# ON THE ANALYSIS OF VERTICAL INTEGRATION
## an Alternative to the Fisher Body Case

*Bengt Högberg,*
*Department of Management & Economics*
*Linköping University,*
*S-581 83 Linköping,*
*Sweden*
*Tel: +46 13 281000,*
*E-mail: bengt.hogberg@itec.se*

## Abstract
Does asset specificity explain vertical integration? The debate among transaction cost theorists draws on a case more than seventy years old. The present paper offers a modern case that contradicts the strength of the relationship between asset specificity and vertical integration. Instead, it points at the shortcomings of one version of transaction cost theory and discusses reasons why a co-operative relationship can be superior to vertical integration.

One of the issues often debated within transaction-cost analysis concerns the reasons for vertical integration. When those of us who are not transaction-cost theorists compare interpretations based on that theory with arguments derived from exchange, resource-dependence, or network theories, we tend to disregard that there is not one and one view only among transaction-cost theorists themselves. When we discuss whether firms incorporate critical functions through vertical integration, instead of organising them through various co-operative relationships with other firms, if market transactions are deemed unfeasible, then the transaction-cost alternative of explanation is predominantly based on Williamson´s works (Högberg 1998; Högberg 1999).

In 1987 there was a conference during which transaction-cost economists discussed, among other things, the reasons for vertical integration. The proceedings from that conference were published in Williamson and Winter (1993). The conference proceedings capture the essential differences between two groups of transaction-cost economists when it comes to the explanation of vertical integration.

Transaction costs can be defined as the costs of organising resources across markets (Demsetz 1993, p. 161). They pertain to the negotiating of and the securing compliance with the conditions under which transactions are carried out between firms. All other things being equal, the higher the transaction cost, the greater the impetus to remove the transaction from the market. This can be done by removing it entirely from the market and performing it in house - the case of vertical integration. There are also intermediate forms such as long-term contracts of a more or less incomplete nature. This means that not all issues are regulated once and for all in the contract but kept open in the sense that the contract specifies the conditions under which renegotiations can be triggered as well as the procedures for such renegotiations.

Williamson extended classical transaction-cost theory. His contributions were to have great influence on how transaction costs are defined and how they can be linked to forms of

regulation. However, two important building blocks in his theoretical fundament have caused controversy when it comes to their role in explaining vertical integration. Asset specificity was introduced as a (the) determinant of transaction costs. The specificity of an asset depends on the range of alternative ways of using that particular asset. The difference between the present and the next best use of an asset owned by one of two transacting firms represents the value that can potentially be appropriated by the other one and, hence, a transaction cost (cf. Klein, Crawford and Alchian 1978). The other dimension is the behavioural assumption of opportunism, "a deep condition of self-interest seeking that contemplates guile" (Williamson 1993, p 92). For example, asset specificity could make it possible for a supplier to act in an opportunistic manner that under certain circumstances could not be checked effectively through long-term contracts. Instead, the buying firm would, provided it has the resources, resort to vertical integration by acquiring the supplier or by setting up its own production of the parts in question. What matters in the extension of the classical analysis, is not so much the cost of negotiating a contract as the (potential) cost of enforcing the contract and, especially, the cost of its failure. That cost is defined as a function of asset specificity and opportunism.

Coase, and other "classical" transaction-cost theorists, criticised what they considered to be an over-simplified analysis of the issue. They did not subscribe to the view that asset specificity plays such an important role for determining whether a firm would integrate vertically or not. Demsetz (1993, p 166) stated that he was "not so sure that it costs (much) more to detail the terms of a contract when asset specificity is involved than when it is not.... Truth is, it is not a predictably significant variation in transaction cost that motivates the vertical integration solution offered by these authors (primarily Klein and Williamson – my remark). It is the presumption that losses are greater if an agreement fails when asset specificity is involved than when it is not". Evidently, Demsetz did not subscribe to the extended definition of transaction costs made by Williamson and others. Coase (1993) admitted that there would be a risk for opportunistic behaviour as a result of specific investments, but concluded that he had been more concerned about it than the businessmen he interviewed already during the thirties. He had found that the implementation of long-term contracts is commonly accompanied by informal arrangements not governed by contracts and concluded that the propensity for opportunistic behaviour is usually effectively checked by the risk of losing a business or the business reputation of the opportunistic party. Coase (1993, p. 72) stated: "Vertical integration is an important subject but as I said earlier I think we will be able to understand it better if we treat it within the context of a more comprehensive theory".

## The Fisher Body Case

The most frequently cited empirical basis of the discussion between the two groups of transaction-cost theorists was the Fisher Body case. In 1919 Fisher Body and General Motors signed a ten-year agreement according to which Fisher Body would, as sole supplier, manufacture automobile bodies for General Motors on the condition that Fisher Body invested in the very large and expensive stamping machines and the dies necessary for manufacturing metal bodies. These investments constituted high asset-specificity. The agreement had a price formula, which was of the cost-plus type (not including capital costs). The price could not be higher than the one charged to other customers and not exceed the average market price for similar bodies manufactured by other suppliers. There was also a clause about compulsory arbitration in case of disagreement over price. Klein and others claimed that the length of the contract in combination with the price formula created an

opportunity for Fisher Body to hold up General Motors when demand for closed metal bodies increased dramatically (Klein, Crawford and Alchian 1978; Klein 1993; Williamson 1981). The hold-up consisted of Fisher Body´s refusing to invest in labour saving technologies and to move production adjacent to General Motors´ assembly plant. The short-term gains for Fisher Body from acting opportunistically were interpreted to be higher than the costs of losing its business reputation. The transaction costs resulting from the hold-up and the terms of the contract induced General Motors to integrate backwards and acquire the remaining shares in Fisher Body that they did not already own (General Motors owned 60% of the shares). "Specific investments create the necessity for long-term contractual terms which, in turn, imply the rent-dissipating transaction costs associated with the possibility of contractually created hold-ups" (Klein 1993, p. 217).

Coase (1993, p. 71) argued that during his visit to General Motors in 1932 he was "told that the reason they (General Motors – my remark) had taken this action was to make sure that the body plants were located near the assembly plants". Coase also referred to another visit he had made. He had visited A.O. Smith the world's largest manufacturer of frames for automobiles and trucks. A.O. Smith did not have production units located closely to the assembly plants of their customers. The contracts were of an incomplete nature with provisions for renegotiations and adjustments to changing market conditions. Coase argued that by 1983 General Motors and A.O. Smith had co-operated for more than 50 years without attempts by General Motors to integrate backwards. The example of A.O Smith made Coase sceptical about the generality of the Fisher Body case. Klein (1993, p. 224) responded that there were two major differences between the cases. First, Fisher Body delivered bodies solely to GM, while A.O. Smith had several customers. Secondly, he believed it to be significantly larger economies of scale in the production of frames compared to bodies. Therefore, the cost of vertical integration would increase, if supplies to the other customers were not maintained.

## The Aim and Structure of the Paper

Although there are other empirical cases reported elsewhere (see e.g. Joskow 1993; Monteverdi and Teece 1982), one cannot escape the impression that an intensive discussion between high profile economists rests on a case that is about seventy years old. Even though there are economic principles, which do not change with time, managerial and information technologies have changed drastically. What would have seemed impossible in the twenties and thirties are now standard procedures. Thus, in order to investigate the potential relationship between asset specificity and vertical integration there is need for a "modern" case but one, which has clear similarities with the Fisher Body and the A.O. Smith cases. This paper attempts to provide such a case.

The present author is chairman of an industrial group, a subsidiary of which - Verkstäderna Weibulls AB - supplies frames to one of the world's largest manufacturer of buses – Volvo Bus Corporation.

This case represents a present-day situation in the commercial vehicle industry. As such it can offer additional empirical data that may contribute to solving the "within" transaction-cost controversy whether there is a causal relationship between asset specificity and vertical integration. But, that is not all; it is a case that can confront transaction-cost arguments with arguments from other frameworks such as exchange and interaction theory. It can contribute to explaining why so many cases do not lead to vertical integration despite asset specific

investments. Although the paper does not aspire to explain vertical integration, an explanation of why vertical integration does not happen can also be, at least a modest, contribution to what Coase called a more comprehensive theory of vertical integration.

The paper starts with a brief account of the historical development of the relationship between Weibulls and Volvo Bus. The aim is to give a background against which the contracts can be understood. The contracts are given a rather detailed description (in order to make it possible for the reader to form his or her own opinion). Thereafter, the three cases are compared using the variables relevant from an extended transaction-cost perspective. Finally, the analysis is widened to take other frameworks into account.

## Delimitations of the Paper

This paper is based on one case and cannot aspire to have a general applicability. It is true that comparisons are made with two other cases, but the information about these cases is abridged or fragmented. I do not have sufficient information about them in order to make all the comparisons that I would deem relevant. This will be evident to the reader from the succeeding sections of the paper. Having said that, it is also important to point out that those cases are only given sketchy accounts in the sources discussed here.

Another limitation concerns my own role. I do not write in the capacity of a researcher without ties to the subject under study. My role as chairman of the group not only creates difficulties relating to my own interpretations but also in relation to the answers I receive from people in our organisation. On the other hand, I have a unique opportunity to obtain important information about the company and its relations with its largest customer. It should also be mentioned that I have not made any interviews with Volvo Bus (so far), but I have participated in several of the most important negotiations.

There is information that for reasons of confidentiality could not be divulged in this paper. However, I have tried to take that information into account when writing the paper in order to avoid a situation in which relevant information is disregarded. Most of the information about the market for buses, Volvo's investments in Poland and its joint venture with a competitor of Weibulls has also appeared in newspaper articles, in which representatives of Volvo have been interviewed.

The paper does not discuss the costs of negotiating and maintaining the conditions under which frames are supplied to Volvo Bus – the "classical" transaction cost. This is an interesting issue in itself, but beyond the scope of the present if not of a future paper. However, it should be mentioned that it would be very costly and time consuming for Volvo to procure frames in a market each time an order is received from a bus operator. It is not a realistic alternative. Thus, the procurement of frames and bodies is a function that well illustrates the points made by "classical" transaction-cost economists.

Finally, little is said here about the day-to-day interactions between Weibulls and its customer. This is an important aspect of transaction costs, but limitations pertaining to the size of the paper make it necessary to refer that part to a "follow-up paper".

## The Historical Development – Abridged

Weibulls became supplier of frames to Volvo in the early seventies, and became part of the present industrial group in the early eighties. Then, production technology was quite labour intensive and flexible. Industrial and welding robotics were not in use. Volvo had a policy of spreading its procurement of each component on several subcontractors in order not to become too dependent on a single supplier. This policy applied to all businesses in Volvo including cars. The bus business was part of Volvo Trucks. The supply of frames to the main chassis plant in Sweden was divided between two suppliers, of which Weibulls was one.

The market for buses shows much less variation in demand than the market for passenger cars. It is also much smaller especially in terms the number of units produced. Economies of scale, although important, are considerably smaller than in the car industry (compare with Klein's argument concerning Fischer Body and A.O. Smith mentioned above). Buses can principally be divided into two groups: city buses and coaches. Local municipalities were the major customers for city buses. Coaches faced a more heterogeneous market including private bus operators and public ones.

The European bus manufacturers mainly concentrated on the supply of chassis i.e. the body was produced by independent body manufacturers. A firm such as Volvo was also involved in the business of producing bodies in order to deliver complete buses, but a majority of the chassis was shipped to other body manufacturers. They were often the ones having the direct contact with the final customer. A larger share of coaches than city buses went through independent body manufacturers. The coach operators were typically rather small firms and wanted special features. Building a body on a chassis was more of craftsmanship than industrial production.

Up to the early nineties Weibulls had enjoyed a rather benevolent business environment. There was little variation in demand, prices were adjusted with inflation and labour costs, and technological change was slow. Then came the business slump with cuts in public spending. Inflation fell drastically (and remained at a low level for the rest of the Millennium). Worldwide, the automotive industry embarked on a route towards cost cutting, but also towards considerable technological improvements. With some years of delay the same pattern spread to commercial vehicles, and last, to buses.

**Weibulls became sole supplier**

In 1992 Volvo Bus decided to have only one supplier of frames in order to reduce the price per unit. Weibulls came out victorious in 1993 in the race thanks to a lower price and a stronger relationship with Volvo's purchasing department. Weibulls had a better record in terms of economic criteria, while its competitor had been more compliant with the requirements of the chassis plant (having badly affected the competitor's profitability). The concentration of supplies to one manufacturer meant a doubling of volume and a considerable reduction in unit price. At the same time, Volvo Bus introduced a new planning and ordering system, which was to cause Weibulls severe problems. It increased drastically the number of variants of the basic models up to a level that existing systems could not cope with (software houses have yet to upgrade their systems to handle the requirements of Weibulls). This problem gradually increased and became acute two years later.

Weibulls invested along two lines in order to increase volumes: (1) "adding more of the same", and (2) introducing welding robotics i.e. automation. As a result, production became more Volvo-oriented i.e. it could no longer be switched to other customers as easily as

before. The increase in volume purchased by Volvo to some degree also drove out other customers, because Weibulls did not have the resources to make additional investments.

In 1995 Weibulls had effectively taken over as sole supplier of frames to Volvo Bus. That year marked a record high volume of frames not only because Weibulls was now sole supplier, but also because Volvo experienced a drastic increase in orders. Weibulls was not prepared for this extra volume and ran into delivery problems during the early autumn of 1995. On several occasions deliveries were late and even caused a stop at the assembly line of the chassis plant. There was also an increase in the number of quality errors. Management of Volvo's chassis plant complained vigorously to Purchasing. Weibulls had to improve quality, delivery reliability, and its technical level. It introduced a Kaizen-project that involved the entire company. Investments were made in improved logistics and production systems. A new managing director was appointed. There was a need for a general overhaul of the company. By late 1996 quality and delivery reliability began to improve considerably.

**New competition**

But, Weibulls was soon to face a new and severe threat. A British company specialising in advanced designs of cars and in racing had set up a joint venture with Volvo in order to design and manufacture cabriolets in Sweden. The British company had employed former Volvo people in leading positions. They presented the idea of making the production of bus chassis more efficient by using similar production and assembly methods that had been introduced in the car industry. This would mean a highly automated production process requiring large and specific investments that, in turn, would lead to increased capital-intensity and sensitivity to variations in volume. A new joint venture – majority owned by the British group – was formed with Volvo in order to explore the idea further. When the planning of a new model of coaches started, Weibulls and the joint venture were invited to submit their respective proposals for the frames. Weibulls´ solution was a more traditional one. Volvo Bus chose the competitor's alternative.

At this point of time Weibulls had lost some of its goodwill with Volvo Bus and also its position as sole supplier of frames. In addition, the new competitor was partly owned by Volvo.

**Investment abroad**

In 1998 Volvo Bus decided to invest SEK 400 Millions in its plant in Wroclaw, Poland. At the same time decision was made to transfer production from units in Austria, Germany, and Scotland. Volvo's European bus manufacturing would be concentrated to Sweden and Poland. Volvo's move was dictated by the necessity to cut costs. This could be done by concentrating production and to choose a low-cost country. The Wroclaw plant will not be limited to chassis only, but will also be building bodies. The idea is to integrate chassis and body in order to reduce lead-times and to achieve a more efficient industrial operation. Weibulls was asked to set up a plant to make frames adjacent to Volvo's own plant. Since this would induce considerable investments and a move abroad, Weibulls wanted a long-term agreement giving it the status of single supplier for city buses. Volvo was ready to enter into such a relationship provided that Weibulls agreed on price cuts.

Weibull´s efforts to improve its level of competence had favourable effects on quality and logistics, thereby restoring its goodwill with Volvo. In addition, also Weibulls gained access to the development side of Volvo Bus. Much can be achieved in the product development process by early consideration of the integration between the frame and the chassis. Today,

Weibulls is one of the five most important suppliers to Volvo Bus in terms of purchase value. On average the frame represents approximately ten percent of the production value of the chassis.

**The Contracts**

The structure of contracts and their general conditions are similar throughout the commercial vehicle industry. Usually, the contracts are organised in a hierarchical manner. Standard conditions, which apply to all suppliers, are outlined in a general contract. Another contract regulates issues that are specific to each supplier, for example prices, logistics, delivery times. There are also other agreements or written conditions e.g. environmental requirements, delivery plans. Usually, the manufacturer of commercial vehicles issues forecasts that cover several years. These are then broken down into annual forecasts etc. Final orders are placed not later than a certain number of days before delivery (the period from order to delivery has been shortened considerably in recent years). Generally, the buyer only assumes responsibility for the final order, not for the forecasts. The supplier has to make its own plans i.e. there is no contracted volume or price adjustments according to volume (not even if the buyer's forecasts miss the target significantly).

When Weibulls was made sole supplier in 1993, the parties concluded an additional agreement – a two-page contract, which would function as an umbrella for the type of agreements mentioned above. The new contract regulated the successive transfer of volume from the other supplier. The increase in volume motivated a considerable reduction of price per unit, a substantial portion of which was expected to emanate from proposals about product rationalisations made by Weibulls. Volvo would participate in the evaluations of these proposals and their implementation in production. Furthermore, the agreement said that Weibulls would make all investments except those, which concerned "type-bound equipment" i.e. equipment that is specific for deliveries to Volvo. Consequently, the change from two to one supplier was regulated in a two-page contract that did not specify the time duration of the single-supplier status except for the period of notice.

When negotiations started for an agreement covering the proposed investment in Poland, Weibulls wanted stronger guarantees than the old agreement had provided. Despite the exclusivity granted by the old agreement, Volvo had entered discussions about a new technology with an outside firm and had set up a joint venture with that firm while the agreement was in force. Weibulls had then been invited to participate in a race for the contract of the new coaches. Volvo had finally chosen the competitor's alternative. If Weibulls were to consider an investment in Poland, which would be of a substantial magnitude, a long-term agreement would be necessary.

Apart from the issue of the length of the contract, Weibulls was also concerned about variations in capacity utilisation. The variations in volume were expected to increase as a result of changes in the market structure (operators became larger and public operators were being privatised) and of the limitation of Weibulls´ exclusivity to city buses mainly. If orders grow in size, an assembly plant may not be able to process several orders at the same time but will have to carry them out sequentially. At the supplier side this will result in larger variations in capacity utilisation as a consequence of there being two suppliers: one for city buses and one for coaches. Furthermore, improved integration from frame to chassis and then to body will reduce lead-times and, hence, result in a fixed volume being manufactured in a shorter period of time than previously. This will also add to variations in capacity utilisation (if resources cannot temporarily be switched to other orders). However, Weibulls did not

manage to include in the contract a volume guarantee or a price formula that took into account such variations.

There is a strong trend in the commercial vehicle industry to cut costs. Also Volvo had begun to bring pressure on its suppliers in order to reduce prices considerably. In the specific case of Weibulls, Volvo also wanted a manufacturing unit adjacent to its own new plant in Poland. The bus manufacturers have taken up ideas from their automotive cousins. Today, it is quite common that the suppliers to the automotive industry have manufacturing units adjacent to their customers´ assembly plants.

Negotiations between Volvo and Weibulls started in early 1999. The parties agreed on a five-year exclusive agreement for city-buses and some other models. A set of agreements were signed: (1) a framework agreement that functions as an "umbrella" and in which the general aims are outlined, (2) a development agreement, and (3) an agreement outlining the specific delivery conditions.

The framework agreement mainly specifies the general aims of co-operation and a hierarchy between the various agreements. Most of the issues to be regulated between the parties were referred to the other agreements.

The development agreement should be seen in the context of the aim to improve the integration between market needs and the supply chain. Weibulls will play a role in this process by participating in the development of supportive structures both in terms of efficiency improvements and development of new concepts for structures. Of great importance is the relation between frame, chassis, and body i.e. the complete and assembled bus. The development agreement is not only a formalisation of previous informal co-operation, but represents something new and a challenge for Weibulls to expand the scope of its technical competence.

The contract about the specific purchase conditions is probably the most important of the agreements because it puts the general aims and words of co-operation in an operational context. Weibulls is given a five-year exclusivity for city buses and certain other buses as well as a first-priority option to supply frames in accordance with Volvo's globalisation programme. Weibull is granted this role as long as Weibulls remains competitive with respect not only to prices but also quality, technical capability etc. The agreement specifies a procedure that will apply, if Weibulls fails to live up to these requirements. Weibulls will then have a certain respite to rectify the deficiency before another supplier can take over the contract. However, Weibulls can initiate arbitration proceedings in order to have an independent evaluation of its competitiveness. Weibulls can also initiate discussions about price revisions, if business conditions change substantially. If the parties cannot agree on price adjustments, Weibulls has the right to terminate the agreement after a period of notice.

Weibulls undertakes to reduce its prices according to a time plan. There is also a target for additional but not compulsory price decreases resulting from product rationalisations proposed by Weibulls. These reductions are expected to be almost as large as the compulsory ones. Cost savings exceeding the targets agreed upon will not result in price reductions but will remain with Weibulls. The agreement also provides other incentives for Weibulls to make contributions regardless whether these contributions apply specifically to the cost of the frame or has a wider application e.g. for the customer's own production.

There is also a program for supplier development. The supplier agrees to improve on a number of dimensions such as quality, delivery precision, cost savings etc. The program for supplier development serves as part of a benchmarking program in order to ensure that the supplier continuously develops its business.

## Comparison with Fisher Body and A.O. Smith

The Weibull case will be compared to the Fisher Body and the A.O. Smith cases with respect to asset specificity and the contractual arrangements in order to find out similarities and differences that might affect the outcome of a transaction-cost analysis.

## On asset specificity

Table A-1 summarises dimensions that can be related to asset specificity. The size of the investment and its range of applications affect the absolute difference between the present and the next best use of a physical asset. Ceteris paribus, a large investment will probably generate a larger income stream than a small investment. The economic consequence in terms of writing off the book value will be larger. A small investment with no alternative applications is a minor problem comparatively.

Fisher Body invested in large stamping machines and dies. These represented very substantial investments. The stamping machines are specific to the car industry, but can be used for deliveries to different car manufacturers. The dies are customer specific. There is no explanation in the sources referred to here, why Fisher Body did not deliver bodies to other car manufacturers than General Motors. Coase (1993) mentioned that General Motors already owned 60% of Fisher Body prior to the long-term agreement. Maybe, other car manufacturers did not want to buy from a supplier who was majority owned by General Motors. A.O. Smith delivered frames for cars and trucks. It is not mentioned whether A.O. Smith made the girders or bought them from other suppliers (steel companies). The manufacturing and forming of girders are capital-intensive operations requiring very large investments in physical assets. Putting the girders together into frames is done through welding or a type of "riveting". The production of frames is by far less capital intensive than the manufacturing of the girders. However, Coase (1993, p. 71) mentioned that the frames were made "with expensive and highly specific equipment". Weibulls buys the girders from Japan. The girders represent the basis in a welded structure. This structure is becoming increasingly complex as a result of the buses becoming more advanced. Weibulls invests in robotics, lifting devices etc. As a consequence of these investments, manufacturing is becoming more capital intensive and less flexible, but not at all to the same degree as in the manufacturing of bodies. A.O. Smith had several other customers and so has Weibulls, but largely outside the commercial vehicle industry. However, Weibulls´ dependence on Volvo Bus is considerable. Deliveries to Volvo represent approximately 70 percent of total revenues.

One might conclude that Fisher Body's investments in stamping machines are larger and less flexible than the corresponding investments made by the other two companies, but that the major difference with respect to asset specificity arises from the investments in dies. Since Fisher Body apparently owned the dies, these investments led to high asset specificity. A.O. Smith and Weibulls are not the owners of the dies. Fisher Body's more narrow customer base would also affect the value of "the second best use" of its equipment. We can probably assume that Fisher Body had higher physical asset specificity than A.O. Smith and Weibulls. Fisher Body would have been more severely damaged by a loss of customer, all other specificities equal.

Klein (1993) attributed substantial importance to human asset specificity when he explained General Motors´ move to acquire the remaining shares in Fisher Body. My discussions with Weibulls´ technical staff revealed an important difference relating to the human competence involved. The bulk of the engineering in the manufacturing of bodies is in designing new dies as well as in planning and starting production. Complex frames require more of human related competence throughout the entire manufacturing process than in the case of bodies. There is also a larger number of variants of the basic models requiring flexibility and adjustments not only in terms of volume. It should be observed that a modern bus frame is much more complex than a truck or car frame. Weibulls has more or less transformed from a traditional subcontractor to a development and manufacturing organisation. The proportion of technical and logistics expertise compared to blue-collar workers has grown considerably during the past five years. However, higher competence is one thing. Another is whether this competence is limited in terms of its range of applicability. Expensive investments in highly skilled people with limited alternative use create human asset specificity. Asset specificity with respect to management and technical people is, in my opinion, not limited to Volvo's needs only. The situation might be somewhat different on the production floor. It is true that the increasingly leaner production and the introduction of a large number of robotics, forming lines of production for specific models, have improved the competence of the production personnel, but more specifically adapted to Volvo's needs. The fact that Volvo has taken a larger share of the capacity also limits the experience of different types of products.

There is also another type of human asset specificity: the one that pertains to learning and/or experience. When a new model is introduced, a new journey along the learning and experience curves starts. The manufacturer accumulates a "general" experience in making frames, but each new model, or even a modification of an existing one, leads to increased per-unit costs initially. These effects appear to be related to the level of engineering and complexity of the unit. Learning and experience effects are highly relevant to Weibulls. They are relevant to manufacturers of automobile bodies too, but the number of modifications and, probably, also model alterations are less frequent (even though the frequency seems to increase). The extent to which learning is specific to the present use of human and physical assets, it increases switching costs for both the supplier and the buyer.

All in all, it is difficult to draw definite conclusions as to which one of the companies has the highest human asset specificity. It seems that human asset specificity relates to different phases of design and production in Weibulls compared to Fisher Body.

Weibulls has made investments of a relation-specific nature. The investments are to a large extent the result of new opportunities for improving co-ordination with the customer. These opportunities were brought about by new technology, which was not available in the twenties or thirties. The new agreement between Weibulls and Volvo implies further mutual adjustments leading to increased relational asset specificity. This will bring Weibulls and Volvo closer together and increase switching costs. Site specificity could be a special form of relational asset specificity. Coase (1993) argued that the refusal of Fisher Body to move production adjacent to General Motors´ assembly plants was the main reason for General Motors buying out the Fisher brothers. Volvo wanted Weibulls to build its Polish plant within a couple of hundred meters of its own assembly plant. Weibulls was prepared to do this. However, as there were several problems with that particular site, Weibulls decided to choose another one, which was about 15 kilometres away from the Volvo plant. This will increase transportation costs, because the frames have to be loaded onto lorries instead of being driven "factory wise" from one building to the next. A plant adjacent to the buyer's restricts the

supplier's freedom considerably. This is an opinion that I have encountered during my discussions with our own people as well as other suppliers. It is not only a question of site specificity, which should not be ignored, but it improves the customer's ability to exert his power. The short distance makes it possible to visit frequently and on short notice. This might also hamper any possibility of attracting other customers.

My conclusions from comparing asset specificity between, primarily, Fisher Body and Weibulls (A.O. Smith is more similar to Weibulls), are that there is no convincing evidence that overall asset specificity would be significantly greater in the case of Fisher Body. However, there are differences as to the types of asset specificity involved. Fisher Body has larger physical asset specificity as a result of larger investments and their ownership of the dies. They only had one customer, which drastically reduced the "second best use of the equipment". However, we do not know why they did not supply bodies to other customers as well.

Furthermore, the question remains: for whom is asset specificity a problem? The one who owns or employs the specific asset might have a problem, because he cannot easily re-deploy his resources. If these resources are not easily replicated, the other party might have a problem too. Williamson argued that generally both parties are affected and that "buyer and seller make special efforts to design an exchange that has good conformity properties" (Williamson 1981, p. 555). We will return to this question in the next two sections of this paper.

## On the contracts

All of the cases concern products, which the buyer could not realistically purchase in a spot market. This is not only because the suppliers needed to make considerable investments in equipment that was more or less specific to the customer's requirements, but also because it would be costly and time consuming to negotiate a contract every time a bus or car manufacturer wanted to place an order. Therefore, the parties needed to establish a long-term relationship in which investments and prices were regulated according to some formula. This could be done through a contract or through vertical integration in terms of ownership. In all three cases the parties resorted to contractual alternatives. Only in one of the cases did a vertical integration later replace the contract (Fisher Body – General Motors). Table A-2 summarises the essential aspects of the contractual relationships between the three subcontractors and their customers. Again the information about A.O. Smith is limited and relates to the situation in 1970 (as reported by Coase 1993). The cases represent contracts of an incomplete type.

The Fisher Body-General Motors contract gave the supplier a long period of exclusivity without a price formula that effectively encouraged efficiency improvements. There were no real inducements or benchmarking procedures except for a condition that the price of the frames should not be higher than for those sold to other customers, or the average market price for frames manufactured by other firms (Klein, Crawford and Alchian 1978). In the A.O. Smith case prices were negotiated annually and renegotiated, if there were changes in designs or costs. This prevented automatic price increases making the supplies uncompetitive.

Weibulls has always negotiated prices for basic models. If variants of the basic models or design changes are introduced, new negotiations take place but only concerning the changes as such. Previously there has also been an element of automatic adjustment to inflation and

general wage increases. The new five-year contract does not have any such automatic increases. On the contrary, Weibulls´ contract includes compulsory price cuts as well as targets for further price cuts resulting from co-operative efforts. After the new contract in 1999, Weibulls assumes more of the market risk than previously. In exchange, the new agreement provides more opportunities related to development of new models and improvements in the manufacturing of existing ones. Compulsory price cuts were introduced already in 1993, but were then motivated by the increase in volume that was brought about by Weibulls´ status as a sole supplier.

If the three cases represent a development pattern of how prices are regulated, one can conclude that there has been a move from passive or automatic increases of prices towards a combination of compulsory price decreases and rules for re-negotiation of prices. Furthermore, inducements play an increasingly important role and they predominantly pertain to cost saving and development. There is a mixture of "stick and carrot".

Fisher Body had a ten-year exclusivity. Weibulls´ exclusivity is only five years. Nothing is mentioned about A.O. Smith's situation, but my general experience is that ten-year contracts are hardly ever concluded in the automotive business today. Consequently, Fisher Body – General Motors represents a type of contract that we will not come across anymore. Investments are depreciated during a shorter period of time because technical development has grown faster. Shorter contract periods imply more flexibility. Clauses, which lead to unintended and severe effects if conditions change drastically, can be renegotiated. This reduces the risk of contractually induced hold ups. It is true that Weibulls has agreed to compulsory price decreases, but it is also possible for Weibulls to terminate the contract prematurely, if the parties cannot agree on the price adjustments that Weibulls requires.

In the cases of Weibulls´ and A.O. Smith's there are hardly any salient provisions for contractually induced hold ups. Asset specificity is taken into account in terms of exclusivity specified in time and clauses that intend to assure competitiveness and flexibility. The parties have to make new agreements concerning certain key issues during the course of the contractual period. Weibulls´ first contract provided for a hold up, because it did not grant Weibulls exclusivity for a fixed period of time. When the new investment in Poland became an issue, Weibulls felt that they could not live with such a loosely structured relationship. Fisher Body was the only one of the suppliers who owned important type-bound equipment (in Fisher Body's case the dies). This gave Fisher Body a potential to hold up General Motors, but also represented a financial burden (increasing asset specificity). It is probably very rare that suppliers own such expensive and specific tools in the automotive industry of today. Volvo has the right to drawings and designs made by Weibulls in connection with the Product- and Process Development Agreement as well as a right to buy from Weibulls such type-bound equipment as Weibulls might own.

## Asset specificity, contracts and vertical integration

The analysis of the contracts revealed important differences between Fisher Body on the one hand and Weibulls and A.O. Smith on the other. In the latter cases contracts have been sufficient (and probably efficient) means to regulate the relationships with the customers. The Fisher Body case requires further analysis. Fisher Body demanded a long-term agreement in order to make the investments. Without such an agreement General Motors´ position would be very strong had they wanted to hold-up Fisher Body. The contract changed that picture completely. According to Klein (1993) and Klein et al. (1978) the price formula was

inadequate for securing General Motors´ interests when the immense growth in demand for closed metal bodies started. The agreement did not provide enough inducement for Fisher Body to invest in more labour-saving technology.[119] Why then, did General Motors not invoke the arbitration clause? We do not know whether other suppliers offered lower prices (and had made the necessary investments), thereby giving General Motors´ competitors an advantage. But, we can assume that, if the demand for metal bodies increased rapidly, the competitive market outside the General Motors-Fisher Body relationship would most certainly offer lower prices (provided that there existed independent manufacturers of bodies).[120] Surely, continued deliveries after 1929, when the contract was due to expire, should have meant much to Fisher Body.

Perhaps, General Motors did not pursue the matter of arbitration, because the issue of having its supplier adjacent to its own assembly plants was the overwhelming problem (as Coase argued). That issue was not covered at all in the agreement. Thus, at best the agreement provided for a solution to the price problem. But still, could Fisher Body really ignore the threat of losing its customer? Probably, not even Coase´s argument seems to have been the ultimate explanation of the vertical integration. In my opinion, General Motors´ majority ownership was an essential factor limiting General Motors´ range of alternatives. Maybe, the Fisher brothers just wanted to force General Motors to offer a very generous price for the remaining shares?

It seems very difficult to draw conclusions from the Fisher-Body case, because the information about the case is incomplete. The very fact that Fisher Body was to make an asset-specific investment would not "normally" have awarded it an agreement that gave it a strong hold-up potential.[121] The explanation offered by Klein is, in fact, not a clear causal relationship between asset specificity and vertical integration. It is an explanation that rests on the relation between an ill-considered agreement that, according to Klein, created a hold-up opportunity and the disadvantaged party's (the buyer) move to solve that problem by integrating backwards. Thus, the Fisher Body case hardly proves a causal relationship between asset specificity and vertical integration.[122]

---

[119] However, the sources available to me do not discuss if Fisher Body managed with their initial investments in stamping machines when demand started to grow. Did they not have to invest in additional capacity in order to meet demand? If so, were there "labour-intensive" alternatives available in the market? I am puzzled about Klein's (1993) argument here. Usually, when you invest in increased capacity, you choose a modern technology. The agreement only had a few years left before renegotiations. In order to position itself for the re-negotiations, Fisher Body should have conceded to a "pre-emptive" re-negotiation of the price formula in order to avoid future competition.

[120] The sources do not say anything about the procurement of bodies by the American automotive industry in the twenties. It is relevant for the analysis to know whether there were independent manufacturers of bodies or whether the car manufacturers made their own bodies. If there were no alternatives available in the market, General Motors´ situation would be more precarious than I have assumed.

[121] Maybe, other firms than Fisher Body would have been ready to make the investment without such a far-reaching agreement. But again, General Motors already owned 60% of Fisher Body.

[122] It is sometimes quite difficult to see the causal chain between asset specificity and vertical integration in the works by transaction cost theorists. Generally, it is the supplier who makes the asset specific investment, which leads to an integration backwards by the customer. Consequently, it is assumed that also the customer finds himself in an asset specific situation, but that does not necessarily follow from the supplier's asset specificity. Consider the case of an oil refinery, which enjoys the position of a regional monopsonist. The cleaning of its cisterns is done by an independent maintenance firm, which uses specially designed robotics. There is no market outside the refinery for this equipment and there are several suppliers, which are interested in and capable of performing the task. The supplier has made an asset specific investment, but the customer has a wide range of alternative suppliers to choose from. In such case a contract is entered with one of the potential suppliers, but the

In the A.O. Smith and Weibulls cases incomplete contracts have worked despite substantial asset specificity related to strategically important items.[123] Volvo and Weibulls have become increasingly interdependent and the cost of switching supplier would be considerable. In the short-term perspective Weibulls could hold up Volvo. It would take up to two years for a new supplier to take over and reach an acceptable cost level. If Weibulls tried to hold up Volvo, the business would be given to someone else, even if that would mean higher costs during a considerable time period. However, there has not been a single incident of a blatant threat to hold up Volvo. This is not to say that discussions about prices etc cannot be quite tough. Weibulls has to prove the force of its arguments. Nor have there been any attempts by Volvo to take over Weibulls. Is this because asset specificity is not large enough, that asset specificity is not a relevant explanation, or that the hold-up problem can be taken care of through an incomplete contract?

## An Extended Analysis

We have not found convincing support for the assumption that asset specificity is causally related to vertical integration. What we have found, is that firms about to make a large investment specific to the needs of an important customer strive for a long-term agreement with that customer in order to safeguard the investment. Having said that, we might do well in analysing the reasons for not integrating vertically by way of a take-over or a merger (instigated by the buyer or the supplier). Transaction-cost theory focuses on the costs associated with different types of governance structures. Little or nothing is said about how costs can be reduced within a specific mode of governance – particularly in a co-operative relationship. In a way this turns the problem around 180 degrees.

## Efficiency gains and their distribution

Of primary importance in the Weibulls-Volvo case is the work towards reducing costs. This concerns design and development, logistics, and production. Such cost reductions are not only a result of effects attributable to the learning curve in manufacturing, but also applies to the integration and co-ordination between the parties. For example, Volvo's design office used to supply the design drawings, which Weibulls converted into production drawings. However, the design drawings represented a restriction on the choice of the most efficient production set up, partly as a consequence of Volvo's design people not being experts on the

---

length of the contract will probably depend on the size of the investment made by the supplier. In this case the contract would probably be for 1-3 years.

[123] It was mentioned above that in Klein´s opinion economies of scale could explain why A.O. Smith remained an independent supplier. "There appears to be significantly greater economies of scale in producing automobile frames than producing automobile bodies, with Smith supplying frames then and now to multiple automobile manufacturers, thereby raising the cost of vertical integration as a solution to the hold-up problem (Stigler). It is also important to note that the investment in automobile frame production is, apparently, less buyer-specific than the investment in automobile body production." I do not entirely share these assumptions, at least not if the analysis concerns today's manufacturing technology. The capital intensity is considerably higher in body compared to frame manufacturing (provided that the production of "raw" girders is not included). This higher capital intensity affects the level of fixed costs and, hence, economies of scale. The manufacturer's vulnerability to volume (level and variations) increases. Therefore, I am of the opinion that economies of scale are not smaller in the production of bodies compared to frames and could hardly explain why vertical integration took place in the Fisher Body case and not in the A.O. Smith case. However, it seems unclear to me, whether Klein (1993) actually meant the technical reasons for economies of scale, or that the cost of taking over A.O. Smith would be higher, because A.O. Smith had other customers who might switch to new suppliers once General Motors had taken over. As a consequence, per unit costs would increase.

production of frames. This often led to long discussions about adaptations and redesigns. Now, Weibulls can participate in the design phase, or even make the design drawings, and take production efficiency into account already during that phase. The new agreement provides for such improvements and they are already being implemented. The costs of co-ordination are also decreasing as a result of improved software and competence in working together.

We do not face a situation with unchanged transaction costs particular to a specific mode of governance, but rather a dynamic process in which these costs are gradually reduced. As a result of this process an economic surplus emerges. Who is to reap the major share of the emerging surplus?[124] This is an issue for much discussion and manoeuvring between the supplier and its customer. The party, who has best access to information about the cost implications of the changes, will have an advantage, at least in the short-term. The supplier generally has an information advantage over the buyer, because he is the one who performs the function in question and he has no real competitors (sometimes a buyer invites other suppliers to quote, but there is no genuine competition for the order). This is one of the reasons why the buyer requires a program for pre-determined cost reductions. Consequently, we put forward the proposition that it is not so much a potential hold up that occupies the minds of the managers, but rather how to receive a satisfactory share of the efficiency gains that are achieved during the course of co-operation. In addition, the buyers are concerned about obstacles to achieving such efficiency gains (compare this with Volvo's and General Motors´ fears that their suppliers would not have sufficient inducements to cut costs).

There is the obvious argument that the same efficiency gains can be achieved, if vertical integration takes place. Then co-ordination will be brought about within one hierarchy. Large firms tend to decentralise operations in order to reduce management costs and increase incentives i.e. they try to introduce some market mechanisms. Thus, transaction costs will become an issue also within such firms. There is some empirical evidence indicating that transaction costs might even be higher with internal than external suppliers in a decentralised firm (e.g. Walker and Poppo 1991). The Weibulls-Volvo case shows that the buyer sees a large potential in close co-operation with the supplier. The price cuts that are expected from the technical co-operation are almost as large as the commercial ones. In addition, Weibulls´ initiative to a Product and Process Development Agreement is a reflection of Weibulls´ strong belief that it could improve efficiency more than in the mere production of the frames. To Weibulls, there is an untapped potential that Volvo has not exploited yet. Weibulls focuses its competence on the technology of welding and supportive structures. This is reflected in its top-management structure. Furthermore, Weibulls can benefit from relationships with other customers improving its core competence. Volvo would not have the same advantage. The production of frames would be an activity far away from the focus of top management. However, the other large Swedish manufacturer of buses, Scania, has chosen an in-house strategy. It would be interesting to compare the reasons behind the different strategies and their efficiency implications.

## Value creation

Ceteris paribus, transaction-cost theory predicts that efficient boundaries are drawn so as to minimise transaction costs (cf. Williamson 1981). The Weibulls-Volvo case shows that these

[124] This is not equivalent to the discussion about appropriable quasi rents in Klein, Crawford and Alchian (1978).

interfaces are not only a source of costs but that they can also represent a potential for value creation (cf. Zajac and Olsen 1993). I have already discussed the additional potentials in the Weibulls-Volvo case accruing from the co-operation in product and process development. These potentials are not only related to cost reduction but also to the creation of additional value in terms of improved functionality of the product. However, this aspect of the Weibulls-Volvo case rests more upon the intentions and beliefs of the partners than on ex-post results. It is still to be seen whether these aims can be turned into reality.

## Trust vs. opportunism

The behavioural assumption regarding opportunism is a cornerstone in the extension of transaction-cost theory. Opportunism is also strongly linked to the role accredited to asset specificity for explaining why a hold-up situation may occur. If one assumes a lesser inclination of man to act opportunistically, the rest of the structure of the extended theory becomes somewhat undermined. Coase (1993) claimed that he had considered the risk of fraud (one possible result of opportunism) already when he wrote the draft of "The Nature of the Firm" in 1934, but had dismissed it as an important explanatory factor. "Opportunistic behaviour is not necessarily fraud, although it may be, but in estimating the likelihood of opportunistic behaviour the same approach can be used. ... the propensity for opportunistic behaviour is usually effectively checked by the need to take account of the effect of the firm's actions on future business" (Coase 1993, p. 70f).

Transaction cost theory attaches limited importance to the social embeddedness in which economic processes take place (Granovetter 1985). In order to understand empirical observations of efficiency gains and value creation such as in the Weibulls-Volvo case, the scope of interpretation must be expanded so as to take into account social dimensions too. One such dimension is trust and another is equity. There is a rich literature about trust: how it is developed and what kind of efficiency effects it can bring about. Trust can refer to the other party's ability to do what has been agreed as well as that party's willingness to do it. The latter aspect can be regarded as the antonym of opportunism. Equity refers to the conditions of exchange and is a prerequisite for a trustworthy relationship. If the conditions of exchange do not reach a level of equity perceived to be satisfactory by both parties to the exchange, trust will barely develop.[125] The Weibulls-Volvo case shows that equity and trust play important roles in understanding the longevity of that particular co-operation and also for explaining the level of integration between the parties and, hence, the level of efficiency gains that can be achieved. There are empirical studies which have their roots in exchange theory and which show how trust enhances efficiency in inter-organisational relationships (eg. Lazerson 1995; Uzzi 1997). Larson (1992, p. 91) even found that over time successful "relationships began to resemble well-coordinated, vertically integrated units with established systems, procedures and modes of communication".

Others have stressed that trust is gradually built up as a result of interactions between individuals representing buyer and supplier (e.g. Håkansson 1982; Johansson and Mattsson 1987).[126] It should be observed that a deep co-operative relationship such as the one between

[125] This does not necessarily mean that a surplus resulting from efficiency gains has to be divided equally between the transacting parties in order to be perceived as equitable by both of them.

[126] As was mentioned in the section about delimitations, the day-to-day interactions between people in the two organisations have not been subject to study in the present paper. However, this in an area of great importance for a future analysis of the role played by trust in the relationship between Volvo and Weibulls.

Weibulls and Volvo is a result of almost thirty years of experience. A professional buyer does not enter a far-reaching contract with a supplier of non-standardised items without careful selection. Usually several suppliers are invited to submit offers. The first contract with the selected supplier is probably not very far reaching. The scope and depth of the relationship increase as a result of positive experiences. Therefore, the partner's inclination towards opportunistic behaviour will be tested before a close relationship is established. The extended transaction-cost analysis does not take this aspect into consideration and, as a consequence, overestimates the strength of opportunism.

## Real vs. hypothetical costs

There is also another weakness with the role attributed to hold-up as a transaction cost. The risk of a hold up is not a "real" cost unless it materialises i.e. it does not show on the profit and loss account of the firm. By including the hypothetical hold up as a cost in the analysis of the most efficient mode of governance, one runs the risk of choosing an alternative that is more costly than would be the case if no hold up occurs. That will definitely affect the profit and loss account. In a world characterised by a chase for cost reductions, the firms will focus on eliminating hold ups without having to choose an otherwise cost inefficient mode of governance. Classical transaction-cost theorists argue that the proponents of the hold-up concept overestimate its probability. Even disregarding the discussion above about the development of trust, we could well argue that the longer the period without attempts of a hold up, the lesser the parties will perceive the risk of a future hold up. The point of indifference between hierarchy and contract accordingly moves in favour of contract. In addition, time enhances integration and trust and, consequently, the potential for gradual increases in efficiency.

The cost of eliminating or managing the risk of a hold up is also considered to be a transaction cost. This aspect is in line with classical transaction cost theory. The Weibulls-Volvo case showed that much work was spent on designing the contractual framework so as to manage any potential for a future hold up. Evidently, this could be done without vertical integration. Just as Demsetz (1993), I am not so sure that this cost varies with the level of asset specificity. However, the Weibulls-Volvo case does not provide an answer to this question.

## Conclusions

The Fisher Body case is not a case one should choose in order to illustrate or make plausible a causal relationship between asset specificity and vertical integration. First, Fisher Body was about to make an asset-specific investment that would put them in a vulnerable position. The response by General Motors was to agree on a contract that reversed the vulnerability. Secondly, the contract had clauses that could remedy some of the problems caused by Fisher Body, but apparently General Motors did not take advantage of them. Thirdly, General Motors was a large shareholder in Fisher Body. They were not two independent firms. It is difficult to distinguish between transaction-cost implications and a possible battle over ownership. The Weibulls case illustrates and makes plausible that asset-specific investments make a supplier anxious to secure the stability of his relationship with an important customer and that an incomplete, long-term contract can make this possible.

It is the combination of asset specificity and opportunism that makes up the explanation of vertical integration offered by Klein and Williamson. If one relaxes their strong behavioural

assumption about opportunism, their statement becomes much weaker. There are both theoretical arguments and empirical evidence that stress the positive results of trust in inter-organisational relationships. The Weibulls case illustrates how a supplier and its customer can work closely together without having every detail regulated. There are substantial efficiency gains to be achieved from co-operation between, in terms of ownership, independent firms. The previous section of this paper discussed some potential reasons why such effects might be difficult to replicate in house.

However, it is important not to let the pendulum swing in the opposite direction and replace the assumption about opportunism in the extended transaction-cost theory with an equally strong and unrealistic assumption about trust. The Weibulls case shows that poor performance by the supplier can destroy previous high levels of trust and result in a somewhat opportunistic behaviour by the customer. This case also makes it clear that, from time to time, there are tensions between the parties concerning prices, capacity utilisation etc. Despite the fact that these products cannot be procured on a short notice in the market, there must be an element of competition involved in order to keep the relationship viable. The incomplete, long term contract between Volvo and Weibulls has mechanisms that are intended to safeguard the competitiveness of the supplier.

Most of the literature about inter-organisational relationships is not based on transaction cost theory. The extended analysis touched upon some of those frameworks that take into consideration the social aspects of interaction such as the exchange theory and the interaction approach.

## References


Coase, Ronald H. (1993), "The Nature of the Firm: Influence," in *The Nature of the Firm: Origin, Evolution and Development,* Oliver E. Williamson and Sidney G. Winter, eds. New York/Oxford: Oxford University Press, 61-74.

Demsetz, Harold (1993), "The Theory of the Firm Revisited," in *The Nature of the Firm: Origin, Evolution and Development,* Oliver E. Williamson and Sidney G. Winter, eds. New York/Oxford: Oxford University Press, 159-78.

Granovetter, Mark (1985), "Economic Action and Social Structure," *American Journal of Sociology,* 91, 481-510.

Håkansson, Håkan (ed) 1982, *International Marketing and Purchasing of Industrial Goods An Interaction Approach,* Chicester: John Wiley.

Högberg, Bengt (1998), "Interorganizational Relationships. On the Development of Three Frameworks," Linköping: IMIE, (presented at the 7th Nordic Workshop on Interorganizational Research, Linköping/Norrköping, August, 22-24, 1997).

---- (1999), "Research about Interorganizational Relationships: Articles in Administrative Science Quarterly", Competitive Paper presented at the 15th IMP Annual Conference in Dublin, September 2-4, 1999.

Johanson, Jan and Lars-Gunnar Mattsson (1987), "Interorganizational Relations in Industrial Systems: A Network Approach Compared with the Transaction-Cost Approach," *International Studies of Management and Organization,* 17, 34-48.

Joskow, Paul L. (1993), "Asset Specificity and the Structure of Vertical Relationships", in *The Nature of the Firm: Origin, Evolution and Development,* Oliver E. Williamson and Sidney G. Winter, eds. New York/Oxford: Oxford University Press, 117-37.

Klein, Benjamin, Robert G. Crawford and Armen A. Alchian (1978), "Vertical Integration, Appropriable Rents and the Competitive Contracting process," *Journal of Law and Economics*, 21, 297-326.

Klein, Benjamin (1993), "Vertical Integration as Organizational Ownership: The Fisher Body-General Motors Relationship Revisited," in *The Nature of the Firm: Origin, Evolution and Development,* Oliver E. Williamson and Sidney G. Winter, eds. New York/Oxford: Oxford University Press, 117-37.

Larson, Andrea (1992), "Network Dyads in Entrepreneurial Settings: A Study of the Governance of Exchange Relationships," *Administrative Science Quarterly*, 37, 76-104.

Lazerson, Mark (1995), "A New Phoenix?: Modern Putting-out in the Modena Knitwear Industry," *Administrative Science Quarterly,* 40, 34-59.

Monteverde, Kirk and David J. Teece (1982), "Supplier Switching Costs and Vertical Integration in the Automobile Industry," *Bell Journal of Economics,* 13, 206-13.

Zajac, Edward J. and Cyrus P. Olsen (1993), "From Transaction Cost to Transaction Value Analysis: Implications for the Study of Interorganizational Strategies," *Journal of Management Studies,* 30, 131-45.

Uzzi, Brian (1997), "Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness," *Administrative Science Quarterly*, 42, 35-67.

Walker, Gordon and Laura Poppo (1991), "Profit Centers, Single-Source Suppliers and Transaction Costs," *Administrative Science Quarterly*, 36, 66-87.

Williamson, Oliver E. (1981), "The Economics of Organization: The Transaction Cost Approach," *American Journal of Sociology*, 87, 548-577.

---- (1993), "The Logic of Economic Organization," in *The Nature of the Firm: Origin, Evolution and Development,* Oliver E. Williamson and Sidney G. Winter, eds. New York/Oxford: Oxford University Press, 90-116.

Williamson, Oliver E. and Sidney G. Winter, eds. (1993), *The Nature of the Firm: Origin, Evolution and Development.* New York/Oxford: Oxford University Press.

**Table A-1. Asset Specificity**

| Dimensions of asset specificity | Fisher Body | A.O. Smith | Weibulls |
|---|---|---|---|
| Component | Body<br>Car | Frame<br>Car/Truck | Frame<br>Bus |
| Customers | GM | GM-cars<br>Several-trucks | Volvo-bus<br>Several-welding |
| Physical assets | | | |
| - Investment | Large | Large | Medium↗ |
| - Specificity | Tools-Large<br>Machines-Medium | Medium | Low/Medium↗ |
| Human assets | | | |
| - Investment | Unknown | Unknown | Medium↗ |
| - Specificity | Medium | Unknown | Medium↗ |
| Relational asset specificity | Low-medium? | Medium? | Medium/High↗ |
| Location next to customer´s assembly plant | Refused | No<br>Yes-Poland | No-Sweden |

**Table A-2. Contracts**

| Dimensions of contracts | Fisher Body | A.O. Smith | Weibulls 1 Before 1999 | Weibull 2 |
|---|---|---|---|---|
| Time | 10 years | ? | No fixed time<br>12 months notice | 5 years |
| Exclusivity | Yes | ? | Yes | Yes but part of range |
| Price | Cost plus | Annual<br>Re-negotiation when change in model and design<br>Change in cost | Per basic model<br>Change in cost | Per basic model<br>Substantial change in business condition |
| Tooling | Owned | Customer owned | Customer owned<br>Or option to buy | Customer owned<br>Or option to buy |
| Conflict resolution | Arbitration | ? | Arbitration | Arbitration |
| Benchmarking | No | ? | ? | Yes |
| Inducements | No | ? | ? | Yes |
| Development | ? | Yes | Limited | Important |