment of internet-based trade platforms. The described framework could represent a promising opportunity to develop systems for electronic trade that take improvements and advantages to the participants of trade platforms that are tailored to the specific needs of an individual interorganisational relationship.

The interorganisational relationship is represented by the following characteristics: the region in which enterprises acts, the form and role of the enterprises, the market organisation form, the trade functions, the information relationship, the trading

processes and social economic characteristics of the interorganisational relationship. To reflect a sector's reality, trade platform designers need to address the characteristics of interorganisational relationships and combine them with the traded product and the related features.

Within the trade platform prototype elaborated at the Chair of Management, most parts of these characteristics are fulfilled. The personal trading profile for each business participant on the platform presents a basis for the realization of these characteristics.

The conceptual framework will be qualified and evaluated employing the platform prototype. Besides, this the conceptual framework can be used to address the specialities of various sectors and tailor specific electronic trade platforms that fit the need of the referred sectors.

REFERENCES

AKERLOF, G. (1970). The Market for Lemons. Qualitative Uncertainty and the Market Mechanism. Quarterly Journal of Economics 84 (1): 488-500

GAITANIDES, M.; SCHOLZ, R.; VROHLINGS, A. (1994). Prozessmanagement – Grundlagen und Zielsetzungen. In: GAITANIDES, M.; SCHOLZ, R.; VROHLINGS, A.; RASTER, M. (Hg.): Prozessmanagement. Konzepte, Umsetzungen und Erfahrungen des Reengineering. München: Carl Hanser Verlag

GLASNER, K.; PASSENBERG, I. (2001). E-Markets – Erscheinungsformen, Business-Modelle und Entwicklungschancen. Information Management & Consulting 16 (1): 79-85

HAUSEN, T.; HELBIG, R.; SCHIEFER, G. (2001). Networked Trade Platforms. In: SCHIEFER, G., HELBIG, R., RICKERT, U. (Ed.) E-Commerce and Electronic Markets in Agribusiness and Supply Chains. Proceedings of the 75th Seminar of the EAAE, February 14-16, 2001, Bonn, Germany. Bonn, S. 213-222

KAPLAN, S.; SAWHNEY, M. (2000). E-Hubs: The New B2B Marketplaces. Harvard Business Review. May-June: 97-103
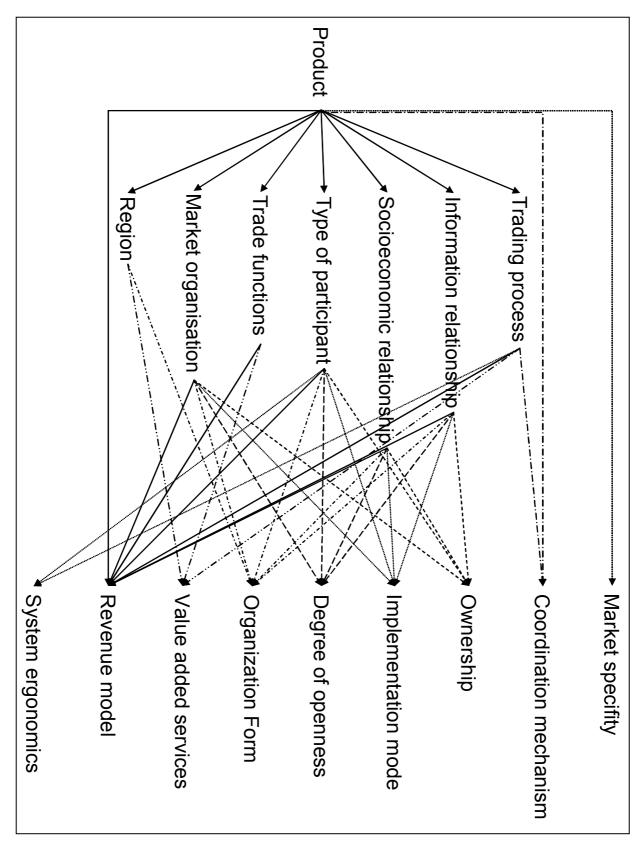
OBERPARLEITER, K. (1955). Funktionen und Risiken des Warenhandels. Zweite Auflage. Wien. Springer Verlag

SCHERER, F.M.; ROSS, D. (1990). Industrial Market Structure and Economic Performance. Third edition. Boston. Houghton Mifflin Company

SCHIEFER,G. (2000). The Evolution of Electronic Market Places in and for Agribusiness: Approaches and Experiences form a Historical Perspective. Bericht B-00/1. Bonn: ILB-Verlag

TERRY, S. (1999). The Development of Online Marketplaces or Psst, Buddy…Wanna Buy a Naked Mouse? IN: CommerceNet (Hg.): Research Report: The Portfolio series #99-20. July 6. http://www.commerce.net/research/ebusiness-strategies/1999/99_20_r.pdf

WILLIAMSON, O. E. (1985). The Economic Institutions of Capitalism. Firms, Markets, Relational Contracting. New York. The Free Press

Appendix: Conceptual framework of platform design