Aspects of the dynamics of cooperations in a supply chain under consideration of trust

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Abstract

The importance of trust has grown over the last decade because of the prevalent use of business strategies that depend on the cooperative behavior of groups of economic partners. Such behavior is, in general, a response to the increased complexity and instability of the business environment and the associated pressure that this places on organizations (Moss Kanter, 1989).

Research in the field of production and operations management has been dealing with the phenomenon of competition as well as the phenomenon of cooperation for a long time. One reason for this interest is the fact that cooperations can generate win-win-situations. To reach such a win-win-situation in a supply chain it is necessary to design a planning and coordination system that includes all companies within the supply chain.

In this context cooperations are very important in all its forms between market solutions and hierarchy. Due to the fact that cooperations are not static but highly dynamic the relationships concerning the decisions of the management of cooperations should be well understood. So there is a need for a theoretically dynamic based analysis of cooperations. Trust can be seen as the crucial item for the constitution as well as the development of the cooperation over time, which is a dynamic and extremely complex phenomenon. The various links between the dynamic of cooperations and trust within a supply chain as a hole makes optimal decisions concerning the management of cooperations difficult as an aspect of supply chain management.

The object of this paper is to discuss the different possibilities for transactions and coordinations for a company and to analyze cooperations itself as a dynamic construct. Additionally, trust will be examined as a major instrument for co-ordinations in cooperations. Finally, a dynamic analysis of a supply chain is supposed to be as a synthesis of the dynamic of cooperations and the aspect of trust.

Keywords: Dynamics, Cooperation, Trust, Supply Chain, Supply Chain Management

I. Requirements in a changing business environment

Due to the ongoing differentiation of customer demand industrial companies are confronted with an increasing demand for customer specific solution. Therefore manufacturing companies are pressed to produce more and more complex products to

defend their competitive position or to build up new competitive advantages. At the same time the demand-volume is dispersed among a greater number of regional markets leading to the fact that only globally operating companies have the chance to obtain competitive advantages with the help of high output figures.

Thus there is the necessity to develop and to produce products for customers from all over the world and thereby using differentiation potentialities. Additionally, flexibility becomes increasingly important due to the shortening of product life cycles. A company must be able to react fast to occurring changes in customer demand and to innovate a product on several markets to achieve economies of scale (Semlinger 1993).

Globalization and the resulting need for companies to act on international markets lead to the fact, that the structure of a product and its underlying process embodies a degree of complexity, which can only be managed via a great effort of coordination. Additionally, to be competitive high investments are necessary in order to develop and offer a wide product range. Often, those investments exceed the limits of the financial resources of small and medium enterprises. An important consequence is that a single company usually won't be able to fulfill the market requirements, i.e. performing the development and market introduction of different variants. A possible reaction to this dilemma is to focus scarce resources like know-how, human and financial resources on selected core areas (Prahalad/Hamel 1991), for instance by reducing the vertical range of manufacturing or by focussing the factory on a small product range needing less different production technologies.

II. Systematization of coordination mechanisms

The outsourcing of business processes in order to concentrate business activities on strategic important core areas and core processes, the so called core competencies, is accompanied by the danger of not being able to meet customer needs because of a smaller product range. This risk on the one hand and the advantages of the concentration on core competencies on the other hand lead to an increase of the intensity of work division and to closer forms of collaboration with other companies in the fields of research and development, production, purchasing, quality assurance, and distribution. In contrast to traditional forms of collaboration between companies the optimization of internal and especially of external inter-firm cooperations becomes increasingly important (Edres and Wehner 1993). To realize control over the resulting external pre- and post tiers without supplementary effort or rather with a decline of internal effort, it is necessary to implement efficient coordination mechanisms and instruments.

Coase, the founder of institutional economics, was the first dealing with the advantages and disadvantages of the two coordination mechanisms market and firm (Coase 1937). The intermediary hybrid forms were considered admittedly much later within the scope of the extension of Coases approach.

The literature distinguishes three forms of coordination: market, cooperation, and the firm. The existing forms of coordination can be depicted as a continuum with the two poles firm and market. As synonyms for market the terms contract and swap are used.

For firm the terms hierarchy, employment contract, or concern are used. Cooperative forms of coordination are lying between the two poles and are accordingly seen as hybrid, intermediate coordination form. The changeover from a market transaction to a cooperative or hierarchical transaction and coordination is achieved by a internalization of tasks and functions. Thereby, the degree of integration of collaboration and the complexity of the coordination measures increase as well as the mutual dependency, the duration of the relationship, and the necessary control mechanisms (Kaufmann 1994, 176). The opposite way from a hierarchical to a market coordination is characterized by externalization processes. (Wildemann 1996, 20).

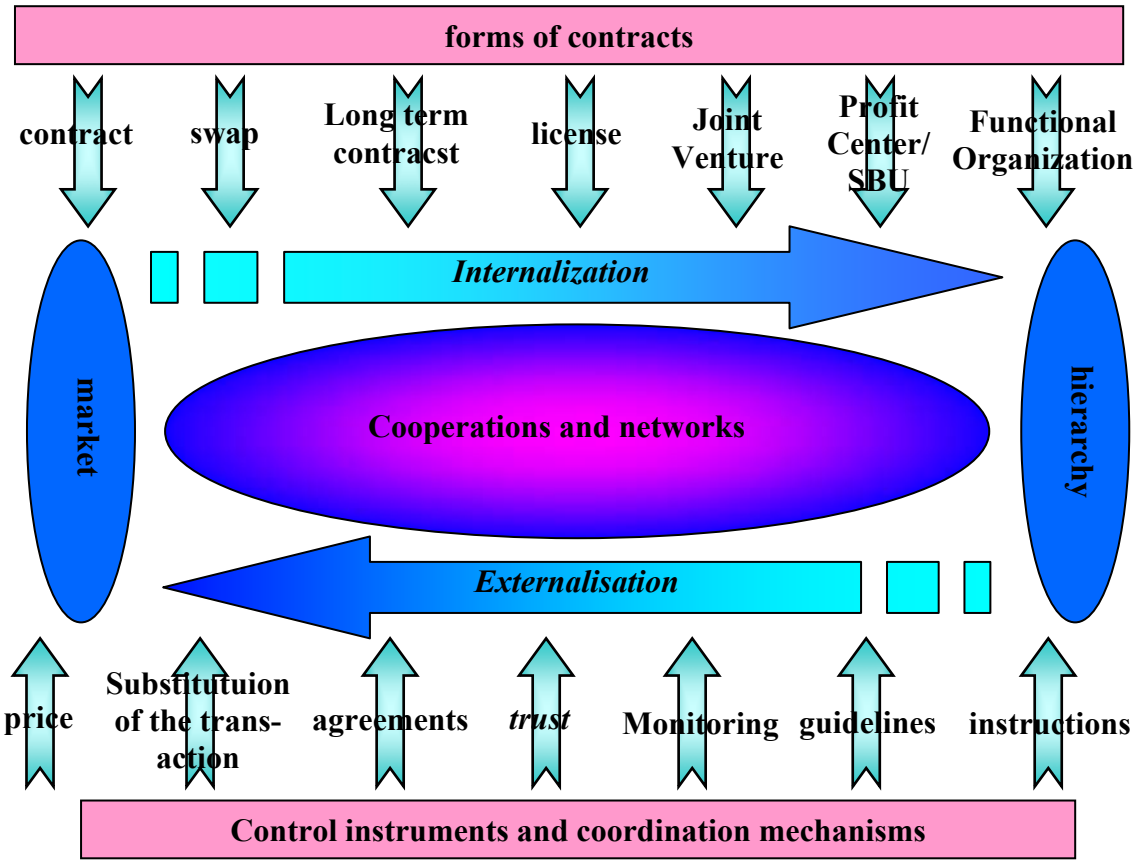

Figure 1: Coordination mechanisms and instruments

The borders between market, cooperation, and hierarchy are smooth. While market transaction between two independent agents is done on the basis of a usually absolute specific contract, hierarchy is an institution with a standardized performance, in which coordination takes place via authority in contrast to the price-driven market solution.

Contrary to the market solution cooperation is determined by a rational coordination of behavior and a higher degree of negotiation intensity (Kaufmann 1994, 176). On the other hand, compared to concentration in forms of concerns, mergers, and acquisitions cooperations are defined by a partial collaboration and the missing durable business relationship with a unitary leadership, e.g. within a merger two or more companies merge into a independent legal form, whereby all resources, the responsibility for leadership, and the financial risk is put together. Consequently, a merger is accompanied by the loss of the legal and economic autonomy.

Cooperation can be seen as a hybrid form between market and hierarchy. A partner can decide to enter or exit the cooperation. Following a definition of Thelen a partner should at least be able to make individual decisions in its other businesses based on its own economic responsibility, which is not determined by the cooperation (Thelen 1993, 47). The independence of companies and therewith their economic autonomy is restricted by mutual or one-sided venture capital. Thelen assesses the limit for mergers resp. acquisitions to 50 percent (Thelen 1993, 48). A connection based on venture capital does not necessarily exclude the status of cooperation.

Via the merging of particular business functions in terms of outsourcing or shifting, a mutual dependency will result regarding the partial collaboration. Outsourcing means externalization of functions and tasks; within the scope of shifting partners specialize on particular tasks. Cooperation also takes place, if a spontaneous information transfer between two departments of different companies happens without merging or outsourcing.

A further characteristic of cooperations is the voluntary of collaboration. Companies have the option to initialize or to end a cooperation. This characteristic is problematic, if due to the retirement of a partner the existence of others is endangered. In this case there is no clear delimitation to a merger. Additionally, Thelen mentions time aspects and excludes a simple project-based collaboration from the concept of cooperation (Thelen 1993, 49). Regarding the concept of virtual companies as specific form of cooperation, i.e. companies with different functions merge for the time of a particular project, this opinion cannot be followed. A company has three different transfer possibilities referring to the forms of co-operations discussed above: A single company solution, mergers and acquisitions, and cooperation. Each alternative has different advantages but also disadvantages as shown in figure 2.

Forms of Co-ordination		
	Single Company Solution	
	Initiation of development strategies based on internal resources	- time-intensive
		- cost-intensive
		- higher risk
		- corporate control
		- high complexity
	Merger and Acquisition	
	Acquisition of external resources and know-how	- fast
		- cost-intensive
		- higher risk
		- corporate control
		- high complexity
		- legal restrictions
	Cooperation and Network	
	Inter-company division of labor, mutual completion and combination of resources and know-how	- fast
		- flexible
		- temporal limitation possible
		- co-ordination effort

Figure 2: Forms of co-ordination

The organizational development of a company necessary for the single company solution takes a great amount of time and resources and involves high costs and risks. Therefore this form of co-ordination is – especially against the background of shortening product life cycles, severe competition, and a growing complexity of production processes – difficult to implement. The complete (horizontal and vertical) integration – the other extreme form of cooperation – prevalently also proved to be, as a hierarchic construct, a sub-optimal solution. According to Bronder and Pritzl it shows no definite positive correlation with an increase in cost-effectiveness (Bronder and Pritzl 1992). This is particularly due to the high organizational complexity. Moreover, compared to smaller autonomous organizational units vertical integration leads to a decline of the competitive pressure in the market. Lamming mentions the case of General Motors, where corporate suppliers expect a more than 50% higher price than their independent competitors (Lamming 1994). On the other hand integration entails some advantages, e.g. the merger with a financially strong corporation allows making essential investments in capacity, technology, quality, productivity, and human resources. The complexity and the resulting co-ordination effort arising from an acquisition lead to decreasing flexibility of the larger organizational unit and they tie up more management resources. At the same time the risk of decreasing efficiency of the transformation process and lower reactivity to market changes is increasing. Therefore the strategy of merger and acquisition often misses the objectives aimed at.

Cooperation and networks emerging through the internalization and externalization of different economic activities are predominantly an organizational form where more co-operative than competitive relations between legally and economically independent companies prevail (Sydow 1992, 79). In a vertical cooperation – a cooperation between companies of different stages of the value chain – tasks are normally allocated to the different members in a way that every company assumes those functions that it performs best relative to the other companies. This results in an elimination of disadvantages for single companies in the network. A cooperation taking place between companies of the same stage of the value chain is called a horizontal cooperation.

In theory and in practice different hybrid approaches for simultaneously considering costs, quality, and time with regard to internal processes have been developed. Today external procurement accounts for more than 50% of the production costs. The continuing trend towards a reduction of the vertical range of manufacture – upstream regarding research and development, construction and production of preliminary products as well as downstream with respect to service and logistic functions – is one reason why the potential of influencing the performance of a company transcends the company's border. Therefore the range of external functions and tasks is of growing importance for the competitive position of a company. The amount of costs influenced by procurement, the importance of procurement for the liquidity and profit realization of a company is growing and results in an increasing dependence of a company's performance on the efficiency and the cost situation of its suppliers (Wildemann 1995; Burt 1990). To reveal rationalization potentials it is therefore necessary to consider chain-wide total costs. It is especially the interface costs that are important for co-operations. Moving away from a functional view and the resulting sub-optimal solutions to a chain-wide process orientation – especially at the interfaces – will lead to an alignment of transformation processes to the critical performance factors and to an avoidance of redundancy. This is of particular importance in today's market

configuration with its dominating role of demand. A lasting success of every single company in a value chain – from the first supplier to the retailer – depends on the ability to satisfy the end-consumers' needs.

III. Dynamics of Cooperations

Most analyses of cooperations found in the literature deal with the reasons for the existence as well as the different forms and characteristics of cooperations. Those models are static; they do not consider the fact that cooperations are highly dynamic: Decisions made at time t are not only influenced by the factor constellation at time t, but also depend on the events at time t-1 and on the anticipated events at time t+1. A dynamic analysis has to consider this fact. It therefore has to integrate the momentum of the cooperation as well as the dynamics of the environment the cooperation is imbedded in. The concept of process is closely related to the idea of dynamics. According to Gerybadze a process is a „[…] a sequence of activities necessary to achieve a desired end […]"(Gerybadze 1995, 58), Van de Ven defines it as follows: "Process, conceptualized as a flow of activities, refers to the direction an frequency of resources and information flowing between members" (Van de Ven 1976, 26). These rather vague definitions are criticized by Van de Ven as being "[…] typically inadequate to deal with the complexities of many strategy ventures because [they] assume[s] invariance between and within all organizational units in following a prescribed order of development phases; one locked after another" (Van de Ven 1992, 172).

According to Van de Ven a dynamic model has to not only analyze single phases, but additionally describe „[…] multiple, cumulative, conjunctive, and iterative progressions of convergent, parallel, and divergent streams of activities […]" over time (Van de Ven 1992, 172).

One possibility to model cooperations dynamically is to not only model the single successive phases containing characteristic procedures and events but to also integrate processes and process-models. The latter describe an iterative cycle and contain interdependent variables, called "soft factors" that are operating during the course of the phase. The values of these variables are changing over time. Examples of such variables are trust, reciprocity, opportunism, forbearance, and learning (Parkhe 1993).

A lot of models found in the literature divide a cooperation's life cycle into different phases. These models usually analyze the different phases statically (Zajac. and Olsen 1993; Spekman and Isabella and MacAvoy and Forbes III 1996; D'Aunno and Zuckerman 1987; Dwyer and Schurr and Oh 1987).

Niederkofler developed a process-model for strategic alliances (Niederkofler 1991). He postulates that the high rates of instability of alliances are due to management failure and therefore can be minimized. His process-model is based on the two determinants „strategic fit" – e.g. through common interests based on complementary resources – and „operating fit" – the implementation in a way satisfying both partners.

An „operating misfit", together with a strong dependence on the partner or a change in the environment finally lead to a „strategic misfit". Trust and goodwill can have a

stabilizing effect in all development-stages supporting conflict resolution. The two variables change over time. Coping successfully with an „operating misfit“, has a positive effect on the two factors, whereas one partner's lack of internal support or cultural differences have a negative effect.

A similar model can be found at Van de Ven and Ring and Van de Ven. In their process model the authors consider the development and evolution of cooperative relationships as a sequence of negotiations, mutual commitment, and fulfillment (Van de Ven 1976; Ring and Van de Ven 1994). In Doz's process-model of cooperation-evolution the learning processes taking place between the partners over time are in the center of consideration (Doz 1996).

1. The structure of a dynamik cooperation model

An analysis of the literature shows that though of an abundance of publications and theoretical explanation approaches there is a shortcoming of dynamic models and studies of cooperations. Despite the fact that few models regard the phases as shown above they comprise a static view of the within phases. Interactive processes and influence factors spanning across phases are generally ignored. The process models however emphasize exactly these interactive processes. Through the cyclic formation of several sequences the typical, recurring actions within a cooperation with their vital influence factors are represented. A feature of such models is the emphasis of scientific behavior aspects of the interaction, such as learning and role behavior. External influence factors are however much neglected. The typical phases in the lifecycle of a cooperation like the first contact making, negotiations, conclusion of contract etc. are hardly represented.

Recapitulating following requirements of a dynamic cooperation model can be formulated:

- Initial conditions should be considered, which lead to the formation of a cooperation. Also driving forces und causes, which lead to the suspension of a cooperation respectively to an exit of individual partners, should be considered. These driving forces then also lead to instability of the cooperation and create a respective dynamic.
- The complexity of a dynamic cooperation should be captured and implemented trough the consideration of the individual phases of the lifecycle of a cooperation and also trough the modeling of the interactive, spanning across phases processes.
- External and internal influence factors are also important aspects, which operate across and link phases and should therefore also be integrated as components of the dynamics in a model.

A dynamic cooperation model, which withholds the above postulated elements of internal and external influence factors, starting requirements as well as lifecycle phases and interactive process cycles could thus look like as depicted in the following figure 3.

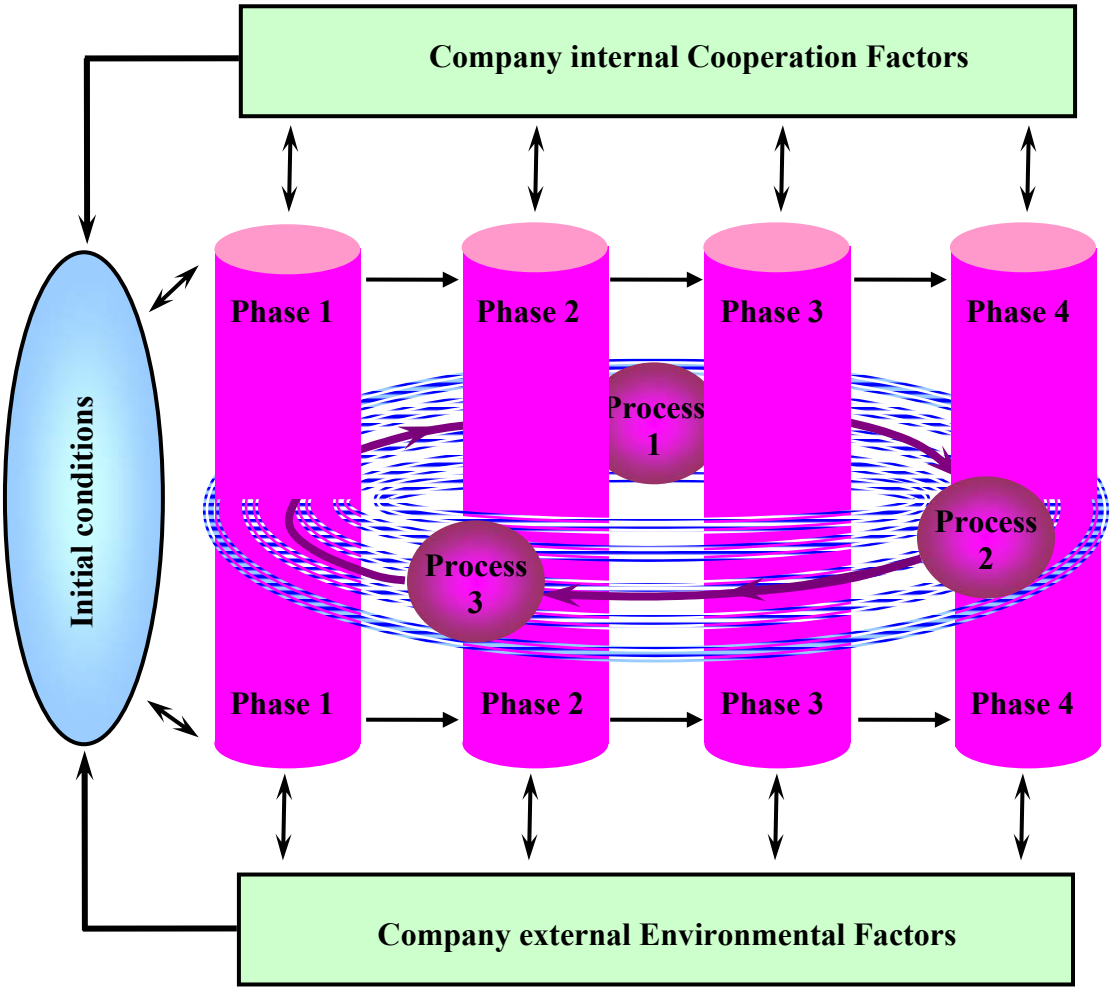

Figure 3: Dynamic Cooperation Model

The factors influencing a cooperation can be distinguished into external as well as company and cooperation internal factors resulting from the environment of the cooperation.

2. External Environmental Factors

Examples for external environmental factors are the attribute of the product, the information aspect, the trend of demand, the interdependence of the market participants, the general utilization of factor, the market phase of the respective industry as well as non-economic factors such as the country culture, legal and institutional regulations as well as external shocks, as for example an oil crisis or a natural disaster. These external factors are interdependent and have a complex impact not only on the initial situation of a cooperation, but on all the individual phases. Consequently a intense competition results for instance from a slow industry growth, a high number of competitors, high fixed and storage costs, high product standardization as well as high market entry barriers (Porter 1990, 42 ff.; Eisele 1995, 282). According to Kogut high entry barriers in turn increase the cooperativeness of individual actors (Kogut 1989, 183). On the

other hand however they have a negative influence on industry wide company profits and with that also on the stability of a cooperation and its success.

3. Internal Cooperation Factors

Under the term internal cooperation factors one can depict variables of the individual cooperation partners specific to the company such as relative competitive advantages, strategy, performance, company size, structure and culture, reputation and experiences with cooperations as well as the functional position and significance within the cooperation.

As with the external factors there are co-acting effects existing between the internal and the initial conditions on the one hand and the individual life cycle phases of the cooperation on the other hand. Internal influence factors can be depicted by specific resources, which are brought into the cooperation by the respective cooperation partners, as well as out of the combination of these into a collectivity. Cooperations are amongst other things based on resource requirements on the one hand and on the provision of these resources on the other. The entrepreneurial call for action that ultimately result from external driving forces such as demand fluctuations, technological changes or legal regulations, are closely linked with resource interdependencies between the competitors and the abilities resulting from the resource potentials of a company. Ultimately the subject or cause for a cooperation to come into existence is the provision of resources respectively its transfer. A resource valuable, scare, difficult to imitate and substitute is from a resource based view necessary for the establishment of a lasting competitive advantage (Barney 1991, 105 f.).

If such a resource resides with a cooperation partner he will try to minimize the risk of losing that resource by enforcing certain cooperation structures. The partner bringing in the more valuable resources into the cooperation usually has a more powerful and negotiating position.

A fact that has to be taken into account in a cooperation model is the dynamics of the cooperation partner's resource potential. This can be influenced and changed by means of the cooperation itself as well as activities independent from the cooperation. Therefore learning processes within a cooperation can lead to higher resource potentials. On the other hand such learning processes may also lead to a situation in which, for example, the know how resources of the weaker partner may align with that of the stronger partner, which may lead to instability or even withdrawal from the cooperation.

Barney distinguishes three groups of resources (Barney 1991, 101):

- Physical resources, i.e. technological facilities, equipment, machines, raw materials and location,
- organizational resources, i.e. coordination, planning and control systems as well as relationship structures between the cooperation partners and between these and the environment and
- resources based on human capital, i.e. the employees' abilities and experiences, personal management and know how.

4. Initial Conditions

As stated in a study by Larsen within successful cooperations certain elements exist such as reputation and earlier experiences in the form of "preconditions for exchange history" as well as mutual economic advantages such as "conditions to build" (Larson 1991; Larson 1992). Such initial conditions are also formulated in the process model by Doz (Doz 1996). These initial conditions stimulate or repress specific learning processes which in turn determine the further course of the cooperation by directly affecting the iterative process cycle in a stimulating or repressing way. A change in external environmental factors can cause a disturbance in the process cycle in form of external dissonances. Thereby, favourable initial conditions for a faster stabilisation and adjustment within the scope of the process cycle may occur.

Consequently interdependencies between the initial conditions and the cooperation process exist. Changes and adjustments of the initial conditions over time may occur due to internal as well as external factors. While some of the initial conditions are more strongly influenced by external environmental factors, to others the internal cooperation factors are of greater importance.

The initial conditions are described by interdependent factors which result from specific combinations of internal and external factors and from factors arranged during the first phase of negotiations. Consequently the initial conditions are also of dynamic nature.

IV. Conceptualizing Trust

Trust is a multilayered dynamic phenomenon with many facets. Based on earlier reflections from Gambetta (Gambetta 1988) and Zand (Zand 1972) Mayer and Davis and Shoormann define trust as following: "Trust ist the willingness of a party to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer and Davis and Shoormann 1995; 712). Thus trust begins there where knowledge ends (Sydow 1995, 183). Trust is knowledge concerning interaction; it is an expectation about the further development of the underlying interaction. Under lack of knowledge trust becomes necessary.

Analyzing the literature concerning the phenomenon of trust one will recognize different concepts not only amongst the diverse sciences (especially social science, psychology, economics) but also within them. In most cases trust is analysed on an individual level (Wagner III 1995), in which both confider and confidant are persons. It is therefore about interpersonal trust, in which the confidant is given the necessary attributes of trustworthiness. Trustworthiness from the perspective of the confider results from abilities, the goodwill and the integrity of a person (Mayer and Davis and Shoorman 1995, 715).

In the economic as well as in the organizations theory trust is seen as an efficient mechanism for the design and control of transactions (Zucker 1986, 56). This assumption is verified in real life where partners in a cooperation have knowledge of

possibilities to guard themselves from opportunistic behavior but trust their partners such as to install few or no specific mechanisms of protection (Gahl 1991, 164).

The definitions of trust from the economic and sociologic perspective differ significantly. In most economic approaches trust is not considered. Williamson differentiates between three forms of trust "calculative", "personal" and "institutional" trust but at the same time he points out the discrepancy included in the term "calculative trust" (Williamson 1993, 485). According to Williams that both economists and sociologists use trust in the sense of risk is deceptive. For him trust is a diffuse concept that should not be applied to economic problems but solely to interpersonal relationships which can not be calculated (Williamson 1993, 486).

In economics trust in connection with cooperations is seen as an exogenous factor and as a constant respectively a static variable. These are given facts brought into the cooperation by the partners and are modeled in form of reputation of the firm, brand names or "credible commitments" respectively "contractual safeguards" (Shapiro 1982; Dasgupta 1988; Williamson 1993). In this approaches trust is working as „implicit contracting" excluding a market for trust(Arrow 1974, 23). In this sense trust operates as "implicit contracting" whereas a market for respectively with trust is concluded(Arrow 1974, 23). Therefore trust receives the character of a public good. In an extreme example trust can replace formal contracts which create costs and are difficult to control.

The game theory through a multistage view loosens the static concept of trust. Though trust is built upon experiences of past games it is based upon calculated considerations aiming to improve one's own position. An emotional component is implicitly included in the so called tit-for-tat strategy but is not further dealt with.

The sociologic definition of trust is likewise not explicit. In contrast to concepts found in the economic literature however these concepts assume trust to be dynamic and an emotional predisposition respectively altruistic behaviour to exist. Gambetta defines trust as: "[…] a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action, both before he can monitor such action and in a context in which it affects his own action" (Gambetta 1988, 217).

Williamson counts Gambetta and also Kreps (Kreps 1990) and Dasgupta (Dasgupta 1988) to those researchers that regard trust as a subgroup of calculable risks (Williamson 1993, 464). Also Noteboom, Berger and Noorderhaven define trust as a subjective probability that the confider will act in a certain way (Noteboom and Berger and Noorderhaven 1997). They however specify the definition by differentiating „competence trust" and „intentional trust".

Lewis and Weigert develop a sociological concept of trust seeing trust as more than only a sub-category of risk (Lewis and Weigert 1985, 967). They criticize that in psychology trust is only analysed as an individual concept. Beyond this however trust is to be analyzed in a social interactive context. This concept is similar to (Granovetter 1985) who points out that economic actions take place in a network of social interactions. Trust therefore has different cognitive, emotional, and behaviorist components and amongst other things serves the reduction of risk and complexity (Luhmann 1988, 95).

The difference between the sociological and the economical definition therefore lies with the emotional element. The cognitive element in economic interactions is however compared to private interactions more distinctive.

Zucker's sociological comprehension of trust splits the phenomenon into three components. It defines trust as: "[…] a set of expectations shared by all those involved in an exchange" (Zucker 1986, 54) and distinguishes three kinds of specifications – "characteristic-based trust", "process-based trust" and "institutional-based trust". A similar classification is found in Sheppard and Tuchinsky who speak of the three kinds of trust "deterrence-based trust", "knowledge-based trust" and "identification-based trust" (Sheppard and Tuchinsky 1996).

The "characteristic-based trust" (Zucker 1986) as well as the "identification-based trust" (Sheppard and Tuchinsky 1996) deal with a form of trust which results from the identification with the values or from a positive assessment of a certain person's character.

"Process-based trust" (Zucker 1986) as well as "knowledge-based trust" (Sheppard and Tuchinsky 1996) is based on experience and knowledge of certain behaviour patterns and routines. It results from the dynamics of past and future exchange processes and is particularly influenced by the reputation of the company and its brand name.

The third form of trust, "institutional trust" (Zucker 1986) emerges from a "social embeddedness" in specific institutional structures, whereas "deterrence-based trust" (Sheppard and Tuchinsky 1996) assumes that individuals will keep their promises because they fear negative consequences from opportunistic behaviour. Thus one partner can trust another as long as the gains resulting from an opportunistic behaviour are lower than the (penalty-) costs and other negative consequences.

In the literature a number of other authors are found who split trust into three types, but respectively using varying separating criteria (Williamson 1993a, 485; Lewicki and Buncker 1995, 115; Misztal 1996: Huemer and Krogh and Roos 1998).

For trust to originate a model has been developed by Mayer, Davis and Shoorman (Mayer and Davis and Shoorman 1995). Thus the origination of trust on the one hand depends on the expectations and the attitude of the confider, the so called tendency to trust. This in turn is dependent on the experiences, personality and cultural background. On the other hand the trustworthiness of the confidant is of crucial importance. It is manifested in the factors ability, goodwill and integrity.

Ability means the knowledge, competencies and characteristic attributes of the confidant, which are necessary for the fulfilment of a certain action targeted by the cooperation. The goodwill is expressed through a positive attitude towards the confider and includes altruism and loyalty. The third factor, the integrity, is derived from the assumption that the confidant will abide to certain principles that are acceptable for the confider. It is influenced by congruency of words and deeds, a sense of justice and reputation.

Over time the intensity can vary due to experiences from repeated interactions and additional information from the social network. Since it is possible to collect external information about the confidant's ability and integrity these two factors are especially important at the beginning of the cooperation. Only with duration of the cooperation the goodwill of the confidant will have an impact. Finally together the tendency to trust and

trustworthiness determine the level of trust. However the tendency to trust decides the extent of the three mentioned factors that are necessary for the establishment as well as for the maintenance of the cooperation.

In the model by Mayer, Davis and Shoormanthe the idea of trust and risk are clearly distinguished (Mayer and Davis and Shoorman 1995). This is necessary because the originating of a cooperation is not only dependent on trust but also on the evaluation of the perceived risk of a cooperational relationship. In contrast to the opportunity risk which is already considered in the level of trust, this kind of risk refers to the changes of success of an action dependent upon conditions within the context (i.e. involved parties, distribution of power, number of alternatives). The level of this risk that the confider is willing to take depends on the level of trust.

According to Mody trust is not necessarily given exogenously (Mody 1993,168). It is more likely developed by a successful relationship. Trough trust the probability to share and generate knowledge is increased and opportunistic behaviour minimized. Thus trust receives a dynamic character.

V. System Dynamics as an analytic tool for analysing cooperations in Supply Chains

Starting from the considerations described above the dynamics of cooperations in a Supply Chain can be examined. For this purpose a simulation model of a simple 4-step supply chain based on the system dynamics approach is developed. Handfield and Nichols define the supply chain as the whole value-added chain from the initial production till to services for end users:

„The supply chain encompasses all activities associated with the flow and transformation of goods from the raw materials stage (extraction), through to the end user, as well as the associated information flows" (Handfield and Nichols 1999, 2).

Planning and control mechanisms that apply to the isolated optimization of single members of the supply chain will predominately lead to suboptimal solutions. Considering the supply chain as a whole will improve these sub optima. The focus of planning and governing therefore shifts from the isolated, internal activities in horizontal processes to an integrative view of the whole supply chain (Christopher 1998, 231 ff.). In the context of system theory a supply chain can be understood as a complex, dynamical, socio-technical system with the single supply chain partners as elements of the system and the material and information flows as well as the economic relationships as links of these elements. An important contribution to the systematic perception of a supply chain was made by Forrester in his book "Industrial Dynamics" (Forrester, 1961). Through the expansion of the system's boundaries in that the whole supply chain is considered the management of a company is extended as shown in figure 4 to the management of a company network, becoming the supply chain management (Zäpfel and Piekarz 1996, 49).

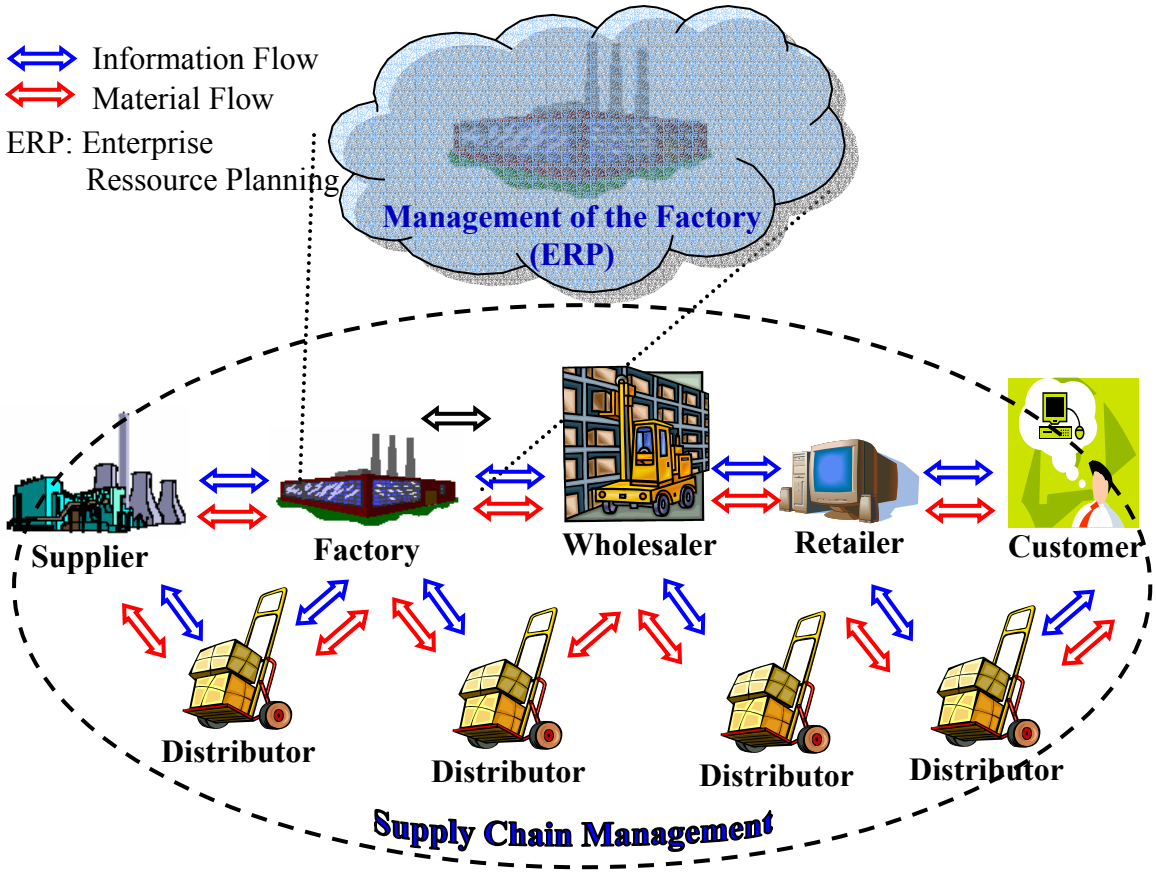

Figure 4: From the management of a factory to Supply Chain Management

Supply chain management focuses on a long term collaboration and partnership between the supply chain members. According to Poirier and Reiter this results in the possibility to reduce coordination efforts (Poirier and Reiter 1997). In this context the management of the cooperation as a cross-functional task plays a vital role: on the one hand it has to make sure that cooperations with new potential partners are entered, on the other hand the stability of the cooperation has to be secured over time. For this function it is of utmost importance to understand the dynamics of a cooperation and its causal connections. In the midst of these considerations lies the concept of trust as a dynamic phenomenon. In the beginning trust is a central dynamic variable for the formation of a cooperation, later it is of great importance for the stability of the partnership. As explained above trust is a complex variable that depends on a number of other factors.

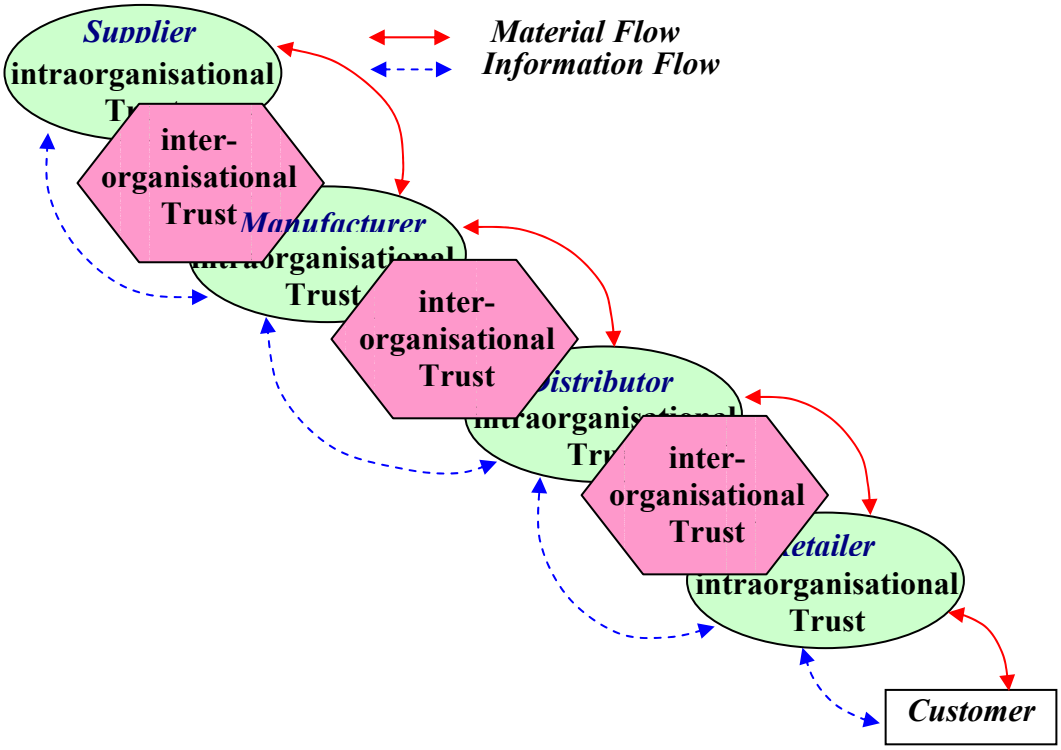

Figure 5: Trust in the Supply Chain

The value of a cooperation as a variable comprising the whole supply chain results as depicted in figure 5 from the mutual trust between the individual partners of the cooperation as well as the mutual trust between the individual organizational entities.

In the literature cooperations are mostly described with the help of multi-tier models. The dynamic analysis of these models is limited to the chronology of the phases. Within a phase this dynamic component is not taken into consideration. One object of this paper was a sensitization regarding the dynamics of cooperations.

Another object was to present the complexity concerning the concept of trust. Further it was shown that trust is an important component of cooperations and therefore it should play a major role in the management of cooperations as part of supply chain management. The dynamic behavior of supply chains was extensively analyzed in the literature, whereas especially the analysis of Forrester undertaken from a perspective of system theory is to be mentioned (Forrester 1961). A further step could be the systemic analysis of supply chains and networks of companies by synthesizing the insights from the field of dynamic research of cooperations. It might be reasonable to base further studies on the concept concerning trust and the work of Forrester. This can be done by the development of a comprehensive simulation model based on the system dynamics approach.

References

Arrow, Kenneth J. 1974. Essays in the theory of risk-bearing. Amsterdam.

Barney, Jay B. 1991. Firm resources and sustained competitive advantage. Journal of Management 17(1), 99–120.

Bronder, Christoph and Pritzl, R., eds. 1992. Ein konzeptioneller Ansatz zur Gestaltung und Entwicklung Strategischer Allianzen. In: Bronder, Christoph. Wegweiser für strategische Allianzen. Frankfurt/Main, Wiesbaden 17–44.

Burt, David N. 1990. Hersteller helfen ihren Lieferanten auf die Sprünge. Harvard Manager (1), 72–79.

Christopher, Martin. 1998. Logistics & Supply Chain Management. London.

Coase, Ronald H. 1937. The nature of the firm. Economica 4, 386–405.

D'Aunno, T.A. and H.S., Zuckerman, eds. 1987. A life-cycle model of organizational federations: The case of hospitals. Academy of Management Review 12(3), 534–545.

Dasgupta, Partha. 1988. Trust as a commodity. In: Gambetta, Diego, ed. Trust. Making and breaking cooperative relations. New York, 49–72.

Doz, Yves L. 1996. The evolution of cooperation in strategic alliances: Initial conditions or learning processes?. Strategic Management Journal 17, 55–83.

Dwyer, F.R. and P.H., Schurr and S., Oh, 1987. Developing buyer-seller relationships. Journal of Marketing 51, 11–27.

Eisele, Jürgen. 1995. Erfolgsfaktoren des Joint-Venture-Management. Mannheim.

Endres, Egon and Wehner, Theo, eds. 1993. Probleme in der Reorganisation der zwischenbetrieblichen Arbeitsteilung. Hamburg.

Forrester, Jay W. 1961. Industrial Dynamics. Cambridge.

Gahl, Andreas. 1991. Die Konzeption strategischer Allianzen. Berlin.

Gambetta, Diego. 1988. Trust – Making and Breaking Cooperative Relations. Oxford.

Gerybadze, Alexander. 1995. Strategic alliances and process redesign. Berlin.

Granovetter, Mark. 1985. Economic action and social structure: the problem of embedded ness. American Journal of Sociology 91(3), 581–610.

Huemer, L. and Krogh, G.v. and Roos, J., 1998 Knowledge and the Concept of Trust. In: Krogh, G.v. and J., Roos and D., Kleine. Knowing in Firms – Understanding, Managing and Measuring Knowledge. London, Thousand Oaks, New Delhi, 123–145.

Kanter, Rosabeth Moss. 1989. When Giants Learn to Dance: mastering the challenge of strategy, management, and careers in the 1990s. New York.

Kaufmann, Friedrich. 1994. Strategie der Auslandkooperation mittelständischer Unternehmen. Internationales Gewerbearchiv, Bd. 42, (3), 175–188.

Kogut, Bruce. 1989. The stability of joint ventures: reciprocity and competitive rivalry. Journal of Industrial Economics 38(2), 183–198.

Kreps, Davin M. 1990. Game theory and economic modelling. Oxford.

Kuhn, A. and, B. Hellingrath and M. Kloth, 1998 Anforderungen an das Supply Chain Management der Zukunft. Information Management and Consulting 13(3).

Lamming, Richard. 1994. Die Zukunft der Zulieferindustrie. Frankfurt/Main, New York.

Lewicki, Roy J. and Barbara B., Bunker, eds. 1996. Developing and Maintaining Trust in Work Ralationships. In: Kramer, Roderick M. and Tom R. Tyler, eds. Trust in Organisations: Frontiers of Theory and Research. Thousand Oaks, CA: Sage Publications, 114–139.

Lewis, J.D. and A. Weigert, eds. 1985. Trust as a social reality. Social Forces 63(4), 967–985.

Luhmann, Niklas. 1988. Familiarity, confidence, trust: Problems and alternatives. In: Gambetta, Diego, ed. Trust. Making and breaking cooperative relations. New York, 94–107.

Mayer, R.C. and / J.H. Davis, and F.D. Shoormann, 1995. An Integrativ Model of Organizational Trust. Academy of Management Review, 20(3), 709–733.

Misztal, B.A. 1996. Trust in Modern Societies – The Search for the Base of Social Order. Cambridge.

Mody, A. 1993. Learning through alliances. Journal of Economic Behaviour and Organisation 20, 151–170.

Niederkofler, Martin. 1991. The evolution of strategic alliances: Opportunities for managerial influence. Journal of Business Venturing 6, 237–257.

Nooteboom, B. and H., Berger and N.G., Noorderhaven, 1997 Effects of trust and governance on relational risk. Academy of Management Journal 40(2), 308–338.

Parkhe, A. 1993. “Messy” research, methodological predispositions, and theory development in international joint ventures. Academy of Management Review 18(2) 227–268.

Poirier, Charles C. and Stephen E., Reiter, eds. 1997. Die optimale Wertschöpfungskette: Wie Lieferanten, Produzenten und Handel bestens zusammenarbeiten. Frankfurt.

Porter, Michael E. 1990. Wettbewerbsstrategie. Frankfurt.

Prahalad, Combatore K. and Gary, Hamel, eds. 1991. Nur Kernkompetenzen sichern das Überleben. Harvard Manager 2, 66–78.

Ring, P.S. and Van De Ven, A.H., eds. 1994. Developmental processes of cooperative interorganizational relationship. Academy of Management Review 19(1), 90–118.

Semlinger, Klaus. 1993. Effizienz und Autonomie in Zuliefernetzwerken. Zum strategischen Gehalt von Kooperationen. In: Staehle, Wolfgang H. and Sydow, Jörg, eds. Managementforschung 3, Berlin, New York, 309–354.

Shapiro, Alan C. 1982. Consumer information, produkct quality, and seller reputation. Bell Journal of Economics 13, 20–35.

Sheppard, B.H. and M., Tuchinsky, eds. 1996. Micro-OB and the Network Organisation. In: Kramer, Roderick M. and Tom R., Tyler eds. Trust in Organisations: Frontiers of Theory and Research. London: Thousand Oaks, New Delhi, 140–165.

Spekman, R.E. and L.A., Isabella and T.C., MacAvoy and T., Forbes III., 1996. Creating strategic alliances which endure. Long Range Planning 29(3), 346–357.

Sydow, Jörg. 1992. Strategische Netzwerke. Evolution und Organisation. Wiesbaden.

Thelen, Eva M. 1993. Die zwischenbetriebliche Kooperation. Frankfurt/M.

Van de Ven, A.H. 1976. On the nature, formation, and maintance of relations among organisations. Academy of Management Review 1(4), 24–36.

Van de Ven, A.H. 1992. Suggestions for studying strategy process: A research note. Strategic Management Journal 13, 169–188.

Wagner III., John. A. 1995. Studies of individualism-collectivism: Effects on cooperation in groups. Academy of Management Journal 38(1), 152–172.

Wildemann, Horst. 1995. Entwicklungsstrategien für Zulieferunternehmen. München.

Wildemann, Horst. 1996. Produktions- und Zuliefernetzwerke. München: TCW Transfer-Centrum Verlag.

Williamson, Oliver E. 1993. Calculativeness, trust, and economic organization. Journal of Law and Economics 36, 453–486.

Zand, Dale E. 1972. Trust and Managerial Problem Solving. Administrative Science Quarterly 17, 229–239.

Zäpfel, Günther and Bartosz, Piekarz, eds. 1996. Regelkreisbasiertes Supply Chain Controlling. In: Wildemann, Horst, ed. Produktions- und Zuliefernetzwerke. München, 45–95.

Zajac, E.J. and C.P., Olsen, eds. 1993. From transaction cost to transactional value analysis: Implications for the study of interorganizational strategies. Journal of Management Studies 30, 131–145.

Zucker, Lynne G. 1986. Production of trust: Institutional source of economic structure 1840-1920. Research in Organizational Behaviour 8, 53–111.

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