

Observing suppliers observing early supplier involvement : an empirical research based upon the social systems theory of Niklas Luhmann

Citation for published version (APA):

Vos, J. P. (2003). *Observing suppliers observing early supplier involvement : an empirical research based upon the social systems theory of Niklas Luhmann*. (ECIS working paper series; Vol. 200309). Technische Universiteit Eindhoven.

Document status and date:

Published: 01/01/2003

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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**Observing Suppliers observing Early Supplier Involvement:
An Empirical Research based upon the Social Systems Theory of
Niklas Luhmann**

J.P. Vos

Eindhoven Centre for Innovation Studies, The Netherlands

Working Paper 03.09

Department of Technology Management

Technische Universiteit Eindhoven, The Netherlands

July 2003

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Early Supplier Involvement

*An Empirical Research based upon
the Social Systems Theory of Niklas Luhmann*

Jan-Peter Vos

Department of Organisation Science, Eindhoven University of Technology
PO Box 513, 5600 MB Eindhoven, The Netherlands, e-mail: J.P.Vos@tm.tue.nl

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ABSTRACT

In this empirical study, the focus is on the risks involved with implementing practices of Early Supplier Involvement (ESI) from the perspective of suppliers, which has not been given its due attention. For suppliers, making sense of ESI implies dealing with the following chicken-and-egg problem: the capabilities to be offered depend on the way the business is defined and vice versa. In this paper, a model is presented to describe how suppliers have made sense of this chicken-and-egg problem. This model was used for an empirical exploration of the risks involved with ESI-strategies and draws significantly on theoretical and methodological insights of the social systems theory of the late German sociologist Niklas Luhmann. Until now, social systems theory has not gained much attention within organization studies. As such, this study also aims to illustrate some of the potential of social systems theory.

KEYWORDS

Early Supplier Involvement / Functional Analysis / Jobbers
/ Luhmann / Social Systems Theory

Introduction

'Early Supplier Involvement' or ESI is currently in vogue as a means to foster innovation in supply chains. Ever since the publication of the automotive studies carried out by researchers of the Massachusetts's Institute of Technology (Womack et al., 1991), the management of the contribution of suppliers to the product development process of Original Equipment Manufacturers (OEM), whether automotive-oriented or not, has gained significant attention of both academics and practitioners. The automotive studies showed that Japanese car manufacturers that managed the contribution of their suppliers successfully were able to bring new automobiles to the market in shorter times, with more innovative features and with considerable less effort in terms of development hours with respect to engineering and manufacturing. It appeared that the use of the specialized capabilities of suppliers makes product development both more efficient and more effective (e.g. Clark, 1989; Cusumano and Takeishi, 1991; Dyer & Ouchi, 1993). ESI, as the relating strategy is called, however, is no panache. The greater responsibility of suppliers for the outcome of the product development process of OEM-companies does not always lead to an increase in development-performance (Harley et al., 1997; McCutcheon et al., 1997). In order to enhance the strategic performance of ESI, several improvements have been proposed (e.g. Wasti & Liker, 1997; Bonaccorsi & Lipparini, 1994; MacDuffie & Helper, 1997; Wynstra & Ten Pierick, 2000; Wynstra et al., 2001). These authors have in common their strong focus on the perspective of OEM-companies. True, it has been addressed that often suppliers have little or no experience in joint product development and that their level of technical capabilities is below par, but the focus has remained what OEM-companies can do about these problems. Existing literature ignores the problems experienced by a certain category of suppliers, i.e. 'jobbers', in dealing with ESI and the way they deal with these problems. In this paper, we will present the findings of an empirical research in this respect. It will become clear that these suppliers can choose

different alternatives to make sense of ESI strategically and that each alternative has its own risks that may jeopardize the ESI-strategy.

Theoretical Framework

Previous research on ESI from the perspective of suppliers is primarily focused on ‘component suppliers’ (McCutcheon et al., 1997; Wasti & Liker, 1997; Afuah, 2000, Takeishi, 2001). These type of companies supply parts that are entirely developed as their standard products (Clark et al., 1987, p.741). In this study the focus is upon suppliers that, until now, have offered production capabilities to realize ‘detail controlled parts’, which are parts that are developed entirely by OEM-companies from basic to detailed engineering (Clark et al., 1987, p. 741). Companies busy with this type of business are regularly referred to as ‘jobbers’ (Woodward, 1965, p. 39). From previous research, it turned out that jobbers experience difficulties to engage successfully in ESI. It appeared to be of key importance to make clear how they do business with their customers (Vos et al., 1998). Therefore, it may be of importance to observe how these suppliers of detailed controlled parts have redefined their business to make sense of the capabilities necessary to engage in ESI. For this, we have chosen to investigate the way suppliers have made sense of this phenomenon (Weick, 1979) by means of the social systems theory of the late German sociologist Niklas Luhmann (1927-1998). Just as sensemaking is key for organizations to Weick, ‘Sinn’ or meaning is key to Luhmann’s conception of social life. Unfortunately, this is not the place to deal with Luhmann’s social systems theory at great length because of its overwhelming size. His own personal bibliography dated at January 1996 accounts for over 50 books and almost 400 papers. As a result, presenting social systems theory implies that you need to confine yourself to a limited description of this theory, which apparently has made the comprehension of this theory far from easy or obvious (see King (2001) for an interesting overview of the misconceptions of Luhmann’s sociological program). Nonetheless, it can be argued that

Luhmann's theory of social systems centers primarily on the role of self-reference in observation (Luhmann, 1984). After Luhmann's 'autopoietische Wende' or paradigmatic turn to autopoiesis in the late 1970s, this observational focus has become more and more apparent. In fact, all his publications after his 1984 book 'Soziale Systeme' on art, religion, economics, pedagogies, law, politics, love, science, etc. can be seen as descriptions of these autopoietical social phenomena based upon Spencer-Brown's calculus of forms (1972) and Von Foerster's second-order-cybernetics (1979 & 1981). Indeed, it would be very difficult not see Luhmann's conception of communication as observation, i.e. for social systems to communicate means to observe and to observe means to communicate.

Within social systems theory, communication is regarded as self-referential (Luhmann, 1984). The concept of self-reference implies that when the social system reflects upon its existence, which is an operation by itself, it finds out that the relationship with its environment depends on itself. As a result, the social system tautologically finds out that *it is what it is*, which implies that the social system needs to conclude that its environment is the product of self-observation. Consequently, the social system paradoxically finds out that while observing its environment it is observing itself and not itself. Therefore, social systems cannot decide whether they observe themselves or not, which leads to the conclusion that *social systems cannot identify themselves while identifying themselves*.

The fact that self-observation is trapped in either tautological or paradoxical reasoning indicates that there is a limit to the knowledge social systems can obtain about themselves and their environment. The function of tautology and paradox is to indicate the ultimate complexity experienced by social systems, which forces them to do something to escape self-referential closure. Social systems that carry out operations (i.e. communications), autologically distinguish between self-reference ('Selbstreferenz') and hetero-reference ('Fremdreferenz') and in the process 'de-tautologize' and 'de-paradoxalize' themselves. As a

result, social systems recursively create a boundary between themselves and their environment throughout time. Once operational, the self-referential system can reflect on the unity of its operations. In terms of Spencer-Brown (1972), this reflection takes the form of a ‘re-entry’ of the system/environment-distinction into the system. As we have seen, the re-entry takes the form of either tautology or paradox. The reason why these phenomena occur when a system tries to observe itself with the system/environment-distinction is due to the fact that the one who is referring and the subject he/she is referring to cannot be the same at the same time. During self-observations you cannot observe that you are busy with observing yourself. In other words, the act of self-observation is the ‘blind spot’ of the self-observation. It seems therefore quite ironic that, while reflecting upon *their being there*, social systems find out that they stumble upon a problem, which they have already solved by means of blissful self-ignorance, i.e. *their existence*. Nonetheless, the inherent blind spots may undermine the self-reproduction of social systems because they lead to indecision. For this reason, there are inherent risks involved in dealing with self-reference.

The observation of the risks involved with the way jobbers have redefined their business to make sense of the capabilities necessary to engage in ESI, implies that we need to observe how these jobbers have made their ESI-strategy happen by making sense or ‘solving’ the following strategic chicken-and-egg problem in distinguishing between themselves (self-reference) and their environment (hetero-reference) (Figure 1).

Insert Figure 1 about here

[...]

(1) The business to be defined depends on the capabilities to be offered

(2) The capabilities to be offered depend on the business to be defined

[...]

In making sense of this problem of infinite regress, suppliers stumble upon self-reference. That is, while being busy with self-observation, they need to conclude that the problem they face only exists because they created it themselves. This problem is similar to the problem of the Baron of Münchhausen who needed to pull himself out of the swamp by his own hair. In order to solve the chicken-and-egg problem, suppliers can give meaning tautologically to either (a) their businesses in the sense that they could be what they could be or to (b) their capabilities in the sense that they, again, could be what they could be. The first option relates to an outside/in-approach to strategy and the latter to an inside/out-approach. It should be mentioned, however, that no social system starts form scratch or 'ex nihilo'(Luhmann, 1986), which implies that a new strategic self-description based upon the business/capability-distinction of Figure 1 is part of an already solved chicken-and-egg-problem related to the same distinction and that may or may not structure or 'structurate' (Giddens, 1984) the way both tautological arguments become 'asymmetrised' or 'unfolded' (Luhmann, 1984) throughout time (Figure 2).

Insert Figure 2 about here

The 're-entry' (Spencer-Brown, 1972; Luhmann, 1994) of the business/capability-distinction into the same distinction can appear at both sides of the distinction. In the left part of Figure 2, the distinction re-appears at the business-side of the distinction, which leads to the following self-reflective question.

1. ‘What could our *future* businesses and capabilities be given our *past* businesses?’

Likewise, when the distinction re-appears at the capability-side of the distinction (i.e. the right part of Figure 2), the following self-reflective question results.

2. ‘What could our *future* businesses and capabilities be given our *past* capabilities?’

In either case, the chicken-and-egg problem as depicted in Figure 1 needs to be solved.

Confronted with the tautological arguments underlying the chicken-and-egg problem, organizational members experience an excess of opportunities to choose from in defining the future ESI-strategy. To prevent inability to choose from happening, therefore, the only way to define the future strategy is by just doing something. Therefore, dealing with self-reference in making sense of strategic issues involves acting naively to become operational (Vos, 2002). In system theoretical terms the function of naivety is *to temporalize complexity to create reality*.

As a result of the naivety involved, each choice made by suppliers to solve their strategic chicken-and-egg problem and to make sense of ESI, is in large extent contingent and therefore inherently risky. After all, the company could have chosen to do otherwise.

Yet, as mentioned above, it is to be expected that the past communication of suppliers *both* enable *and* constrain their future communication. That is, depending on which side of the distinction the distinction re-appears, self-reference and hetero-reference will be unfolded by means of answering the relating self-reflective question mentioned above. Within strategy literature this structuration of future actions by means of past actions is known as the ‘dominant logic’ of companies (Prahalad & Bettis, 1986 and Bettis & Prahalad, 1995) that enables and constrains the way they deal with strategic issues. In answering each of the two self-reflective questions, two alternatives exist (Figure 3). The point in finding these answers is to observe how one’s future operations are based recursively on one’s past operations, whether the future operations are aimed at the reproduction of past operations or at the

altering of these operations. We aim to observe (1) which of the four alternatives jobbers have chosen to engage successfully in ESI and (2) the risks involved with each of these alternatives. The risks are of importance to determine the dysfunctionalities of the alternatives or functional equivalents presented in Figure 3.

Insert Figure 3 about here

Methodology

The empirical research is aimed at observing the self-descriptions of the strategy of jobbers that were in the midst of making sense of ESI. To explore this, we have conducted five in depth case studies, which will be presented here in concise form. The case study design chosen can be described as an *embedded multiple-case design* (Yin, 1994, p. 39). The design was *embedded* because each case study had two units of analysis, i.e. the present and future business strategy of a supplier of detailed controlled parts. The case study design was *multiple* because the business strategies of five companies were described and analyzed. In addition, the case study design employs the logic of *literal replication* (Yin, 1994, p. 46) because each case was carefully selected to be homogeneous or similar with respect to the ‘independent variable’. That is, the cases were selected because of similarity with respect to phenomenon of interest, i.e. sensemaking of ESI.

The field research was carried out in association with two organizations that both took an interest in supporting small and medium sized enterprises, not necessarily suppliers, with respect to providing knowledge and support in answering strategic knowledge questions. In association with these parties, a mailing was carried out to introduce us to 20 companies, which were probably willing to participate in the research. Of these companies, 19 replied positively and 17 companies were investigated eventually. Within this set of 17 companies, seven companies were found that were involved with ESI. The ESI-strategies of five of these

companies were considered useful for further analysis because their organizational members were in the midst of making sense of ESI. Therefore, both the present strategy, that was not entirely oriented towards ESI, and the future strategy, that was oriented towards ESI, could be described. The remaining two companies already practiced ESI for some years and as a result were considered of less relevance to the research. The group interviews were joined by organizational members that were busy with making sense of ESI. The fact that both a company's present and future strategy was described made it possible to measure the strategy on two distinct time-intervals at one single point in time. This was in fact a trick to describe two distinct business strategies that otherwise could only have been described by means of conducting a longitudinal research. By this maneuver, it became possible to determine the way the business/capability-distinction re-appeared into itself.

In applying social systems theory it is important to note that the former considerations about the research method chosen have little to do with the methodology associated with this theory. In fact, it can be argued that case study designs are 'loosely coupled' with respect to the way one ought to perceive social reality. After all, once is decided upon a case study design, one still needs to decide upon relevant theoretical points of view and research techniques to be used, whether these techniques are qualitative and/or quantitative. It is Luhmann's opinion that a theory should be accompanied by a method and vice versa. The starting point of Luhmann's social systems theory is the ultimate complexity brought forth by the self-referential distinction between system and environment. Social systems need to asymmetrise or reduce this circular complexity to become operational. Luhmann's functional method can be seen as a means to observe the way social systems reduce this complexity and to put their attempts into theoretical perspective. For this, Luhmann uses the distinction between first and second-order observation, which he took from Von Foerster's second order cybernetics (1979 & 1981).

With first-order empirical observations, the aim is *to observe how social systems observe*. Likewise, with second-order empirical observations, the aim is *to observe what social systems cannot observe because of the way they observe* (i.e. the blind spots of social systems). It is apparent that for second-order observation the researcher needs an observational-framework that is more comprehensive or complex than the framework in use by the observed social system. In both cases, however, the research is focused on the various ways or functional equivalents with which social systems ‘de-tautologize’ and ‘de-paradoxalize’ themselves. The ultimate goal of functional analysis is to compare these functional equivalents on their dysfunctionalities, as can be illustrated by means of the statement that ‘complexity leads to selectivity, selectivity to selections, selections to contingency and contingency to risk’ (Luhmann, 1984, p. 47). The notion of function as used by Luhmann is different from what is generally defined as function within functionalistic social systems theory. Contrary to Parsons, Luhmann considers functions not as mechanisms that produce social order. Instead, function is considered to be a regulative heuristic scheme to compare the ways social problems are solved and to observe the unintended consequences of these functional equivalents (Luhmann, 1974, p. 14). The unity of theory and method is established through the fact that social systems theory regards complexity as the ultimate problem of social systems and the functional method focuses on problems and solutions of social systems in this respect.

The main implication for second-order observation is that some functional frame of reference is necessary to compare various functional equivalents to each other, whether this frame of reference is available beforehand or is the result of empirical explorations. Consequently, first-order observation relates to the observation of social phenomena as an *insider* and second-order observation relates to the observation of these phenomena as an *outsider*. Both types of observations, however, are self-referential and are as such paradoxical: as an insider

you remain an outsider to the organizations observed and as outsider you remain an insider to the scientific system. Due to these paradoxes, both first and second-order observation have their blind spots or un-decidabilities of which a social researchers needs to take account. The un-decidability of first-order observation is that you cannot know if your observations truly grasp the specifics or not of the communications of the social systems observed. Likewise, the un-decidability of second-order observation is that you cannot know whether your observations or reflections on the blind spots of first-order observations are true in the sense that they get acknowledged by the scientific system. This implies that social systems theory explicitly subscribes to the fact that there is no meaning with respect to social reality, which is not shadowed by the ignorance it sustains (Baecker, 2001: 71). The first-order methodological problems were ‘solved’ by means of letting the participants communicate about several strategic issues. Besides this interference, the inquirer interfered to keep the autopoiesis or self-reproduction of the communication about the strategic issues going on. Lastly, the inquirer interfered when the sensemaking with respect to a strategic issue had come to a closure, whether the participants agreed that they agreed or whether they agreed to disagree. The second-order methodological problems were dealt with by means of a configuration theory (Vos, 2002, p. 90-103) that enabled the comparison between the strategic reality as observed by the companies and an ideal-typical description of various strategic realities dependent on the business-type enacted.

Findings of First-Order Observations

The first-order observation of the strategic self-description of the suppliers involved, was done by means of group interviews based upon a standardized research tool that enabled the ‘verstehen’ and ‘mißverstehen’ of the strategic communication within the resource limits of the research. This research tool modeled the way self-reference was unfolded with respect to of six strategic decisions, three of which were oriented externally (business, added values and

competitive moves) and three of which that dealt with internal issues (capabilities, assets and operating procedures). The resulting strategic self-descriptions were ‘triangulated’ by means of brochures of the companies that were aimed to inform potential customers. Each brochure contained a self-description of the businesses and the capabilities of a company and consisted of both written and photographic material. As such, these brochures could function as supplemental evidence to determine how the companies unfolded self-reference with respect to the business/capability-distinction and made sense of ESI in the process.

The strategic self-descriptions of these companies are too comprehensive to present them here in full detail. As such, the results of the first-order observations are reduced to the way the business/capability-distinction (Figure 1) was asymmetrised and are presented in Table I.

Insert Table I about here

From this table it appears that each supplier has unfolded self-reference with respect to the business/capability distinction with a preference for the capability-side of the distinction. This, however, seems to make sense. From the self-descriptions it appeared that, for jobbers to be jobbers, the self-reproduction of their capabilities on a continuous basis by means of acquiring and carrying out assignments secures their existence. That is, because of their capabilities the elemental operations or communications become ‘anschlußfähig’ or connectable to each other throughout time. As such, it comes as no surprise that the business/capability distinction is asymmetrised by enacting capabilities first instead of businesses. Supplemental evidence for this observation of the way jobbers create meaning can be found in their brochures. The pictures contained in the brochure of each company particularly highlight characteristics of the members and the production equipment of the organization (see for example Figure 4).

Insert Figure 4 about here

With respect to the future strategic self-descriptions a more differentiated view appears. One company has asymmetrised the business/capability-distinction by enacting capabilities (case 4) and four by means of enacting businesses (case 1, 2, 3 and 5). The preference of the latter group of suppliers to strategically focus on businesses was accounted for by means of the argument that the capabilities were of course of prime importance but that the acquirement of assignments related to ESI were also indispensable for the development of the necessary capabilities. Note that this in fact a reformulation of the underlying chicken-and-egg problem of Figure 1. The management of the company that enacted the capabilities first, argued that the company should acquire assignments in the future only for the prototyping of products to be manufactured and assembled in series by others, even when this meant a formal leave of the present business strategy and a loss of employability.

Despite these dissimilarities between both groups of suppliers, there is also a similarity to be found. All suppliers have defined future strategies that radically break with their past strategies. The suppliers of case 3, 4 and 5 highlighted that, due to the high wages in the Netherlands, the production in series of the products of their customers should be moved to low-wages countries in the near future. Staying ahead of competitors was the main reason for the suppliers of case 1 and 2 to redefine their strategy. Comparing the past and future strategies, it appeared that each supplier aimed to maintain the existing relationships with customers. That is, the ‘dominant logic’ is the reproduction of the present customers in the future strategy (alternative I of Figure 3). Within case 4, alternative I-B was to chosen to make sense of ESI and within case 1, 2, 3 and 5 alternative I-A was chosen.

Findings of Second-Order Observations

The second-order observation of the strategic self-description of the suppliers involved, relates to the observation of the blind spots or un-decidabilities of their future strategy. The question to be answered therefore is to which extent the suppliers involved have ‘de-tautologized’ and ‘de-paradoxalized’ themselves successfully. In short, what is the ignorance sustained by the way the suppliers communicate about ESI?

Within case 1, 2, 3 and 5, each supplier has defined its future business as dealing with the engineering, manufacturing and assembling of products or parts of products owned by their customers. In contrast to their present business, the focus is now not upon the realization of products only but on the design and realization of these products. That is, these suppliers use ESI as a means to enhance *both* the functionality *and* the manufacturability of the products of their customers. The necessary future capabilities, however, are defined in very general terms as engineering, manufacturing and assembling technologies. In fact, the suppliers have defined their capabilities in the same terms as they define their businesses. As a result, while being busy with making sense of ESI by means of the business/capability-distinction, the distinction between functionality and manufacturability re-entries within the capability part of the former distinction (Figure 5).

Insert Figure 5 about here

Consequently, the suppliers stumble upon another chicken-and-egg problem: *the capabilities necessary to enhance the functionality of the customer’s products depend on the capabilities necessary to enhance the manufacturability of these products and vice versa*. The occurrence of this chicken-and-egg problem is a sign that the suppliers of case 1, 2, 3 and 5 have failed to ‘de-tautologize’ the capability part of alternative I-A (Figure 3). It seems that these suppliers

have become stuck in a ‘capability trap’: *the paradox that they have defined their future capabilities by not defining them*. As a consequence, the un-decidability of the ESI-strategy employed relates to the capabilities necessary to enhance *both* the functionality *and* the manufacturability of the products of their customers.

Within case 4, the supplier has not chosen to focus on both the functionality and manufacturability of products or parts of products. This supplier enhances only the manufacturability of the sheet metal subassemblies and products of their customers. In order to enhance this manufacturability, the supplier aims to realize a prototype of subassemblies specific to the customer that can be manufactured both effectively and efficiently in series by other parties in countries with low-wages. For this reason, this supplier has defined ‘Design-for-Assembly’ as its main future capability. It seems, however, that the supplier has not defined the prototypes to be realized in great detail. That is, the supplier has not chosen yet the manufacturability of which prototypes should be enhanced. As a result, while being busy with making sense of ESI by means of the business/capability-distinction, the distinction between prototypes ‘Design-for-Assembly’ (DFA) re-entries within the business part of the former distinction (Figure 6).

Insert Figure 6 about here

The main difference between the chicken-and-egg problem of Figure 5 and Figure 6 is that within the former, both sides of the distinction remain ‘tautologized’, whereas in the latter only one side of the distinction remains a tautology. For this reason, the supplier of case 4 has only failed to ‘de-tautologize’ the circular argument that *the prototypes to be realized depend on the prototypes to be realized*. As a consequence, paradoxically, it seems this supplier *has and has not* succeeded in asymmetrizing the business part of alternative I-B (Figure 3). That

is, the ignorance sustained by the way of observation relates to the prototypes of which the manufacturability should be enhanced by means of DFA.

The last step of the functional analysis of the way jobbers make sense of ESI involves a comparison of the functional equivalents observed within the case studies to determine the risks involved with the blind spots of these functional equivalents. This means that the blind spots should be observed by means of another way of observation that puts the attempts of the suppliers involved with the case studies in perspective. For this, the distinction between suppliers which offer capabilities in *designing* artifacts (e.g. firms of consulting engineers) and those which offer capabilities in *realizing* artifacts (e.g. jobbers) presents itself (Van Gunsteren, 1987; Vos et al. 1998; Vos, 2002). Companies that recursively solve design-problems throughout time, can become capable in applying solution-principles (e.g. the use of gravity to position objects) independent of the specific goods or services designed for customers in the here and now (Vos, 2002, p. 97). Likewise, companies that recursively realize designs throughout time, can become competent in applying realization-principles (e.g. the use of lathing to realize rotation-symmetric objects) independent of the specific goods or services realized for customers in the here and now (Vos, 2002, p. 97). Because these companies become capable in applying their knowledge and skills independent of specific assignments by means of reflexivity and reflection, they can deal with the ignorance sustained with respect to the specifics of the artifacts to be designed, respectively realized.

Paradoxically, jobbers seem to *function* because of *their ability to deal with their inabilities*.

The ignorance sustained by the suppliers involved with case 1, 2, 3 and 5, relates to the specifics of the capabilities to enhance both the functionality and manufacturability of products of their customers. In terms of the distinction between offering capabilities in designing and realizing artifacts, these suppliers try to enact two distinct business-types at the same time, which leads to the oscillation between necessary solution and realization-

principles, which may lead to the inability to reproduce the application of these principles independent of specific assignments, which may lead to the inability of the organization to function as a whole. As turned out from our empirical observations, most suppliers experience severe difficulties in acquiring assignments of customers to make their planned strategy a success. Therefore, ironically, it seems as if these suppliers jeopardize or risk their existence by means of the way they try to remain existent.

The ignorance sustained by the supplier of case 4, relates to the specifics of the prototypes of which the manufacturability should be enhanced by means of DFA. Using the explanation or description of the recursive self-reproduction of capabilities in realizing, it appears that this ignorance or un-decidability is a *conditio sine qua non* for jobbers to function properly. To bring the functional analysis of this specific ESI-strategy to a close, it appears that the risks involved with the blind spot of the ESI-strategy are inherent to the functioning of this prototyping-strategy and manageable because the recursive self-reproduction of the capabilities seemingly takes place independent of the prototypes to be developed.

Discussion

One may wonder, on this point, how Japanese suppliers within the automotive industry have succeeded in preventing the capability trap. After all, it appeared, from the automotive studies concerning Japanese supplier involvement in design, that 51% of the total engineering hours were spent by suppliers (Clark et al, 1987, p. 741; Womack et al, 1991, p. 157). Apparently, this fact becomes unexplainable when we take into consideration that only 8% of the engineering related to 'supplier proprietary parts' (Clark et al, 1987, p. 741; Womack et al, 1991, p. 157). These are parts that are 'developed entirely by parts suppliers as their standard products' (Clark et al, 1987, p. 741). This implies that 92% of the engineering done by suppliers related to parts and subassemblies owned by car manufacturers. Have these suppliers found some kind of magic strategic alternative to stay out of the capability trap?

On closer inspection it appears that of this 92%, 62% relates to ‘black box parts’, i.e. ‘parts whose basic engineering is done by automakers, while detailed engineering is done by parts suppliers’ and 30% to ‘detail-controlled parts’, i.e. ‘parts developed entirely by car makers from basic to detailed engineering’ (Clark et al, 1987, p. 741). Apparently, the latter category relates the supply of parts where ESI is not a standard practice and, therefore, the detail-controlled parts can be regarded as ‘standard’ jobbing practices, i.e. the manufacturing (*not* the engineering) of parts according to the specifications of customers. This leaves still 62% involvement of suppliers in engineering to be explained.

One reasonable explanation is that the detailed engineering of the black box parts concerns the re-engineering of parts with respect to their manufacturability. That is, changing the design such that it becomes more effective and efficient to manufacture. The fact that suppliers are capable to do this, is not surprising because suppliers offering capabilities in realizing to their customers, become capable in applying their technologies independent of the goods or services realized in the here and now. In other words, these suppliers become capable in the evaluation of the drawings of designs with respect to their manufacturability. Therefore, the capability of suppliers in detailed engineering could more appropriate be labeled production engineering (Clark et al., 1987, p. 734). The involvement of suppliers in production engineering has, however, nothing to do with improving the functionality of product designs of customers. Therefore, it can be concluded that Japanese suppliers involved with ESI, did not find a magic strategic alternative to stay out of the capability trap in designing and realizing the products of their customers. That is because Japanese suppliers of detailed controlled parts do not focus on the functionality of the product designs of their customers. Another interesting conclusion that can be drawn from our analysis, relates to the apparent fact that during the automotive studies no Japanese suppliers were involved in improving *both* the functionality *and* the manufacturability of the designs of their customers. It would be

interesting to know whether this is changed during the last decade. Unfortunately, literature that is just as comprehensive on various kinds of ESI and as detailed in its measures on product development as the paper by Clark et. al (1987) is fairly rare. Most literature relates to ‘component suppliers’ and not to suppliers involved with offering capabilities in manufacturing (e.g. McCutcheon et al., 1997; Wasti & Liker, 1997; Afuah, 2000; Takeishi, 2001). An exception to this rule is the paper by Bidault et al. (1998). In this paper, the extent to which manufacturers adopted ESI in their product development process is explored. The authors distinguished between five levels of ESI (Bidault et al., 1998, p. 727). It appears that 87% (level 1, 2 and 3) of the ESI-practices of suppliers relates to production engineering. The ESI-practices of level 5 relate to component suppliers or what Clark et al (1987) label ‘supplier proprietary parts’. In addition, these figures highlight that no suppliers were active in designing and manufacturing parts or components (level 4). So just as with the Japanese automotive studies, this study indicates that it is not a common practice for suppliers offering capabilities in realizing to their customers to focus on both the functionality and the manufacturability of product designs.

Conclusions

From this empirical research, it appears the preference of researchers involved with ESI to focus on the perspective of OEM-companies, has prevented researchers from observing how the suppliers to these companies struggle to make sense of ESI. In that respect, this empirical research is as a first attempt to fill this void. Further research, however, is necessary to observe the inherent risks involved with the strategic alternatives to ESI (II-A and II-B of Figure 3), which were not observed in the sample of suppliers busy with making sense of ESI. The findings of our study are also of importance to OEM-companies because it offers them an alternative to involve suppliers of detailed controlled parts earlier in the development of their products. That is, OEM-companies can put into action these suppliers as pilot plant for the

development of more efficient and effective ways to produce subassemblies, i.e. to make business of enhancing the manufacturability of product designs, which implies both improving the design and the production methods. For jobbers or suppliers of detailed controlled parts, this strategic maneuver to ‘design for manufacturability’ (Wheelwright & Clark, 1992) could imply that, once the prototypes are accomplished, the recurring production of series could be contracted out to manufacturers located in countries where labor costs are lower.

Within this empirical application of the social systems theory, it seems worth noting that we have considered suppliers to experience both agency and structure. According to Pfeffer, most strategy researchers view organizations as isolated units confronting a faceless environment (Pfeffer, 1987, p. 120). In system theoretical terms this implies a preference to observe the system/environment-distinction as a re-entry within the system-part of the same distinction. That is, observing the way organizations observe themselves as being autonomous towards their environment. Naturally, the re-entry within the environment-part of the system/environment distinction is also possible. The former alternative suggests that organizations have ‘strategic choice’ (Child, 1972 & 1997), whereas the latter re-entry suggests that organizations are subjected to ‘strategic contingency’ so that there is little choice (Donaldson, 1985 & 1997). By means of social systems theory and functional analysis, both perspectives can be observed because social systems are considered to be autonomous with respect to their environment (Luhmann, 1984, p. 478) but at the same time they are forced to deal with their environment (Luhmann, 2000a, p. 15). As such, social systems theory seems to offer organization researchers an interesting alternative to renew the long-standing structure/agency-debate. The view of social systems theory in this respect is very much in line with what is called ‘the paradox of human agency’: human agency becomes human bondage because of the very nature of human agency (Dawe, 1979, p. 398). This appeared also from

our empirical investigations because the suppliers involved became trapped in their own structures of meaning both because and despite of their agency.

Our findings illustrate the importance of managers to enact strategic decisions symbolically (cf. Weick, 1987). In this study strategic decision-making was framed as a phenomenon that involved communication by a group of managers rather than the actions of individual managers and as such offers a way to observe decision-making not from an humanistic or subjectivist point of view. As such, social systems theory may be of benefit to the sensemaking perspective of Weick. After all, while Weick regards sensemaking as self-referential (Weick, 1995, p. 23), the role of self-reference is not elaborated on much further by him and as a consequence rigorous empirical research after sensemaking remains quite difficult.

Until now, social systems theory has got a chilly reception in organization studies, if it is referred to altogether. Mingers (2002, p. 119) for instance criticizes Luhmann's idea of decisions being the elemental operations of organizations for being old-fashioned. However, this should not be read as if decision-making is the elemental operation of managers (cf. Simon, 1960). In terms of Luhmann's social systems theory this view of decision-making involves the reduction of communication to the actions (decisions) of persons (Luhmann, 1984, p. 240). Observing decision-making from an autopoietical perspective highlights the significance and insignificance of managerial control, a 'myth' that is enacted by both managers and subordinates (Luhmann, 2000b, p. 138-139). As such, social systems theory appears to be far from old-fashioned. The critical remarks of e.g. Stacey should be considered as major ill-readings of social systems theory. Stacey has missed the point when he states that 'Luhmann splits communication off from human bodies' (Stacey, 2001, p. 242). That is definitely not the case because within social systems theory, body language (in the sense of an utterance) is as important as it is for Stacey. In addition, the 'focus on the conservation of

identity' (Stacey, 2001, p. 242) does not apply to social systems theory. After all, as was illustrated within this paper, its identity is something a social system cannot identify while identifying it. Therefore, ironically, Stacey the view of organizations as 'complex responsive processes' seems to be more in agreement with social systems theory as he is willing to admit. Lastly, our observations are self-referential also, which indicates that our findings do not exist independent from our way of observation. That is, we have 'verletzt' or injured the reality as experienced by the companies involved in the very act of observation. What could we have differently? From theoretical perspective, we could have observed not only the *content* of strategy but also the strategy *process* and *context* (Pettigrew, 1987). Notwithstanding this observation, in comparison to the strategy process (e.g. emerging strategies) and strategy context (e.g. corporate governance), research that deals with the way organizations enact strategic concepts is rather under explored. It is our opinion that the 'micro view' on communication as offered by social systems theory, is pre-eminently suitable to observe the way organizational members enact strategic concepts to make sense of the system/environment-distinction (see also Henry & Seidl (2003)). From a methodological perspective, we could have chosen not to do interviews to carry out our first-order observations. In that case, the strategic self-descriptions would not have been related primarily to the communication between the researcher and the managers but foremost to the communications between the managers. As such, 'truer' or less injured self-descriptions would have been possible. For this reason, more research is necessary to observe the ignorance sustained by our way of observation. Consequently, we can only preliminary presume that jobbers that wish to engage in ESI and try to improve the functionality as well as the manufacturability of the product designs jeopardize their self-reproduction. So perhaps practitioners should not take our findings to seriously (i.e. except for this statement). After all,

ironically, the blind spot of the first-order observer is the construction of the second-order observer.

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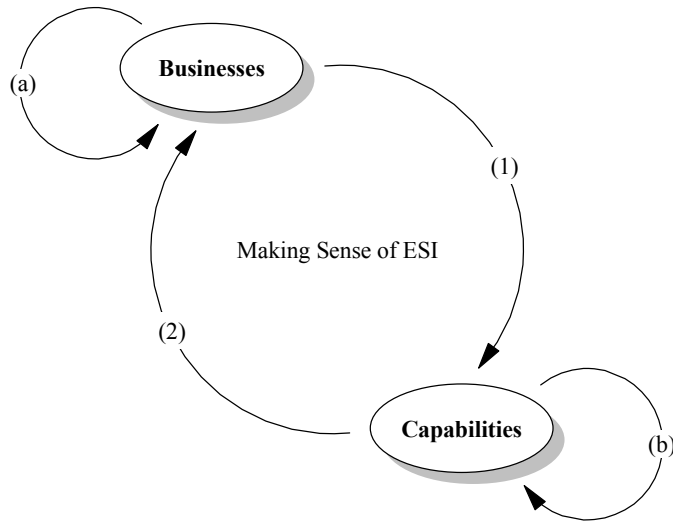


Figure 1: The Business/Capability-Distinction

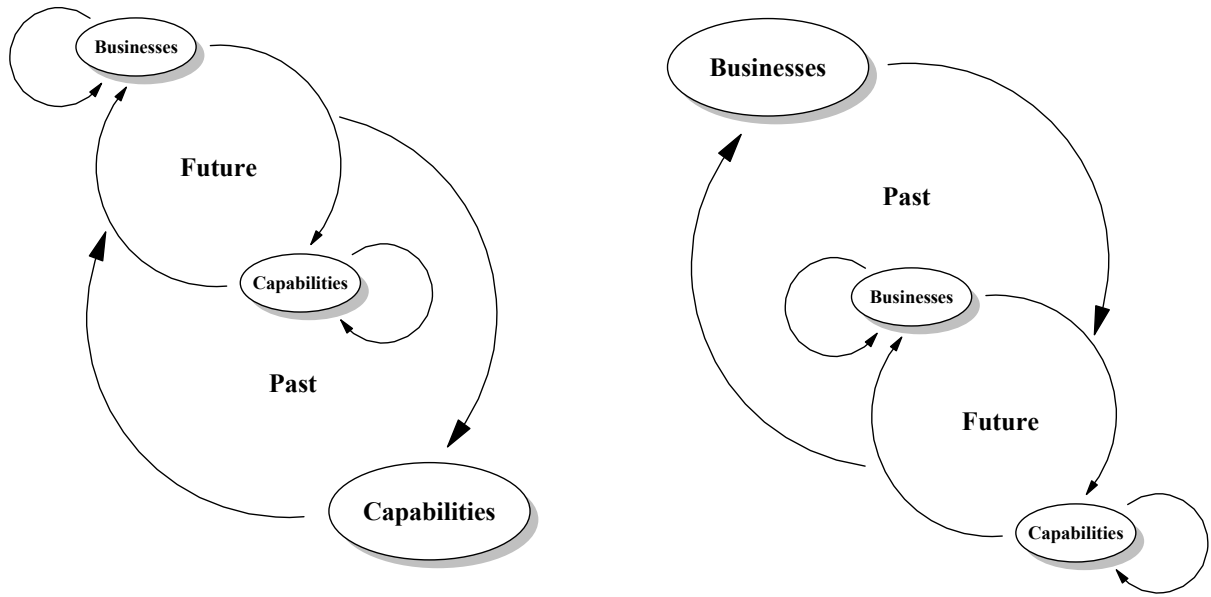


Figure 2: Re-Entry of the Business/Capability-Distinction into the Distinction

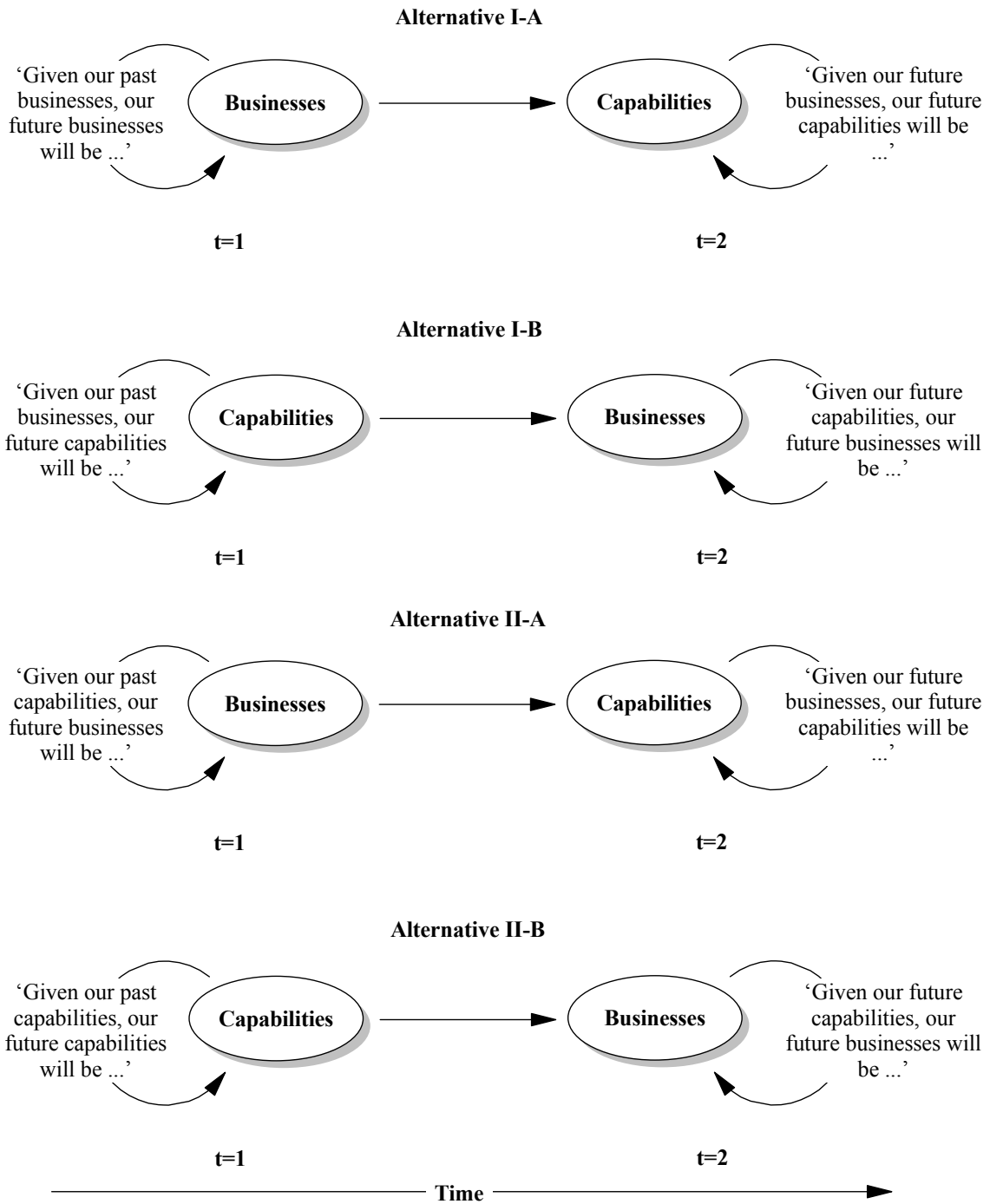
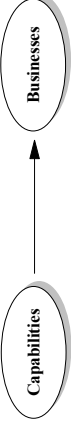
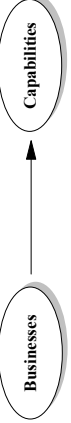


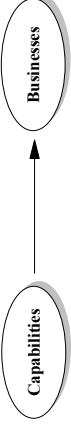



Figure 3: Four Alternatives for Jobbers to Make Sense of ESI Self-Referentially

Case	Present Businesses and Capabilities	Strategic Asymmetry	Future Businesses and Capabilities	Strategic Asymmetry
1. Precision Machining	<p>Manufacturing high quality machine units, special machinery and high-precision components for third parties (business) by means of high-precision metal machining technology (capabilities)</p>	<p>Strategic focus on capabilities because the businesses are made dependent of the technology offered</p> 	<p>Engineering, manufacturing and assembling high quality machine units, special machinery and high-precision components for third parties (business) by means of high-precision metal machining technology (capabilities)</p>	<p>Strategic focus on businesses because the capabilities are unaltered with respect to the present strategic self-description (alternative I-A)</p> 
2. Metalworks	<p>Manufacturing singular product parts made of carbon, sheet metal, special steel and steel strips for third-parties (business) by means of stamping technology (capabilities)</p>	<p>Strategic focus on capabilities because the businesses are made dependent of the technology offered</p> 	<p>Engineering, manufacturing and assembling safety-related subassemblies of automobiles for third-parties (business) by means of manufacturing, assembling and engineering technologies (capabilities)</p>	<p>Strategic focus on businesses because the capabilities are made dependent of the subassemblies to be designed and realised (alternative I-A)</p> 
3. Sheetmetal	<p>Manufacturing cases of products for third parties (business) by means of sheet metal technology (capabilities)</p>	<p>Strategic focus on capabilities because the businesses are made dependent of the technology offered</p> 	<p>Engineering, manufacturing and assembling products for third parties (business) by means technologies not yet decided upon (capabilities)</p>	<p>Strategic focus on businesses because the capabilities are made dependent of the subassemblies to be designed and realised (alternative I-A)</p> 



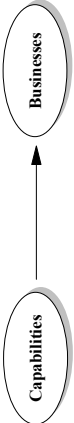
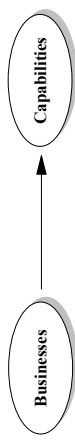
Case	Present Businesses and Capabilities	Strategic Asymmetry	Future Businesses and Capabilities	Strategic Asymmetry
4. Sheetmetal Prototyping	Manufacturing singular and complex ferro and non-ferro product parts for third parties (business) by means of sheet metal technology (capabilities)	Strategic focus on capabilities because the businesses are made dependent of the technology offered 	Engineering, manufacturing and assembling of proto-types of sheet metal subassemblies and products for third parties (business) by means of Design-for-Assembly (capabilities)	Strategic focus on capabilities because the businesses are made dependent of the technology offered (alternative I-B) 
5. Cable-Assemblies	Manufacturing cable-assemblies for third parties (business) by means of stripping and crimping technology (capabilities)	Strategic focus on capabilities because the businesses are made dependent of the technology offered 	Engineering, manufacturing and assembling of proto-types of cable-assemblies and electronic equipment (business) by means of means engineering, manufacturing and assembling technologies (capabilities)	Strategic focus on businesses because the capabilities are made dependent of the subassemblies to be designed and realised (alternative I-A) 

Table I: First-Order Observation of Past and Future Strategies of Jobbers¹ Making Sense of ESI

¹ The names of the companies involved with the case studies are fictive.



Figure 4: A 'typical' Way Jobbers present themselves to the outside World

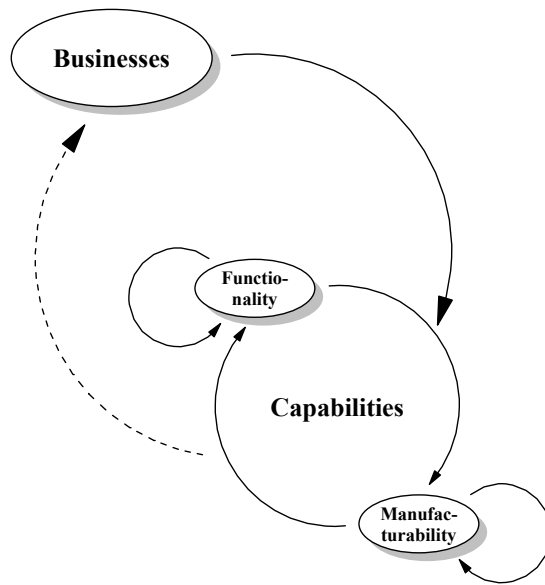


Figure 5: Another Chicken-and-Egg Problem

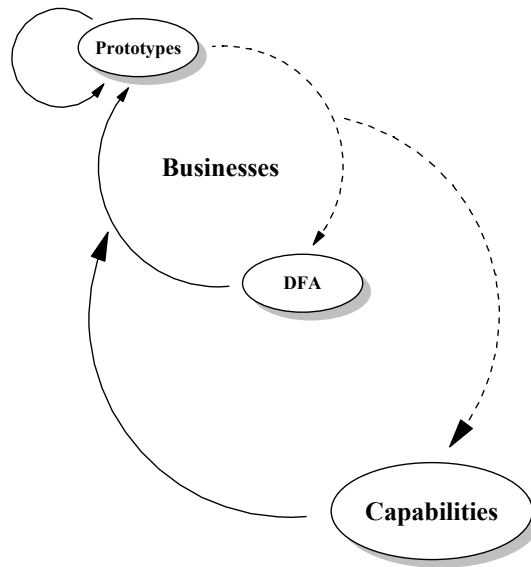


Figure 6: Another Chicken-and-Egg Problem



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