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"AS A CONSEQUENCE OF CHANGE - SUPPLY CHAIN NETWORKS IN THE AGRI-FOOD BUSINESS"

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1 Introduction

Since the beginning of food processing the product flow has not been changed substantially. But this is certainly not true for food products themselves. Instead of an inspection and experience good today food is perceived as a complex bundle of inspection, experience, and credence characteristics. This development has been catalysed by different circumstances.

Even though there have been many factors of influence, for this paper especially the consequences resulting from the crisis in winter 2000/01 are of major importance. After the Bovine Spongiforme Enzephalopathie (BSE) and the Foot and Mouth Disease (FMD) hit Germany, transparency of the whole production process has been demanded by consumers and politicians. On this account, quality has been newly defined by 1. customer needs, 2. the product's "fitness of use", and 3. the process orientation of the whole chain. The first consequence of this was the enactment that animal feed had to be treated with the same precaution as food products. Furthermore, the demand that the production of organic food had to be increased and animal welfare had to be extended can be regarded as an effect of the crisis. The EU directive "178/2002" on traceability can be seen as the most recent repercussion. Additionally, the contemporary discussion of labelling of GMO`s adds to the complexity of modern food products.

Comprising, the requirements of food products have led to the demand of a transparent production chain. Thus, this has led to a high demand of availability of information, making information a competitive must. But in order to get a competitive advantage this information requirements have to be transformed into knowledge creating an inimitable and non-substitutable asset. In favour of these aspects, the food chain is in the progress of being redesigned into vertical networks altering the nature of competition from traditional spot market exchange to the competition of vertical co-ordinated food chains.

The questions how such chain networks have to be designed and which governance structure fits best have been addressed in several well known articles (GULATI et al., 2000, HENDRIKSE, 2003, OMTA et al., 2001, LAZZARINI et al., 2001).

However, while for single companies the need of having knowledge as an important asset and of having a strategic management system is proven, for a chain network such thoughts are seldom discussed in the literature. For this purpose, the authors will elaborate on the question whether these ideas can be transferred to chain networks.

2 Supply Chain Networks

Creating countervailing power co-operatives has been the predominant form of co-operation in former times. But nowadays, as the agri-food business has changed, networks are formed in order to meet the requirements of consumers and politicians.

2.1 Networks

Generally, networks can be defined as "specific properties of the transaction relationships, typified by relational relationships in which formal and informal sharing and trust building

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mechanisms are crucial" (ZYLBERSZTJN and FARINA, 2003). Overall, networks are addressing all questions on inter-organisational relationships of more than two firms (LAZZARINI et al., 2001). In network science the collaboration is determined by different forces, e.g. complementary abilities of the involved firms and risk reduction (MENARD, 2002). For the industrial organisation school – based on the work of PORTER (1980) – different forms of collusion can be used as a source of competitive advantage. Within networks, firms are embedded in upstream and downstream flows of resources, information, and knowledge. Hence, networks can influence the nature of competition and the profitability beyond traditional measures of industry competition (GULATI et al., 2000).

Another approach to networks is taken by BURR (1999), classifying four typologies. They are named spontaneous network, self-organising network, project–orientated network, and strategic network. The typology is derived from the intensity of relation, the co-ordination mechanism, and the existence of a broker. Different to BURR (1999) who has high-lightened self-organising networks, the authors will focus on strategic networks in the subsequent thoughts. In such a hierarchical-polycentric network with a broker, a strategy leading focal company builds the core element of the network being either manufacturer or retailer. Because of the long lasting explicit or implicit contracts, the other network actors are heavily depending on the focal company, whereas the level of dependency is higher for vertical than for horizontal ties (WILDEMANN, 1997). Even though it seems as if the dependency is rather unilateral applying the Resource Dependency Theory, a mutual dependency is getting evident. The influence of an institution matters by the degree of resource dependency it has in its relationships with other institutions (PFEFFER and SALANICK, 1978). If the focal organisation itself is dependent on critical inputs of other organisations, these organisations have some power over the focal company (MEDCOF, 2001).

2.2 Supply Chain Networks

As shown, nowadays in the agri-food business vertical linkages are relevant in order to guarantee the consumer the correctness of credence attributes like organically produced. Hitherto, in the following paragraphs the authors will speak about "supply chain networks" (SCN) or netchains. Being defined by various authors (LAZZARINI et al., 2001, NEVES, 2003, HANF and KÜHL, 2002, ZYLBERSZTJN and FARINA, 2003), the authors abstain from adding a further definition. In general, several advantages resulting from co-operation have been named, i.e. cost and risk reduction as well as sales and revenue increase (ARBEITSKREIS, 1995). Besides such financial incentives, also non pecuniary incentives like knowledge generation, power, and trust motivate the actors to co-operate (UZZI, 1997). GULATI et al., (2000) showed that networks themselves can be seen as an origin of inimitable resources creating inimitable and non-substitutable value. But there are also some constraints: divergent aims of the actors, information asymmetries, partitioning of gains and losses, opportunistic behaviour, etc. (ARBEITSKREIS, 1995). To overcome the constraints and to achieve the gains, collaboration ought to have shared values, trust worthiness, as well as shared knowledge and a shared strategy. Such efforts lead to the creation of a "unique relationship proposition" being defined as an exclusive benefit perceived within a loyal and long lasting relationship between at least two economic actors striving for a common goal by co-operation (HANF and KÜHL, 2003).

In the German agri-food sector small and medium-sized enterprises (SME) play a critical role. Because of this structure, the focal company has to take into account that such companies do not dispose of a sophisticated IT-infrastructure, high men power, and sufficient quantity of commodities. Especially for agricultural goods the total amount of supply needed has to be delivered by various farmers. For this reason, the focal company has to manage such horizontal co-operations itself or it has to co-ordinate them by system suppliers.

2.3 Knowledge in Networks

While traditionally the resource based view of the firm (RBV) focused on the intra-firm creation of core competencies as a competitive advantage (BARNEY, 1991, PRAHALAD and HAMEL, 1990), GULATI et al. (2000) amplified the RBV in such a way that networks can be seen as an origin of inimitable resources creating inimitable and non-substitutable value. As inputs into the networks production processes, resources became an important issue as they have the potential of achieving superior performance for organisations (BARNEY, 1991). Mainly rare, valuable, inimitable and non-substitutable resources are important for providing sustainable competitive advantage. They can be separated into property-based and knowledge-based resources. Property-based resources are traditional, tangible input factors, while knowledge-based resources are bundles of intangible factors (MILLER and SHAMSIES, 1996). As inimitability and non-substitutability are required, particularly intangible resources gain in importance. Besides image and culture, knowledge was identified as a major production factor and intangible resource for organisations, enabling employees and organisations to combine and transform tangible resources for unique production processes and products (STEWART, 1997). By a comparison of a multiunit organisation with a network TSAI (2000) showed that units rich in social capital and strategic relatedness are more likely to realise potential synergies in related business operations. Organisations are more capable to ascertain and utilise new opportunities and to react accurately to the potential change of internal and external environment as well as strategic and tactical actions (WIKLUND and SHEPHERD, 2003).

Especially the transfer and creation of explicit and implicit knowledge within the network by co-operation permits the network to be more competitive. Mainly organisational knowledge is gaining in importance, as it has the ability to serve as a source of sustainable differentiation, and as it is inherently promising difficulties in imitation. By formal and informal knowledge contractual rules can be substituted lowering transaction cost and information asymmetries. In an environment of "creative destruction" (HAYEK, 1949) the firm's success is determined by its dynamic capabilities, i.e. the ability to integrate, build and reconfigure internal and external resources and competencies (TEECE et al., 1997). Particularly for product innovations a co-ordination of knowledge between the different ties of a chain network might enhance the chance creating a successful new product.

3 Strategic Chain Management

As shown, vertical co-operations entail a vast need for co-ordination between the different partners which can be aligned by a sophisticated management concept (BOGASCHEWSKY, 1995). While the importance of management as well as of strategy for the success of an organisation is well proven (ZAHRA, 2003), the importance of a chain strategy and a chain management is highlighted in the following section.

3.1 Comparison of Conglomerates and (Chain) Networks

Strategy, management and vis-à-vis strategic management are thought for single firms, most often for conglomerates. Thus, it must be shown that management concepts are also deployable for SCN.

Whether a conglomerate can be viewed as a network is depending on the autonomy of the subsidiaries, i.e. decentralised conglomerates can be seen as modular enterprises or internal networks (PICOT et. al., 2001). Whether a network can be viewed as a conglomerate depends on the autonomy of the single firms in the network depending on the different types of networks. Being essential for a SCN to have a focal company, only the both types of networks with a broker could be considered.

But loose forms of networks such like regional networks, virtual organisations and project based networks are not suitable for comparisons with conglomerates because of their short-term duration and low intensity of relation (SYDOW, 2002). But, being led by a focal company polycentric-hierarchical strategic networks are characterised by a centralised decision making (JARILLO, 1988). Furthermore, the focal company exerts influence on the decision which member takes on which task securing the super-ordinate network aims (WILDEMANN, 1997). In the course of the "kanban" practise Toyota formed strong direct ties with the suppliers by a norm of reciprocal obligations through consulting assistance (DYER and NOBEOKA, 2000). Having a centralised authority to decide, the focal company is able to design the network (BURR, 1999). In order to create co-ordination mechanisms the focal company has to consider that within a netchain three different types of interdependencies exist. LAZZARINI et al. (2001) advice to exert managerial discretion for sequential interdependencies, for pooled ones to achieve process standardisation, and for reciprocal interdependencies to co-ordinate by mutual adjustments.

In conclusion it can be said that for strategic networks a comparison with a conglomerate is acceptable as well as for modular enterprises vice versa (SYDOW, 2002). Through a chain strategy and management the focal company is able to perform a centralised co-ordination conducting the information, knowledge, and product flows throughout the whole network. Such a managerial co-ordination saves resources of all participating firms creating a sustainable win-win situation.

3.2 Chain Strategy and Management

As shown, strategic networks can be compared with conglomerates. Therefore, concepts used for single firms can be transferred to SCN. In general, strategic management addresses the following topics within a single firm: strategy and culture, implementation of the strategy, clarifying strategic problems, creating a fit between strategy and staff, connecting plans and detecting the impact of external environment (e.g. evolution of branches, new technologies) (MÜLLER-STEWENS and LECHNER, 2001). The authors will combine these points in two categories discussing how the concept of strategic management fits to a chain network. Additional, knowledge is taken into account.

Topics Related to External Environment

Having great influence on the profitability, industry structure is used by the industrial organisation school as a determinate of success. Hitherto, networks have to be designed to re-shape the nature of competition in the industry. Acting in a dynamic environment chain networks have to perform a macro and micro analysis of the environment in order to stay competitive. This analysis has to be done on chain level as well as on single firm level. For the SCN the challenge is to create a fit of the environmental opportunities and threats on chain level with the ones on single firm stage.

Topics Related to Strategy

Co-operations create critical resources needed in the competition with other netchains. On that account, SCN need to have a chain strategy to create a "unique selling proposition" for the final consumer and a "unique relationship proposition" for the members. Creating a chain culture and shared values enhance co-operation and simultaneously the inter-firm information transmission will be simplified. Generating a chain strategy means that every involved enterprise has to adjust to this overall strategy. Thus, every company has to align its firm strategy and business unit strategies. In the process of adjusting the strategies, the plans - strategies are made of - have to be aligned, too. Via this step not only the strategic levels in the single firms are affected, but also the operational levels are stroked. While for a strategic management of a

single company the fit of the firms' strategy and the staff – especially the managers – is of major relevance, for a SCN the strategies fit with the staff is of secondary interest. Most important is that the firms' strategies are adapted in such a way that there is a fit between the single firms' strategies and the overall chain strategy. This means that a chain strategy has to work for firms of different levels in the food chain. Hence, a strategic management concept has to have a mechanism to verify that every involved participant has the same strategy understanding.

Topics Related to Knowledge

Information and knowledge are key assets for the enhancement and co-ordination of participants in networks. Information is utilisable for short-termed, retrospective re-consideration. In the agri-food business it is mainly interrelated with control, traceability, and product liability. The operative management of information is a competitive must. But in contrast, knowledge is a weapon for long-term future orientation and has become the currency of competitiveness and success. Its adoption leads to improvement and active development. The strategic management of knowledge leads to competitive advantages.

The role of information technology (IT) can be seen as an enabler but can not be seen as a substitute of knowledge, i.e. the more valuable the knowledge is, the less sophisticated is the technology that supports it.

3.3 Strategy Focused Supply Chain Network

The network advantages such as the creation of intangible network resources (i.e. knowledge), risk reduction, gaining of economies of scale and scope, and reduction of transaction cost can be achieved by an efficient and effective co-ordination of all tasks. This co-ordination has to be done firstly in the interest of the whole chain and secondly by the interest of the single member firms. In analogy to a conglomerate this co-ordination has to be done via a strategic management. But, this management has to be chain specific. Through the creation of a shared chain vision and strategy the legal independent firms have to be convinced to loose some authority and not to behave opportunistic. Therefore, a major task of the chain strategic management is to create trust and a chain culture of honesty because without them the network advantages cannot be gained. In addition, such a chain management concept turns out to be a "unique relationship proposition" attracting firms to join in. Consequently, the participating firms are challenged to keep up with their competitors enhancing the overall efficiency. And if new enterprises are joining, new knowledge, capabilities, and competencies will enrich the SCN. Another major task of a chain management is to install co-ordination mechanisms which address the three different types of interdependencies in the best way. Therefore, a SCN can be called "strategy focused supply chain networks" if it highlights chain strategy and management.

3.4 Constraints of the "Strategy Focused Supply Chain Networks"

Especially for the agri-food business the conceptualisation of a chain management concept is hampered by different firm sizes, the different corporate cultures, and the differences in IT-systems. But the major constraint is the complexity of a "strategy focused SCN". KAPLAN and NORTON show that the complexity and diversity of interests within a single enterprise hinders the implementation of the overall strategy throughout a single company. On this account, creating a "strategy focused organisation" is still rather the exception than the rule (KAPLAN and NORTON, 2001). Being composed of a multitude of firms, chain networks are even more complex. Such enormous barriers must be overcome in order to create a "strategy focused SCN".

3.5 Existing Chain Management Concepts

Since the end of the 1980's the process as a whole was the key element of every modern management system starting with TQM. In the mid 1990's the customer orientated SCM and ECR were introduced. Critical and sensitive information (e.g. scanner data, amount of stocks) based on logistics should be passed throughout the whole chain. In the late 1990's CPFR emerged based on the ideas and aims of ECR and SCM.

Even though these concepts consider the whole chain, the concepts themselves are mainly designed for a single company and optimising the product and information flow between sequenced ties. Being widely used in the agri-food business, TQM has altered in the course of time from a management system to an implementation of ISO certification. Consequently, TQM nowadays can be seen as a competitive must and not as a competitive advantage. SCM and ECR are sophisticated management concepts built for major enterprises. Only in the last two years, first attempts to adjust the ideas to SME addressing the majority of the German agri-food enterprises are made. However, SCM and ECR are still rather used in projects than in the everyday business.

3.6 QS System

The area of food safety and quality became an issue as an answer to different food scandals in Germany and the pressure of regulatory and market requirements from customers, public, and government. For this reason, the QS system was founded by the participants of the agri-food business which can be viewed as the present state-of-the-art for an information system in the agri-food business.

Aim of the QS system is to create the transparent production throughout the food chain by gathering all relevant information in a data warehouse. The result is a single cohesive framework for food safety from farm to consumer with directives including requirements for e.g. the production, quality attributes, animal welfare and environmental standards. In the QS concept information is centred and is basically resulting from already established concepts (e.g. quality management) containing data about origin and attributes of ingredients of products. It is a collection and exchange of information and more a standard which helps to trace back products to its original source than a competitive advantage.

4 Conclusions

Horizontal co-operations have been found in the agri-food business for more than hundred years. A more recent development is the building of co-operative networks covering every stage of the food chain. These SCN are co-operating within the chain, but fiercely competing against other chains. It could be shown that an enriched knowledge, a shared chain strategy as well as a chain management is needed to prevail and prosper in the agri-food sector.

However, these concepts have been developed in the context of single firms. Thus, the authors showed by a comparison of networks and conglomerates that the use of these constructs in the context of chain networks is acceptable. But, only "strategic networks" have been identified to be able to have a shared chain strategy and management. For the design of netchains in the agri-food sector SME have to be taken into account. Furthermore, co-ordination mechanisms for pooled, sequential and reciprocal interdependencies have to be managed by the focal company.

While the existing chain management concepts like SCM and ECR primarily have been built for single enterprises optimising their supply chain, a chain management concept for supply chain networks has to be multi-dimensional. Such a concept has to take into account that high amounts of information have to be made available, enriched knowledge has to be created and independent companies have to be co-ordinated.

Mastering this challenge, the chain management system can be used as a "unique relationship proposition" in order to attract the best firms to join the network. For this reason, the authors are convinced that by using a strategic chain management concept SCN will master these challenges in order to stay competitive in the future.

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