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List of abbreviations

α	positive parameter of the incumbent supplier's price function that symbolises the importance level of the competitive effect
B	buyer
bzw.	beziehungsweise
β	positive parameter of the incumbent supplier's price function that represents the importance level of the economies-of-scale effect
c	unit cost of the entrant supplier for the good demanded
$\hat{c}$	costs reported by the entrant supplier
c^*	threshold in case of asymmetric cost information
c^0	threshold in case of symmetric cost information
c_k^E	marginal cost reported by the entrant supplier ($c_k^E \in \{c_1^E, c_2^E\}$)
c_j^I	marginal cost reported by the incumbent supplier ($c_j^I \in \{c_1^I, c_2^I\}$)
c^i	level of marginal production costs of supplier i ($c^i \in \{c_1^i, c_2^i\}$)
c_m^i	true marginal production costs of supplier i ($m = 1, 2$)
c_1^i	low marginal cost of supplier i
c_2^i	high marginal cost of supplier i
cf.	confer
CL_{alt}	comparison level of alternatives
$CL_{\exp}$	expected comparison level
CS	consumers' surplus
d	quantity to be switched (decision variable)
d^*	optimal quantity to be switched in case of asymmetric cost information
d^0	first-best quantity to be switched
DC	decision constraint
$d(\hat{c})$	quantity to be switched based on reported costs of $\hat{c}$
E	potential entrant or second supplier
E	superscript denoting that the entrant supplier is the sole producer
e_j	probability that the second supplier is allowed to enter respectively that an audit will be conducted ($e_j \in [0,1]$)
e.g.	exempli gratia

et al.	et alii
etc.	et cetera
f.	and the following page
F^E	fixed costs of the entrant supplier
F^I	fixed costs of the incumbent supplier
F^i	fixed costs of supplier i
$F(c)$	cumulative distribution function
$f(c)$	density function
f_{jk}^i	fraction of total output $Q(^{IE}p_{jk})$ produced by source i ($f_{jk}^i \in [0,1]$, $f_{jk}^I + f_{jk}^E = 1$)
$h(c)$	inverse hazard rate
I	incumbent supplier
I	superscript denoting that the incumbent supplier is the sole producer
i	suppliers ($i \in \{I, E\}$)
ibid.	ibidem
IC	incentive compatibility constraint
id.	idem
IE	superscript denoting that both the incumbent as well as the entrant supplier produce
i.e.	id est
Iss.	issue
IT	information technology
l	superscript which works as a sourcing index ($l \in \{I, E, IE, 0\}$)
λ	Lagrange multiplier in association with the individual rationality constraint
NCS	net consumers' surplus
No.	number
p	per-unit price charged by the incumbent supplier
p.	page
PC	participation constraint
$p(d)$	price of the incumbent supplier as a function of quantity
$p_c(d)$	price of the competitive effect
$p_e(d)$	price of the economies-of-scale effect

p^I_j	price in case of no entry and a marginal cost report by the incumbent supplier of c^I_j
$^l p_{jk}$	price in case of entry and reported costs of c^I_j and c^E_k
pp.	pages
ϕ_{jk}	probability structure
π	profit of the entrant supplier
$\overline{\Pi}^i$	reservation profit of supplier i
$^l\Pi^i_{jk}$	profit of supplier i when source l produces
Q^i	quantity of output (production quota) delivered by supplier i
$Q(p^I_j)$	quantity in case of no entry and a marginal cost report by the incumbent supplier of c^I_j
$Q(^l p_{jk})$	quantity in case of entry and reported costs of c^I_j and c^E_k
$^I r_j$	incumbent supplier's probability of being the producer in case of no entry and a cost report c^I_j ($^I r_j \in [0,1]$)
$^l r_{jk}$	probability of using source l in case of entry and reported costs of c^I_j and c^E_k ($^l r_{jk} \in [0,1]$, $\sum_l {}^l r_{jk} = 1 \; \forall j, k = 1, 2$)
$^0 r_j$	probability of a shutdown of the incumbent supplier in case of no entry and a cost report c^I_j ($^0 r_j \equiv 1 - {}^I r_j$)
s	switching cost
s^i	sunk costs of supplier i
$S1$	incumbent supplier
$S2$	entrant supplier
t	transfer payment
t^*	optimal transfer payment in case of asymmetric cost information
t^0	optimal transfer payment in the first-best case
T^I_j	tax imposed on the incumbent supplier in case of no entry and reported marginal cost of c^I_j
$-T^I_j$	subsidy assigned to the incumbent supplier in case of no entry and reported marginal cost of c^I_j

${}^{I}T^{i}_{jk}$	tax imposed on supplier i in case of entry and reported costs of c^{I}_{j} and c^{E}_{k}
$t(\hat{c})$	transfer payment based on reported costs of $\hat{c}$
θ	positive parameter of the incumbent supplier's price function determining the price without competition
Vol.	volume
vs.	versus
$\bar{x}$	predefined quantity of the good to be procured
0	superscript denoting that neither the incumbent nor the entrant is allowed to produce

1 Introduction

The performance as well as the competitiveness of purchasing companies is strongly influenced by the suppliers used. Consequently, companies can achieve a competitive advantage by selecting an appropriate supplier base. This base is characterised by suppliers offering a certain level of quality, flexibility and innovativeness coupled with adequate prices. Buyers begin to link and integrate these providers into their value creation process and, thus, establish closer relationships. (Cf. Kirst, 2008, p.25)

Today, a growing number of integrated supplier-buyer relationships can be observed. The answer to intricate market dynamics shaping the present business environment lies in the formation of such relationships. These dynamics are induced by market liberalisation, globalisation, capital market pressures, constantly developing information technologies, etc. The choice of suppliers' integration is adequate due to its ability to advance stability and reduce complexity. Starting with the reduction of the supplier base in order to intensify the remaining relations, its execution is finalised after making specific investments and mutual adjustments. (Cf. id., p.1)

This trend is accompanied by disadvantages, such as increased dependency, more complex management requirements and decreasing flexibility of the relationship itself. As long as the performance of the supplying company meets the expectations, no problems arise in this regard. But, if a supplier's weakness is identified and thus has implications on the performance, the above mentioned negative concomitants become a threat leading to inflexibility related to switching the supplier. Switching the supplier is, besides maintaining the existing relationship and trying to improve it, a possible reaction to identified weaknesses. (Cf. id., p.70)

The above mentioned inflexibility could be prevented if ending the relationship would be taken into account from the outset and if the option of exit would be regulated in the contract concluded between the parties. In order to obviate the risk of dependency, it is purposive to keep up with the alternatives available on the suppliers market. Generally, in case of switching the incumbent supplier, a structured and professional switching management is essential to guarantee a smooth process for all parties involved. (Cf. Kirst et al., 2007, p.421)

Supplier switching and decisions made in this context are of growing importance within business processes but represent a topic that is insufficiently examined. Therefore, the work at hand deals with this subject matter and thereby focuses on the decision of buyers whether a supplier switch should be carried out or not. For this purpose, it will

be reverted to two models which, in their way, try to provide evidence when and how to switch. In order to introduce the topic, basic aspects, such as impulses initiating switching and phases which have to be run through in the course of a supplier switch, are clarified first. Concluding, due to its importance, a separate examination of factors retarding or even inhibiting a supplier switch will be made.

As a basis, the terms connected with the topic of supplier switching have to be defined in order to show how they will be used in the course of this work. "The word 'switch' can be used interchangeably with 'change', which affects two dimensions: a content-related layer, which describes what will be changed, and a relational-related layer, which describes the forms of relationships and the interaction patterns." (Kirst, 2008, p.24) The term 'supplier switch' is defined as "the change of a purchasing company's supplier structure, in which an existing integrated supplier will be substituted completely or […] [partially] by a new supplier" (Id., p.25). Relating to the 'act of switching', it has to be considered that it "is not restricted to the selection of the most appropriate actor and the negotiation of the contract [but that it] […] also includes the activities related to channel design, implementation and operation, and finally, the dissolution of the temporary cooperation […]. Thus, switching can be seen as an act of change or as a process." (Verduijn, 2004, p.138)

The remainder of this thesis is organised as follows: First, factors creating a need for and determining the easiness of switching are considered. The balancing of the need for and the easiness of switching delivers insights into the switching behaviour of buying companies which depends on whether these factors are high or low.

The proximate section deals with the different phases which have to be run through in the course of a supplier switch. These phases contain activities ranging from actions taken prior to the switching decision to the final success evaluation after the performed switch.

The main part comprises two models which deal with the option of replacing the incumbent supplier using different approaches to find out when and how it is optimal to switch. The main focus of the first model is on the comparison of entry and auditing as instruments to verify the reported costs of the established supplier against the background of changing the supplier or remaining with the present one. The second model's objective is to provide assistance to organisations in the course of choosing the best possible sourcing strategy. This is done by taking asymmetrical information, switching costs, competition and economies of scale into consideration. Thereby, partial switching is introduced as another aspect having to be considered.

The final section deals with factors having a hindering impact on the decision in favour of supplier switching. Buyers spending large amounts of resources and time to improve the incumbent supplier's performance before taking the option of switching into account is one particular issue examined in this regard. The chapter closes by outlining the strategic orientation a potential entrant supplier is advised to adhere to when inertia is present.

When quoting other authors, evident orthographical errors will be corrected tacitly without changing the content of the quoted statements.

2 The need for and the easiness of switching

In order to provide a better insight into the subject matter, the "factors that create a need for switching, the factors that determine the easiness of switching, and the strategy in finding the right balance between the need [for] and easiness of switching" (Verduijn, 2004, p.295) have to be considered. When doing so, Verduijn (2004) serves as the following chapter's key source.

2.1 The need for switching

The term 'need for switching' implies the reasons as well as the respective motivation to change the current supplier-buyer relationship. Generally speaking, the capabilities and capacities needed do not coincide with those at hand. This lack of conformity can be traced back to "changes in demand, supply and the wider environment of the organisation". (Id., p.133) If it cannot be resolved neither by the organisation nor by the present supplier within a certain time span and/or at a reasonable cost, a switch is the recommended solution to be carried out. (Cf. id., p.133f.)

The need for switching in the broader sense is associated with the motives for switching as well as the contingencies triggering the need, influencing the frequency and determining the urgency of switching. What is called 'motives of switching' in particular refers to the reasons of terminating an established supplier-buyer relationship. Triggers, as the name implies, lead to the arising of the need. Whereas "frequency expresses how often switching is required" (Id., p.149), urgency specifies the importance of switching with regard to remaining competitive. (Cf. id., p.148f.)

2.1.1 Motives leading to supplier switching

In the following, motives leading to supplier switching will be examined more closely. (Cf. id., p.134)

Prices

Still being a crucial part in running a business in matters of procurement, low prices are among the most important motives that lead to the replacement of the current supplier. (Cf. ibid.) Established suppliers hold the ability to abuse their status and unremarkably increase the price. This happens, for example, through the introduction of a seemingly renewed product to replace the preceding one. Afore stipulated discounts will be lowered in the course of such a process, raising the supplier's profit margin. (Cf. Heijboer, 2003, p.149) Another problem is that in case of a single supplier a complementary pricing strategy may be pursued, meaning that the core product supplied is well-priced but related products are comparatively expensive. (Cf. id., p.151)

Quantity or availability

Yet another motive to terminate an established supplier-buyer relationship is represented by incorrect delivery concerning quantity and timing. The resulting unavailability can be traced back to increases in demand, ill-conceived processes, uncertain output in case of agricultural or natural goods, etc. It may happen temporarily, regularly or permanently. (Cf. Verduijn, 2004, p.134)

Quality and performance

Whereas variations in quality and poor performance are obvious motives to switch the supplier, the relative performance can be the trigger of such a change already. In this case, the incumbent fulfils the agreement with the buying company but cannot keep up with competitors. (Cf. id., p.134f.) It has to be emphasised that absent competition resulting from the dependence on one single supplier can be identified as an incentive for a worsening performance. (Cf. Heijboer, 2003, p.151)

New technologies

Not-gained access to new technologies by the present supplier marks another motive to conclude a contract with a new one. To keep up-to-date in this regard is essential in the present economic environment which is characterised by volatile, fast changing and diverse requirements. (Cf. Verduijn, 2004, p.134) It has to be highlighted that single sourcing is frequently linked to a lack of innovation propensity in related economic literature. (Cf. Heijboer, 2003, p.151)

Alternative components

A new supplier has to be found in case of modified components and materials needed due to changing product designs and client preferences if the old supplier is not able or willing to deliver or develop. (Cf. Verduijn, 2004, p.134)

The bankruptcy of a supplying company, a general negative assessment of a supplier and the discovery of a better source are further reasons leading to the termination of a supplier-buyer relationship and, in the course of its development, to the replacement of a provider. Generally, it has to be distinguished between reasons being in the sphere of the buyer and those being not. Referring to bankruptcy, surveys of practitioners have shown that this is a frequently occurring cause, reflecting the general economic development. In fact, the unpredictability of such an event can influence the whole switching process. The buyer might even have to support the new supplier to a greater extent as an effective alternative has to be on hand as fast as possible. (Cf. Arnold, 2007, p.221f.)

2.1.2 Contingencies creating a need for switching

In the course of a theoretical examination, it is hardly possible to determine when supplier switching should take place as it would be necessary to know the particular conditions surrounding the concerned company. (Cf. Verduijn, 2004, p.135) Therefore, the focus has to be on "the contingencies or product, process or industry characteristics that may create or trigger a need for switching" (Ibid.).

A basic overview of the numerous contingencies that induce the need to switch the supplier is given by Verduijn (2004): "The contingencies triggering the need for switching include the introduction of new products […], technological change […], unique customer orders or high variation in customer orders […], high level of specialisation in an industry […]; diverse, complex and widely distributed inputs […], and price fluctuations. […] Several contingencies that influence the frequency in which a need for switching is created: the rate of technological change […]; the length of product life cycles […], the rate of change in customer preferences […]; and the rate and sizes of change in demand volumes. Finally, […] contingencies contributing to the urgency for a switch to take place include the levels of price and time based competition." (Id., p.137) The appearance of one of these contingencies does not necessarily suffice to provoke the need for switching. (Cf. ibid.)

2.2 The easiness of switching

A large number of factors influencing the easiness of switching can be identified. In the following, a range of such factors will be introduced, accompanied by corresponding descriptions to facilitate understanding. Since this subject matter can be examined from various perspectives, partial overlaps may be observed occasionally.

2.2.1 Influencing factors related to the different sourcing strategies

At first, attention will be paid to those factors connected with the different possible sourcing strategies.

The supplier strategy is associated with the quantity of suppliers available for a good demanded. One may differentiate between sole, single, dual and multiple sourcing. The former constitutes a monopolistic situation, with one supplier only being able to deliver the desired supply object. If, out of a group of potential providers, one supplier has been selected, single sourcing has been executed. Dual sourcing denotes delivery by two suppliers, multiple sourcing delivery by more than two. The easiness of switching is affected by the number of suppliers used by a buyer. At least one alternative being disposable can serve as the preliminary buffer until the right choice has been made. (Cf. Kirst, 2008, p.28)

Within the supply-object strategy, the focus is on the complexity of the supplied product and, in particular, on the distinction between unit, modular and system sourcing. Being supplied with simple designed goods which thus are not complex is classified as unit sourcing. Modular sourcing is on hand when the sourced object represents an independent module of the purchaser's final product and is characterised by a higher degree of complexity. In case of system sourcing, the supplier is fully responsible for the development of the entire system. Concerning switching, inter-organisational complexity can be traced back to goods with complex design and comprehensive development responsibility on the part of the supplier. It leads to raised interaction and adjustments in the supplier-buyer relationship. Therefore, the difficulty of replacing a supplier increases with the rising complexity of the product design. (Cf. id., p.28f.)

The different supply-frequency strategies are stock, demand-tailored and just-in-time sourcing. In case of the former, the purchase is carried out in advance. Here, a comparatively large average stock can be observed. Demand-tailored sourcing is used

when no fixed demand pattern is identifiable and the pursued objective is a reduced inventory. The latter is characterised by a reduction of the inventory to a minimum level. This can be obtained "through a synchronization of supply and demand as well as a pull-oriented provision of materials" (Id., p.29). If the purchasing company decides in favour of this strategy, particular adjustments have to be made and information has to be exchanged between the concerned members of the supply chain in order to achieve an unproblematic supply process. Here, the risk of disruptions and supply-sided problems is higher as hardly any buffers are available. Therefore, switching poses a greater challenge the more sophisticated supply frequency is. (Cf. ibid.)

In the course of the supply-subject strategy, buyers decide between individual and cooperative sourcing. As the name implies, single sourcing describes the situation of exclusive procurement being connected with the purchaser's abandonment of economies of scale and scope. If cooperative sourcing is used, the objective of, for example, lower prices will be pursued with the help of joint sourcing. The pursuit of this second strategy and the exploitation of the associated economies of scale can lead to a complication of switching due to the integration of further organisations. Again, additional adjustments concerning the sourcing partners are necessary, leading to increased complexity concerning the replacement of the incumbent. (Cf. ibid.)

Referring to technology, a distinction has to be made between electronic and manual sourcing. Whereas the former is characterised by the usage of advanced information technology (such as e-auctions and websites operated by suppliers), this does not apply to the latter. It has to be considered that the complexity of switching can be increased or decreased by the use of IT. An increase can be traced back to special technology used in the old supplier-buyer relationship which should, in a similar way, also be available in the new one. This results in a more complicated replacement process. In contrast, a decrease can be achieved by using different kinds of e-sourcing which facilitate the comparison of potential suppliers and thereby possibly encourage the supplier change. (Cf. id., p.29f.)

The ultimate strategy is related to the supply market the purchasing company acts in. Here, it has to be distinguished between local and global sourcing. In case of the latter, the buyer has the opportunity to choose from a greater number of alternative suppliers making better offers in matters of price, quality and/or technology. This facilitates the search for an appropriate supplier. On the other hand, problems that hamper supplier switching may arise in the course of the integration process due to cultural diversity and geographical dissonances. (Cf. id., p.30)

2.2.2 Conditions of the specific switching environment

Next, four conditions associated with the switching environment will be examined which influence the easiness of switching in a significant way as well. Their examination enables companies to assess the practicability of a contemplated switch. (Cf. id., p.168f.)

Relationship-specific investments are closely linked with the complexity factor of switching, causing interconnections between the supply partners. The stronger these interconnections are, the more complicated is the termination of the current relationship. This can be traced back to the enhanced complexity which, in turn, can be attributed to the fact that an increased number of interrelationships has to be considered. (Cf. id., p.168)

High dependency of the purchasing company within a supplier-buyer relationship leads to an exacerbated process of switching. This can mainly be attributed to behavioural risks such as adverse selection, hidden action and hidden intention. There is a strong risk that the supplier will try to exploit the purchaser's dependency. He is likely to increase switching costs in order to prevent from switching. This can be seen as a momentary solution only since it earns him a bad reputation and minimises his chances of future business with the outgoing partner. (Cf. ibid.)

The greater the number of potential suppliers being at the command of the purchaser, the better his bargaining power and the higher the probability of being successful by detecting a better distributor. From this it follows that the easiness of switching increases with the possibility of choosing from a bigger group of feasible suppliers. (Cf. ibid.)

Switching costs have a strong impact on the decision to replace the incumbent supplier in matters of risk level and feasibility. Economically seen, it is quite likely that there is no point in switching in case of high switching costs. Depending on their amount, an appropriate period has to be taken into account until the purchaser profits from the better performance of the entrant. Thus, the switching success is characterised by increasing uncertainty since the occurrence of unpredictable circumstances has to be considered and an early termination of the new relationship has to be anticipated. If the mentioned costs exceed a certain situational amount, it is worthwhile to think about whether it would be more advantageous to improve the actual supplier-buyer relationship than to switch. Due to the great impact of switching costs on the decision to replace an incumbent supplier, this topic will be taken up again later on. (Cf. id., p.169)

2.2.3 Influencing factors related to the design decisions of a supply chain

The following chapter takes up the matter of those influencing factors related to the design decisions that have to be made in a supply chain, namely governance, choice of actors, coordination and processes. This connection is based on the fact that the activities associated with switching cannot be reduced to the choice of the new supplier and contract negotiations. Beyond, "activities related to supply channel design, implementation and operation, and finally dissolution of the temporary cooperation" (Verduijn, 2004, p.296) have to be added. The decisions mentioned above are an integral part of switching; a closer look at these will be taken below. (Cf. ibid.)

2.2.3.1 Governance

Factors having an impact on "the easiness of establishing an effective governance structure" (Id., p.142) are uncertainty of transaction/asset specificity, network governance, trust and power.

In market governance, switching to new suppliers can take place without great effort and at low cost. Therefore, its easiness can be considered as very high. (Cf. id., p.140) Increased risk in the course of procurement on the market can be traced back to market imperfections to which companies respond with the pursuing of resource dependency strategies. These induce stable relationships and a reduction of the easiness of switching as can be observed when applying the resource based strategy. (Cf. id., p.276)

If specific assets are necessary for the production of supply objects and in case of highly uncertain business environments regarding outcome or transaction continuity, safeguards are used in order to protect the buyer's individual interests. Although their creation raises transaction costs, a reduction can be achieved by network governance or greater trust within the supplier-buyer relationship. (Cf. id., p.141) In case of the former, social mechanisms help to exchange information concerning the actors and the fear of sanctions and a bad reputation makes opportunistic behaviour less attractive. As a consequence, a decrease of transaction costs and a raise of the easiness can be observed. (Cf. id., p.276)

If neither network governance nor trust is existent, there has to be trust at the very beginning of a new endeavour. (Cf. id., p.141) Trust is essential in a supplier-buyer

relationship but a major bottleneck concerning the quick development of a supply channel. (Cf. id., p.276) It showed "that in networks with frequent transactions and switching trust develops and supports easiness of switching" (Ibid.). An alternative to protect its own interests could be to exercise power over the involved with the result of making switching more difficult for them. (Cf. id., p.141)

2.2.3.2 Choice of actors

The easiness of selecting suppliers is influenced by "uncertainty in the specification of the needs and requirements, availability of actors and market structure, and availability and assessment of actor information" (Ibid.).

The difficulty level of switching parallels the degree of complexity in the course of procurement. Not surprisingly, it showed that uncertainty is higher in case of purchasing new supply objects or from a new supplier compared to a straight rebuy (Cf. id., p.142) and that information retrieval and supplier choice is more challenging when being a matter of specialised goods. (Cf. id., p.271) A positive influence on the easiness can be discovered if the products demanded are clearly specified and standardised within the concerned sector. (Cf. id., p.273)

Market structures characterised by a large number of actors available provide more opportunities in making the right choice. In contrast, selection tends to be more complex in case of markets which are monopolistic or which have to deal with highly specialised goods or in case of products which require close integration and collaboration as fewer providers are available then. (Cf. id., p.142) Additionally, the risk of latecomers has to be noted, meaning that there are few potential providers available and that the demanded supply objects are rare or even preliminary unobtainable. (Cf. id., p.273)

The easiness of switching depends on the amount of information available and how reliable this information is. In the rather unlikely case of perfect information, the evaluation of potential partners would be relatively easy, the greatest value generating one could be chosen then. The use of IT and e-market places raises information availability and lowers transaction costs at the same time. Furthermore, network governance diminishes the necessity of assessing each supposable supply chain partner as it leads to a reduction of the risk of adverse selection. (Cf. id., p.142)

2.2.3.3 Coordination

Switching is more time-consuming and complex "in case of high levels of task uncertainty, close coupling or high interdependency of the activities, high levels of complexity, a large work unit size and high levels of functional diversity" (Id., p.276). This calls for more complexity and elaboration in the matter of coordination. In the following, modularity and standards, network coordinator/-broker, information and communication technologies, routines, common knowledge and experience and proximity will be described. These factors make coordination easier. (Cf. ibid.)

The necessity for coordination is lowered when modular processes are created. "Modularity in processes reduces the amount of coordination that is required between these processes." (Id., p.144) Coordination cannot be turned down completely though. (Cf. ibid.)

Establishing a network broker is another way of facilitating the generation of a supply channel and the coordination between the members within a network. (Cf. id., p.279) But its usage has to be seen critically since there is the danger of letting the network broker become a too powerful actor. (Cf. id., p.145)

As discussed before, the severity of switching can be influenced to a great extent by information and communication technology which encourages transparency and connectivity. Still, the application of electronic integration is double-edged. On the one hand, it leads to a decrease of the easiness due to the fact that its establishment can be expensive. But, on the other hand, if time critical tasks have to be coordinated, it comes along with a rising easiness.

In the course of time routine and experience develop in regard to switching which mainly accelerate the switching process. (Cf. id., p.279)

Referring to proximity, the view is held that modular supply chains are characterised by a low geographical and cultural proximity. From this it follows that low proximity is an indicator for the modularity of supply chains. This results in the fact that high easiness can be observed in such a supply chain more frequently. On the other hand, proximity is not seen as a sufficient reference to modularity or easiness. (Cf. id., p.277) In fact, proximity can increase as well as decrease the easiness of switching. For example, in case of high geographical proximity, the former can be found since fast reactions are possible. (Cf. id., p.279)

2.2.3.4 Processes

The time spent and the degree of effort that is necessary to make the required adjustments concerning processes, resources and distribution have an impact on the easiness of switching. The influencing factors are resource flexibility, modularity and coordination flexibility, 3-Dimensional Concurrent Engineering and availability of resources. (Cf. id., p.281)

Resource flexibility means that a wider range of tasks can be performed with the existent resources or that its capacity can be increased. Highly flexible resources make switching easier.

In case of modularity and coordination flexibility, processes can be recombined in different sequences. Processes can be described as highly flexible if there is the possibility to use identical resources and processes at distinct locations and in distinct sequences. (Cf. id., p.279) It shows that "in supply networks with a high level of supply chain integration, specialised products and resources or immature products or processes, the easiness of switching is low" (Id., p.282).

3-Dimensional Concurrent Engineering can mainly be observed in industries characterised by a high degree of product and technical innovations where new processes or resources are necessary. (Cf. ibid.) Its concept is that a lowering of the time to market can be achieved when resources and processes as well as the product and the supply chain will be designed and adjusted simultaneously. (Cf. id., p.145)

A positive relation exists between the availability of resources and the easiness of switching. Switching is more complex if the resources needed cannot be procured comparatively quickly. (Cf. id., p.280)

2.3 The balancing of the need for and the easiness of switching

The aim of this chapter is to explain the organisational strategies which are brought on by the need for and the easiness of switching. "The balance between the need for switching and the easiness of switching finally leads to the switching behaviour of organisations". (Id., p.149)

The capabilities and flexibilities of companies being members of a supply chain are closely related with the easiness of switching. An increase of the strategic flexibility happens in case of a high level of difficulty regarding switching. The organisations

attempt to have flexible channels in order to fulfil the requirements of new customers, to offer certain product designs, etc. Here, the objective is to have the lowest need for switching possible.

Companies acting in a volatile environment are aware of the fact that situations making a supplier switch necessary do occur. Therefore, they are favourably disposed towards collaborating with other organisations closely despite the possibility of changing the market or moving to new products is restricted and that switching becomes more costly. Here, the pursued strategy of organisations participating in a network is "to select a type and level of flexibility internally and within the current channel" (Id., p.147) and at the same time to create mechanisms that lead to a facilitation of switching. These mechanisms refer to, for example, the development of industry standards in matters of exchange of information, processes and products.

The type of strategy that is pursued to a great extent depends on the current situation and the industry the organisation acts in. (Cf. id., p.146f.)

The need for as well as the easiness of switching may be high or low, leading to different situations and reactions on the part of the concerned company. This can be illustrated by the situation matrix displayed below (Cf. id., p.298):

Easiness

	low	high
low	Static supply channels	Occasional switching
high	Problematic	Dynamic supply networks
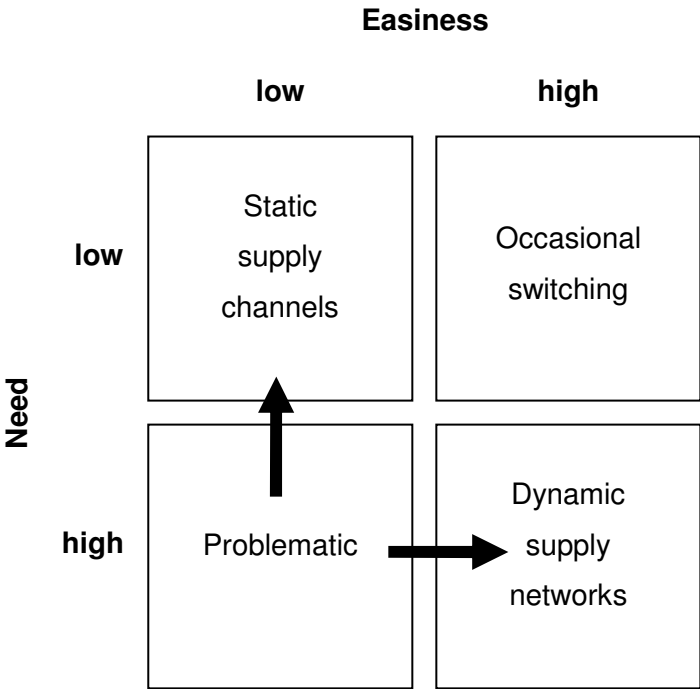
Need

Figure 1: Situation matrix

Source: Verduijn, 2004, p.297

In case of a low need for switching, there is little uncertainty in relation to demand, process or resources. The strategy in such a situation is to establish a static supply

chain. If switching is comparatively easy, companies replace their current suppliers to buy lower-priced materials or to gain insight in the offers of alternative providers.

In case of a high need for switching, demand, products and processes or supplying sources are characterised by frequent changes occurring unpredictably and simultaneously. Then, the adaptation of supply channels has to take place quickly. If the easiness of switching can be classified as high, organisations are used to switch and to adapt their channels regularly and are equipped to that effect. Here, it is a matter of a dynamic supply network.

In case of a high need but a low easiness, the organisation's situation can be described as problematic. Switching would lead to sufficient flexibility but the organisation is not able to react quickly to environmental changes due to barriers of organisational or economic nature. There are two options to avoid such situations: (1.) a reduction of the need for switching or (2.) an increase of the easiness of switching. The former can be accomplished by an extension of the internal, supply chain or supply channel flexibility or a give-up of risky products and a retreat from risky markets. The latter can be achieved through collaboration with organisations acting in the same industry. (Cf. ibid.)

3 Phases of supplier switching

According to the systematisation drawn up by Phillip Kirst in his dissertation 'Switching Integrated Suppliers - A multiple case analysis of supplier switches in an industrial context' (2008), companies have to pass through specific phases in the course of a supplier switch. In particular, Kirst distinguishes

1. "the supplier-switching decision phase,
2. the supplier-switching execution phase, and
3. the supplier-switch success evaluation phase" (Kirst, 2008, p.110).

Taking up Kirst's categorisation, the statements in this chapter are mainly based on his work. To be responsive to this topic is important insofar as "a comprehensive picture of the supplier-switching phenomenon [can be gained] through an analysis of these different phases, their managerial areas and activities, descriptions of certain events within the phases, and the interrelation of their elements" (Ibid.).

The social exchange theory, transaction cost economics and the relational view have been brought together in order to facilitate the explanation of the reasons for and the motivations of replacing an incumbent supplier and to evaluate how successful an executed switch is. The first-mentioned theory forms the basis "by comparing outputs of a current relationship with the expectations one had before entering the liaison, and potential alternative outcomes with other partners" (Id., p.109). Its purpose is to gain knowledge regarding change and stability in a supplier-buyer relationship. The two latter theories will be used for the assessment of the mentioned outcomes. In particular, relational efforts connected with transaction cost economics will be subtracted from relational rewards associated with the relational view. "Depending on the realized outcomes, the disengager[1] might experience dissatisfaction, which leads to switching tendencies". (Ibid.) When making the definite decision to switch, switching costs as well as the costs of supplier development have to be taken into account. (Cf. id., p.108f.)

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[1] Disengager names the initiator of the supplier switch which, in the work at hand, is the buying company.

3.1 Supplier-switching decision phase

The supplier-switching decision phase constitutes the first phase in the course of a supplier switch. Temporally allocated before the actual decision, the following steps have to be taken:

(a) the identification of a supplier weakness on the part of the purchasing company through an evaluation of the disengager's satisfaction with the current supplier-buyer relationship,

(b) the decision either to pursue the loyalty, voice or exit strategy and,

(c) in case of deciding in favour of the exit strategy, the final decision to switch. (Cf. id., p.111)

3.1.1 Activities

At first, the activities being part of the supplier-switching decision phase will be discussed in order to get an initial overview.

The first group of activities comprises all actions which aim at the improvement of the established supplier's performance and are in connection with the below described voice strategy. These activities will be mentioned for the sake of completeness only since they are outside of the topic examined in the work at hand.

The two further groups of activities "are related to the process steps of supplier selection […] and comprise the activities of supplier identification, supplier delimitation, supplier pre-selection, supplier negotiation and supplier selection" (Id., p.176). One group aims at the finding of an appropriate new supplier. This can be proceeded as follows: The purchasing company can do supply market research, can fall back on present suppliers which deliver another object needed or becomes aware of other supplying companies as a result of their marketing activities. The other group's purpose is to verify the performance of a potential new supplier. In this case, the buyer mainly uses self-disclosure representing a cost-efficient possibility to obtain the necessary information and on-site assessment. (Cf. id., p.36, p.176f.)

3.1.2 Supplier weaknesses

Supplier weaknesses can be identified as causes for switching the incumbent supplier. A distinction has to be made between two different forms, namely an absolute and a relative supplier weakness. The latter appears when an alternative supplier performs better in areas such as price, quality or service. In contrast, the former can be identified when the incumbent supplier's performance in the above mentioned areas is decreasing compared to his present one. In response to the identification of such weaknesses, loyalty, voice or exit strategy may be selected by the purchasing company. (Cf. id., p.57)

These weaknesses result from negative triggers such as "quality decline, availability and attractiveness of alternatives, decreased exit barriers, likelihood of success of voice, perceived value of product and services, buyer's loyalty, and strategic fit" (Id., p.61). Additionally, it has to be distinguished between triggers and the final switching motivation. The former typify incidents that cause activities which eventually lead to exit or voice. In contrast, the latter rather corresponds to more general supplier weaknesses (the different motive categories have already been discussed in Chapter 2.1.1). Thus, a buyer is motivated to replace an incumbent supplier when existing triggers stimulate such a category to a certain extent.

Supplier switching must not necessarily be an immediately emerging consequence of triggers appearing. In fact, it is common that the concerned supplier will be warned or that the disengager will try to improve his performance. (Cf. ibid.)

3.1.3 Loyalty, voice or exit strategy

Dissatisfaction concerning the incumbent supplier's performance on the part of the disengager arises if the requested and available capabilities do not coincide and cannot be balanced within an appropriate period of time and at competitive costs. In such a situation a supplier weakness is existent. In answer to this, the buyer can decide in favour of loyalty, voice or exit strategy. (Cf. id., p.57)

By pursuing the loyalty strategy, the buying firm accepts the poor performance of his supplier. The whole situation remains unchanged then.

When deciding for the voice strategy, the buyer stays with the previous supplier, both trying to improve the situation. This can be carried out through an adjustment of the performance or by changing the requirements for the relationship. The latter refers to a modification of its terms and conditions through a renegotiation. One positive aspect of

the voice strategy is that no switching costs arise. Still, if the performance should be amended, resources of the purchasing company have to be used and opportunity costs resulting from the weak performance have to be accepted. Additionally, there is the opportunity to incorporate a further supplier. This can be advantageous in terms of knowledge and capacity but is connected with higher effort regarding coordination and, possibly, extra fixed costs.

Making a decision in favour of the third alternative, the exit strategy, is linked to the termination of the old supplier-buyer relationship and the beginning of a new one. Here, a further option would be to revert to insourcing instead of using an external source of supply. However, this will not be considered since it is outside of the subject area addressed here. (Cf. id., pp.57-59)

3.1.4 Evaluation of the buyer's satisfaction

In accordance to the social exchange theory, the evaluation of the outcome of a current supplier-buyer relationship on the part of the disengager can be carried out with the expected comparison level ($CL_{\exp}$) and the comparison level of alternatives (CL_{alt}).

The former represents the minimum outcome to be expected of such a relationship. A comparison of this minimum with the real outcome has to be made. The latter indicates the best external payoffs to be achieved with alternative suppliers. It is therefore a good indicator of whether a relationship should be stopped or not. A comparison with the realised outcome of the actual relationship leads to the following: The maintenance of the relationship takes place, and thus no necessity to switch the supplier accrues when the realised outcome is greater than CL_{alt}. In case the contrary is observed, dissatisfaction arises, accompanied by the tendency to change the supplier.

To summarise, with the help of these comparison levels, the outcome of an established relationship can be evaluated, and, consequently, the satisfaction of the disengager and the stability of the relationship be determined. (Cf. id., p.97f.)

As noted above, the relational rewards and efforts have been integrated into the social exchange theory. This results in the following definitions:

"Real outcome (Outcome) = real relational rewards - real relational efforts

Expected comparison level ($CL_{\exp}$) = expected relational reward - expected relational efforts

Comparison level alternative (CL_{alt}) = estimated relational reward alternative - estimated relational efforts alternative" (Id., p.106)

The comparison of rewards and efforts of a relationship between a buyer and his supplier results in a particular degree of satisfaction. The qualification of this degree will be carried out by comparing the present relationship with another one. Thus, satisfaction depends on the relationship between expected and actual outcome in the course of an exchange relationship as well as the potential outcome which could be achieved when an alternative supplying company was to be utilised. The figure below illustrates how the buyer's satisfaction degree can be determined and how it can be enhanced through the pursuit of the loyalty, exit or voice strategy. (Cf. ibid.)
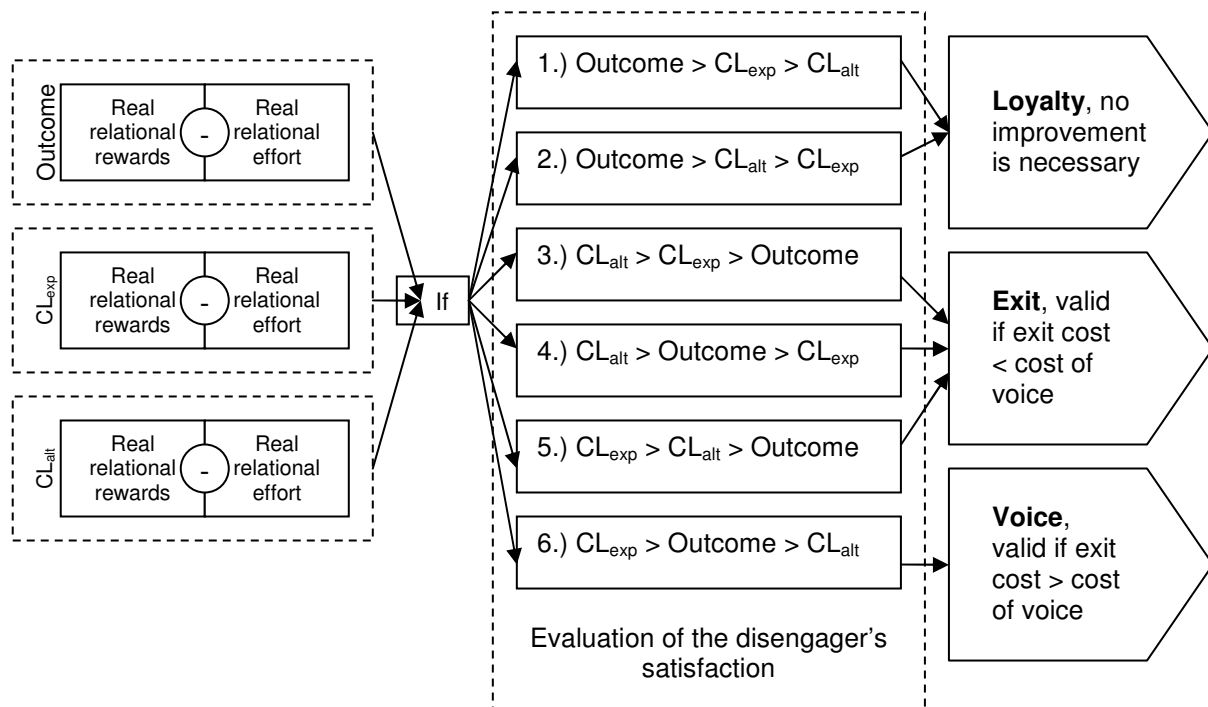
Figure 2: Satisfaction evaluation and resulting strategies
Source: Kirst, 2008, p.107

As mentioned before, the expected outcome can be described as the result of the entire expected relational efforts subtracted from the entire expected relational rewards. Next, the expectations can be checked against the real outcome arising in the actual supplier-buyer relationship. In case the real outcome is below the expected one, dissatisfaction and the tendency to switch will appear. This situation can be interpreted as an absolute supplier weakness. In answer to this, the purchasing company takes the option of replacing the incumbent supplier into account. Therefore, an alternative vendor has to be available. In case this possibility exists, the outcome of an alternative

relationship will be analysed. For this purpose, the following calculation will be used: The estimated relational efforts of the alternative will be subtracted from the corresponding rewards. If the outcome to be gained in collaboration with the new supplier is higher than the former one, switching tendencies will arise. This would be a matter of a relative supplier weakness.

Furthermore, the choice of the strategy pursued by the buyer (exit or voice strategy) is influenced by the switching costs (here named as exit costs) as well as the so-called cost of voice expressing the development costs of the supplier. In case the satisfaction degree of the disengager can be enhanced by both strategies (shown by 3., 4. and 5. in Figure 2), a consideration of the costs of switching and of supplier development might help to come to the right decision.

In conclusion, it can be implied that the tendencies to switch are associated with the dissatisfaction of the buying company. In addition, one should not forget that the costs of both exit and voice strategy should be incorporated into a decision to switch. Furthermore, dissatisfaction is associated with the two types of supplier weaknesses. (Cf. id., p.106f.)

Should the real outcome be below the one expected and another supplier able to provoke improvements, a matter of an absolute supplier weakness is at hand. Here, not the fact that the disengager's expectations are not met is decisive but the existence of another supplier offering a better estimated outcome than the incumbent. The lower real outcome can be traced back to "smaller rewards and the same expected amount of effort, […] higher efforts and the same level of rewards, or a combination of the two developments in such a way that a shortfall occurs" (Id., p.107).

In case of a relative supplier weakness, the real outcome is consistent with the expected one. Still, there is an alternative supplier on hand being able to provide a better one. (Cf. ibid.) This superior outcome can be traced back "to higher rewards and the same effort as in the old exchange relationship, […] lower efforts and the same level of rewards, or a combination [of] the two developments in a way that the surplus occurs" (Id., p.107f.).

3.2 Supplier-switching execution phase

Being the next step in the course of a supplier switch, the supplier-switching execution phase starts with the first activity connected with the disengagement from the incumbent supplier. (Cf. id., p.80) The major tasks in this phase are

    (a) the planning,

(b) the steering and

(c) the monitoring of the supplier switch.

These activities may help to guarantee a smooth switching process and become more difficult the higher the integration degree of the old supplier is. (Cf. id., p.195) This phase is finished as soon as the new supplier performs at the expected level and the relationship with the former supplier has been terminated (or continues in a reduced form). (Cf. id., p.80)

3.2.1 Planning

The initial point of this phase is the planning of the switch. Here, the disengager selects the switching strategy and hence decides how to terminate the old supplier-buyer relationship and to integrate the new supplier. This is done in addition to the anticipation of problems that might occur and the provision of a guideline to facilitate the switching process and to reach the targets set. (Cf. ibid.) The switching strategy comprises the dissolution and the integration strategy. These strategies have to be defined by the buyer after identifying a supplier weakness and making the switching decision. (Cf. id., p.60)

The dissolution strategy deals with the degree of egoism and frankness which determine the behaviour of the buyer towards the old supplier. In both cases, extreme positions might be taken up, namely, referring to egoism, other and self-orientation and, referring to frankness, direct and indirect communication. In reference to direct and indirect communication, the difference is whether the termination of the present supplier-buyer relationship is pronounced explicitly or not. Finally, distinct strategies arise depending on the taken positions. (Cf. id., p.59)

The integration strategy is connected to activities concerning the entrant supplier. More precisely, it is a matter of how the new supplier-buyer relationship will be implemented and operated. (Cf. id., p.60) The different integration strategies result from the intensity of support on the part of the disengager and the amount of specific investments. This leads to differing integration degrees. (Cf. id., p.46f.)

To systemise the activities associated with a supplier switch, reference is made to the relational layer approach. (Cf. id., p.75) This approach distinguishes "the institutional, financial, operational, informational and social layers" (Ibid.) which are related to all actors involved in switching: the buyer, the old and the new supplier as well as further concerned actors like, for instance, customers or other involved organisations. (Cf. id., p.71) "These layers […] can be seen as areas of managerial activity for the disengager

during the course of supplier switches". (Id., p.75) In the following, the five relational layers as well as their role with regard to switching will be examined. (Cf. ibid.)

The parts of the institutional layer are legal as well as formal connections which exist between exchange partners and determine their responsibilities. The former are contractual agreements such as detailed exit clauses which should regulate and facilitate the termination of a business relationship with a supplier. Lawsuit actions, asset division and contracting are examples of activities which belong to this layer and are of particular importance concerning switching.

The flow of money between members of a supplier-buyer relationship and interrelations with financial institutions are related to the financial layer. Referring to switching, this layer is important in matters of compensation claims of both parties, adjustments of payment transactions and determination of costs associated with supplier weaknesses and a switch.

"The operational layer captures the degree to which systems, procedures, and routines of the buying and selling organizations are linked to facilitate operations and support the flow of physical goods. Operational linkages can be systemized by referring to company functions, like logistics, production, distribution, or development." (Id., p.76) Concerning the replacement of a supplier, this layer gains importance since a smooth running of the change is essential in order to avoid disruptions in production. The preoccupation with, for example, safety stocks, product design and potential problems related to logistics, production and distribution beforehand helps to identify arising challenges and create appropriate countermeasures.

As the name implies, the informational layer refers to the information transfer between buying and supplying parties. More precisely, it relates to what kind of and how information is being transferred. With reference to switching, the main focus is on the adopted communication strategy. The plan to switch can be communicated directly or indirectly, a long time in advance or rather on short notice, oral or written but also with the help of indications like a price rise. The chosen way influences the management steps taken. (Cf. id., p.76f.) Being of great importance for the performance of the new supplier, the sharing of knowledge within the previous exchange relationship has to be considered as another highly significant factor. (Cf. id., p.185)

The social layer involves personal relationships that existed in the old supplier-buyer relationship and have to be built up in the new one. This includes the degree of friendship and liking between the exchange partners. A strong social linkage leads to a longer maintenance of an established relationship but also to inertness in the run-up to a switching decision. The latter may result in a later initiation of countermeasures in case of discovered performance weaknesses on the part of the supplier or in extending

the time span up to which the performance of the new supplier surpasses that of the previous one. (Cf. id., p.77)

3.2.2 Steering

The task of steering the activities connected with the change of a supplier can be handled in different ways. A frequently used possibility would be to form cross-functional teams assigned with the processing. These teams often consist of members of inner-organisational departments such as the purchasing department and quality insurance, the team leader originating from the former in most cases. Additionally, it is quite common that the new supplying organisation builds such a team itself to make communication easier. (Cf. id., p.181)

3.2.3 Monitoring

The final task in this phase is represented by the monitoring of the supplier switch. Carried out in a useful way, the buyer can take corrective action or adapt the plans at the very first appearance of deviations from the planned outcome of an activity. (Cf. id., p.111) The data gathered in the course of monitoring is to be used in the supplier-switch success evaluation phase in order to evaluate how successful the supplier switch was. (Cf. id., p.187)

3.3 Supplier-switch success evaluation phase

Being the last phase in the course of a supplier switch, the supplier-switch success evaluation phase can be seen as the finalisation of the whole process. (Cf. id., p.112) It starts as soon as the new supplying organisation has reached the expected level of performance and the old supplier-buyer relationship has been terminated completely or reduced. (Cf. id., p.206)

3.3.1 Evaluating the switching success

As noted in the introduction of this chapter, the social exchange theory, transaction cost economics and the relational view are jointly used to evaluate how successful a performed switch has been. A closer look at this issue will be taken in the following. When doing so, three different success categories will be measured in order to obtain a more differentiated and disaggregated evaluation. (Cf. id., p.108)

The evaluation procedure is as follows: The outcome of the newly formed supplier-buyer relationship is the result of the new supplier's performance. For the assessment of the switching success, comparison levels are used by the buyer. The outcome resulting from the relationship with the former supplier serves as the comparison level of the alternative (CL_{alt}). The usage of the previous supplier's performance as the basis of comparison can be traced back to the fact that a mould-breaking supplier has no relevance right after a switch has been performed. This may change when some time has passed and when the buyer takes other supplying companies into consideration again. The expected comparison level (CL_{exp}) arises out of the old CL_{alt}.

This highlights the buying company's expectations regarding the new trade relationship prior to the replacement of the supplier. As there is a relation between these expectations and "certain economic, technological and switching-related objectives" (Id., p.193), the new CL_{exp} will be used by the disengager to check whether the switching goals have been achieved. The success evaluation can be initiated as soon as the determination of the actual relationship's outcome and of the comparison levels has been completed. A switch can be labelled as successful if the buyer's performance and his competitive position is enhanced. (Cf. ibid.) Or, in more detail: "A vendor replacement is successful if the outcome of the alternative supplier-buyer relationship (CL_{alt}) is as big as expected prior to the switch, bigger, or at least bigger than the outcome […] of the old supplier-buyer relationship." (Id., p.192) Consequentially, the minimum level of switching success is achieved when the performance of the new supplying source surpasses that of the old one. (Cf. ibid.)

3.3.2 Switching success dimensions

In the following, the different dimensions of switching success will be considered. (Cf. id., p.108)

Economic success

As economic reasons act as the main initiators of switching in most cases, this dimension is of great importance to decide whether a performed switch has been successful in terms of saved money, higher earnings and a raised market share. Therefore, the economic success can be seen as the key dimension in this context. (Cf. ibid.) "Thus, the means of economic success (lower cost, higher revenues) influence the relational reward and the relational effort of the Outcome, $CL_{\exp}$, and CL_{alt}." (Ibid.)

Technological success

Determining the technological success can be carried out with the help of measures associated with relational rewards like the degree of innovative dynamic, increased and further patent registrations, improved quality, etc. (Cf. ibid.) "Relational efforts in regards to technological issues essentially reflect a deterioration of certain characteristics of the supply object or the process in comparison to the old supplier-buyer relationship. However, the worsening of certain elements might be counterbalanced by improvements of economic factors." (Ibid.)

Switching-related success

The measures determining the switching-related success can be assigned to relational rewards and efforts, including, amongst others, the length of the whole switching process, the switching costs, the achievement of strategic objectives and rather less weighty factors such as the atmosphere between concerned organisations and coordination problems. (Cf. ibid.)

Two measures connected with the switching-related success have to be considered separately due to their particular influence on the success of switching: the switching costs on the one, the time needed to perform the entire switching process on the other side. Their estimation is carried out in the forefront of the switch, having an impact on the advantageousness of CL_{alt} ahead of the supplier change. As stated before, CL_{alt} turns into $CL_{\exp}$ post-switching whereas the real costs of switching and the real time needed will have an effect on the outcome resulting from the newly formed relationship. Accordingly, a great impact on the success can be led back to the time needed and the achieved switching costs. This applies regardless of the achievement of the preassigned objectives which symbolise the buyer's expectations regarding the relationship with the new supplier and are included in the ex ante CL_{alt}. (Cf. id.,

p.198f.) "The expectations can be organized along certain success dimensions that are related to the economic and technological performance of the new supplier, and to the achievement of certain strategic goals incorporated in the switching-related success dimension. To summarize, it can be stated that if all the objectives and expectations in the economic, technological, and switching-related (including strategic objectives) success dimensions have been accomplished at the anticipated time and cost, the supplier switch can be deemed successful." (Id., p.199)

3.3.3 The overall switching success

The three success dimensions' results put together constitute the overall switching success which indicates the degree of satisfaction of the buying company following an executed switch. (Cf. id., p.191) The achievement of targets set in economic, technological and strategic areas is not synonymous with increasing the buyer's competitiveness though. In fact, the process of switching has to be efficient as a whole. In case this applies, economic value can be created and a competitive advantage be established. (Cf. id., p.10) It is important to keep in mind that the interpretation of the overall success has to be carried out with caution. For this purpose, the individual dimensions will be examined separately. For a better understanding, the aforesaid will be clarified with the following example: If the buyer's aim is to diminish the dependence on the incumbent supplier and achieves this through a supplier switch, then this is reflected in an improved switching-related success. Still, when looking at the economic and technical success, the disengager may realise that, all in all, he is worse off compared to the status predominating before. (Cf. id., p.192)

To summarise, the following figure "shows how the different success dimensions and the ex ante expectations merge into the evaluation of the supplier-switching success" (Id., p.193):
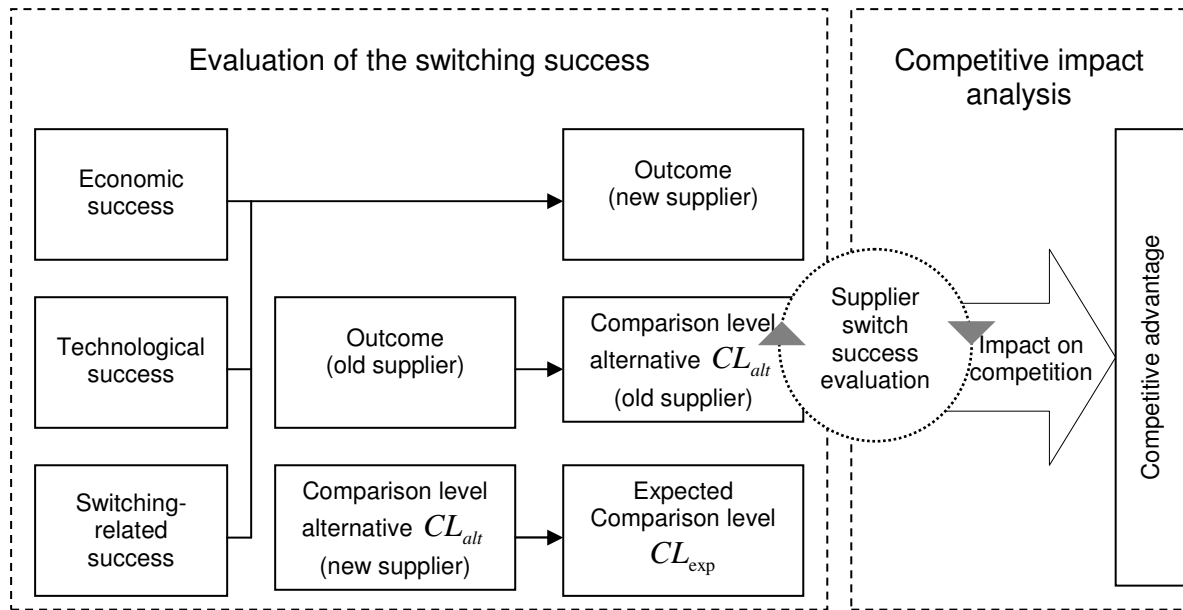
Figure 3: Evaluation of the supplier switching success

Source: Kirst, 2008, p.193

3.4 Systematic switching

Finally, it has to be clarified in what way a systematic structured switch can increase the buyer's competitiveness. As already mentioned, supplier switches take place due to supplier weaknesses causing a poor performance on the part of the supplying company, resulting in a decreasing performance of the disengager and thus in weakened competitiveness. This situation needs to be improved by pursuing the exit or voice strategy. Corresponding to the subject matter of the present work, the assumption that, ultimately, the buyer decides in favour of the former is made here. Depending on the kind of weakness, the objective of the buying company is to achieve a level of competitiveness accomplished prior to the occurrence of the weakness or to surpass the level accomplished before the switch. Until the achievement of the intended objective, the disengager has to accept his rather weak competitive position. Here, the systematic structured switch comes into play in order to prevent this state persist longer than it has to. A systematic performance of the different phases' activities described in this chapter enables companies to reach the goals related to switching in a faster and more efficient way. Consequently, a competitive advantage can be achieved. Furthermore, the systematisation of activities related to a supplier replacement permits the planning and structuring of a switch in advance and the organising of the associated "tasks along different phases and activities. The

developed structure of supplier-switching activities enables disengagers to identify time- and resource-saving potentials by, for example, parallelizing or pulling forward certain switching activities, in a more systematic manner." (Id., p.201) To reduce the time required and to increase efficiency are the main advantages of systematisation put into effect before the need of changing the supplying company arises. Accordingly, a competitive advantage can be gained by using a systematic switching structure. (Cf. id., pp.199-201)

4 The facilitation and improvement of supplier switching decisions

"Exploiting the potential of alternative supply sources and the problem of when and how to switch to an alternative supplier are fundamental issues every firm has to cope with." (Wagner et al., 2007, p.701) The present chapter will therefore try to describe, examine and compare different models designed to support companies in their decision-making process preceding a potential supplier switch.

4.1 Demski, Sappington and Spiller (1987)

At first, the paper 'Managing supplier switching' by Joel S. Demski, David E. M. Sappington and Pablo T. Spiller will be presented and analysed. The authors examine and compare entry and auditing as instruments to verify the cost report of an incumbent supplier, the former under the conditions of shared cost information (first-best) and both under the conditions of not-shared cost information. Their intention is to identify when and how it is optimal to invite another supplier to enter.

The mathematical terms used when describing the model are taken from the paper of Demski, Sappington and Spiller (1987). Furthermore, it has to be referred to the original paper concerning detailed calculations and corresponding proofs.

4.1.1 Initial situation

A purchaser whose constituents are consumers has to procure a product for them whereas their demand is common knowledge. There is an incumbent supplier I and a potential second supplier E. Both have private information regarding their production costs. These costs are correlated and, therefore, the new supplier can be considered as a monitor of the other supplier's costs. The resulting advantages of this constellation are that the exaggeration of costs by the incumbent can be limited and hence also his rents and that production can be placed to the source with lower costs.

At the beginning, the purchaser makes decisions regarding the entry of the new supplier, a shutdown of one or both sources, the payment to the suppliers and their produced output depending on the suppliers' projected costs. Comparing expected

benefits with expected costs is the base of all decisions made. The costs and benefits are endogenous and depend on the prices determined by the purchaser. These prices on their part are dependent on the suppliers' cost structures and the correlation of their costs. (Cf. Demski et al., 1987, pp.77-79)

4.1.2 Model

The cost function of supplier $i \in \{I, E\}$ is composed of the sum of the fixed costs F^i and the marginal production costs c^i times the quantity of output delivered Q^i, i.e.:

$$F^i + c^i Q^i.$$

The fixed costs are commonly known. The level of marginal production cost is private information inherent to the relevant supplier, but only after being prepared to produce. The marginal cost can be low or high and are represented by c_1^i respectively c_2^i with $c_1^i < c_2^i$. The fixed costs can be divided into a recoverable $((1-s^i)F^i)$ and a non-recoverable fraction ($s^i F^i$) whereas s^i denotes the sunk costs. (Cf. id., p.79f.)

The following assumptions have been made:

1. "The incumbent has a marginal cost advantage:

   $$c_1^I < c_1^E < c_2^I < c_2^E.$$ " (Id., p.80)

2. The marginal cost of the suppliers are positively correlated. This means, if the incumbent's costs are low, it is more likely that the entrant's costs are low as well.

3. The goods produced by the two suppliers are identical. (Cf. ibid.)

The sequence in the decision process is as follows: The purchaser asks for a projection of the cost structure, at first from the incumbent and later, if entry is called upon, from the entrant. This can be done by both after incurring their fixed and having an overview over their marginal costs. Based on the primarily occurring projection of the incumbent's marginal cost, the purchaser possesses several decision opportunities: He can authorise production by the established supplier, initiate his shutdown or call upon the second supplier. In case of the latter, the purchaser decides whether both, one or none will be the prospective producers after the entrant's cost report.

The purchaser determines the compensation of the suppliers and their production quotas which "are administered with a price and subsidy scheme" (Ibid.). The subsidies

illustrate the quantity-independent, the price the quantity-dependent part of the compensation. Since demand is commonly known, the price dictates the total production level. The profit of a supplier is composed of the sum of price times quantity, thus revenue, and subsidy less the costs of production. (Cf. ibid.)

In case of no entry, the price p_j^I depends solely on the marginal costs $c_j^I \in \{c_1^I, c_2^I\}$ reported by the incumbent. The further variables are also used in conjunction with this scenario: The production quota is represented by $Q(p_j^I)$. The incumbent's assigned subsidy is indicated by $-T_j^I$ or, to simplify the interpretation, T_j^I denotes the tax imposed on him. Since there is also the possibility of a shutdown of the established supplier, $^I r_j$ indicates the probability of him being the producer and $^0 r_j \equiv 1 - {}^I r_j$ of him being not. The tax corresponding to the latter is denoted as $^0 T_j^I$.

The notation in case of entry is as follows: The probability of an entering invitation of the entrant is represented by e_j. The superscript $l \in \{I, E, IE, 0\}$ will be used as sourcing index to symbolise which supplier produces. The probability of using source l after entry and reported costs of c_j^I and $c_k^E \in \{c_1^E, c_2^E\}$ is indicated by $^l r_{jk}$. Correspondingly, the price is denoted by $^l p_{jk}$, the quantity by $Q(^l p_{jk})$ and the tax imposed on the incumbent by $^l T_{jk}^I$ and on the entrant by $^l T_{jk}^E$. Here, a distinction has to be drawn between cases where one supplier acts as a sole producer and those where both produce just fraction f_{jk}^i of the total quantity $Q(^{IE} p_{jk})$. (Cf. id., p.80f.)

The purchaser may utilise five different kinds of policy instruments during the procurement process to avoid an exaggeration of costs: shutdown probabilities, entry probabilities, prices, taxes and production shares. (Cf. id., p.78, p.81) He is advised to choose these instruments in a way that "maximize[s] expected consumers' surplus, CS, net of subsidy payments" (Id., p.81). Thereby, minimum expected profits of $\overline{\Pi}^i$ have to be guaranteed to the suppliers and penalties in case of an exit (which is possible at any time) are limited to the sunk portion of their initial investments, $s^i F^i$. (Cf. id., p.82)

In the following, supplemental notation linked with profit calculations of the suppliers will be introduced:

The first calculation shows the profit of the incumbent in case of his shutdown when he reports c_j^I although his true costs are c_m^I. This illustrates that the supplier cannot recover the sunk fraction of his investment in such a situation.

$$^0\Pi_j^I(c_m^I) \equiv -s^I F^I - {}^0T_j^I$$

The second calculation represents the incumbent supplier's profit in case of no entry when he is allowed to produce and reports c_j^I instead of the true costs c_m^I.

$$^I\Pi_j^I(c_m^I) \equiv [{}^I p_j - c_m^I]Q({}^I p_j) - F^I - {}^I T_j^I$$

The third calculation reflects the profit of supplier i in case of his shutdown after entry and reported costs of c_j^I and c_k^E.

$$^l\Pi_{jk}^i(c_m^i) \equiv -s^i F^i - {}^l T_{jk}^i \qquad \text{for} \qquad l = 0, n, \qquad n \neq i$$

The fourth calculation illustrates the profit of supplier i when being chosen as the sole producer ($l = i$) after cost reports amounting to c_j^I and c_k^E.

$$^i\Pi_{jk}^i(c_m^i) \equiv [{}^i p_{jk} - c_m^i]Q({}^i p_{jk}) - F^i - {}^i T_{jk}^i$$

The fifth calculation shows the event of production by both suppliers after projected cost of c_j^I and c_k^E.

$$^{IE}\Pi_{jk}^i(c_m^i) \equiv f_{jk}^i[{}^{IE}p_{jk} - c_m^i]Q({}^{IE}p_{jk}) - F^i - {}^{IE}T_{jk}^i \quad \text{(Cf. ibid.)}$$

Additionally, further assumptions have to be noted:

4. "The net increase in surplus from continuing operations when price is set equal to marginal cost is positive, even when high costs are realized:

$$CS(c_2^i) - [1 - s^i]F^i > 0, \qquad i = I, E.$$

5. [...] Net surpluses are ranked in a manner consistent with realized production costs:

$$CS(c_1^I) - \left[1 - s^I\right]F^I > CS(c_1^E) - \left[1 - s^E\right]F^E$$

$$> CS(c_2^I) - \left[1 - s^I\right]F^I > CS(c_2^E) - \left[1 - s^E\right]F^E \text{."} \text{ (Id., p.83)}$$

Now, "the purchaser's problem is to maximize expected consumers' surplus net of subsidy payments" (Ibid.):

$$\max_{p,r,e,T} \sum_{j=1}^{2} [\phi_{j1} + \phi_{j2}] \left\{ e_j \sum_{k=1}^{2} \frac{\phi_{jk}}{\phi_{j1} + \phi_{j2}} \left[\sum_{l} {}^l r_{jk} \left[CS({}^l p_{jk}) + {}^l T_{jk}^I + {}^l T_{jk}^E \right] \right] \right.$$
$$\left. + [1 - e_j] \sum_{l=0,I} {}^l r_j \left[CS({}^l p_j) + {}^l T_j^I \right] \right\} \qquad (1)$$

The problem is subject to the following constraints:

$$\sum_{j=1}^{2} [\phi_{j1} + \phi_{j2}] \left\{ e_j \left[\sum_{k=1}^{2} \frac{\phi_{jk}}{\phi_{j1} + \phi_{j2}} \sum_{l} {}^l r_{jk} \, {}^l \Pi_{jk}^I (c_j^I) \right] + [1 - e_j] \sum_{l=0,I} {}^l r_j \, {}^l \Pi_j^I (c_j^I) \right\} \geq \overline{\Pi}^I \quad (2)$$

The incumbent's individual rationality constraint ensures that he receives at least his reservation profit.

$$e_j \left[\sum_{k=1}^{2} \frac{\phi_{jk}}{\phi_{j1} + \phi_{j2}} \sum_{l} {}^l r_{jk} \, {}^l \Pi_{jk}^I (c_j^I) \right] + [1 - e_j] \sum_{l=0,I} {}^l r_j \, {}^l \Pi_j^I (c_j^I)$$
$$\geq e_m \left[\sum_{k=1}^{2} \frac{\phi_{jk}}{\phi_{j1} + \phi_{j2}} \sum_{l} {}^l r_{mk} \, {}^l \Pi_{mk}^I (c_j^I) \right] + [1 - e_m] \sum_{l=o,I} {}^l r_m \, {}^l \Pi_m^I (c_j^I) \quad j,m = 1,2 \qquad (3)$$

The incumbent's self-selection constraint assures that in case of $c^I = c_j^I$ he can gain the maximum expected profit by a true report of c^I.

$$e_j \left\{ \sum_{k=1}^{2} \frac{\phi_{jk}}{\phi_{j1} + \phi_{j2}} \sum_{l} {}^l r_{jk} \, {}^l \Pi_{jk}^E (c_k^E) \right\} \geq e_j \overline{\Pi}^E \quad \text{for each} \quad j = 1,2 \qquad (4)$$

The entrant's individual rationality constraint should guarantee him the receipt of at least $\overline{\Pi}^E$ in case of entry and a report of c_j^I.

$$e_j \left\{ \sum_{l} {}^l r_{jk} \, {}^l \Pi_{jk}^E (c_k^E) \right\} \geq e_j \left\{ \sum_{l} {}^l r_{jn} \, {}^l \Pi_{jn}^E (c_k^E) \right\} \text{ for each } j = 1,2 \quad \forall k, n = 1,2 \quad (5)$$

The self-selection constraint for the entrant should ensure truthful reporting on his part after reported costs of c_j^I and realised costs of c_k^E.

$${}^l \Pi_j^I (c_m^I) \geq -s^I F^I \qquad l = 0, I \qquad j,m = 1,2 \qquad (6)$$

The incumbent's bankruptcy constraint is used in case of no entry taking place to make sure that his profit will not go below the amount he was to receive if he would leave.

$$e_j\left\{{}^l\Pi_{jk}^i(c_m^i)\right\}\geq e_j\left\{-s^iF^i\right\} \qquad \forall j,k,m=1,2 \qquad i=I,E \qquad l=0,I,E,IE \qquad (7)$$

This bankruptcy constraint refers to the situation of entry. It serves the same purpose the above mentioned does, but with respect to supplier i. (Cf. id., p.83f.)

Before showing the properties of the purchaser's problem in the next chapter, two benchmark solutions - the first-best and the auditing problem - will be presented in order to help establish a better understanding of how to optimise procurement. (Cf. id., p.84)

4.1.3 The benchmark solutions: First-best and auditing problem

The first-best problem addresses the case where the purchaser is aware of the cost information of both suppliers. The auditing problem illustrates when an imperfect and costly monitor of the established supplier's costs is available. The difference to the first-best problem lies in the absence of an alternative production source. Generally, both are given by the purchaser's problem mentioned above. But whereas the self-selection constraints, (3) and (5), are excluded in the former case, the following restriction is added in the latter:

$$^E r_{jk}={}^{IE} r_{jk}=0 \qquad \forall j,k=1,2.$$

Connecting both problems leads to a natural benchmark. Namely, the cost of an audit is as high as the direct costs of entry being composed of the sunk costs plus the reservation profit of the second supplier ($s^EF^E+\overline{\Pi}^E$). The purchaser's decision then is based on a comparison of these costs with the benefits expected when an audit is carried out or entry is invited. The benefit in the first-best case refers to an increased consumer surplus due to a possible low-cost source. In the auditing case, it refers to the value of supplemental cost information of the incumbent. (Cf. ibid.)

The properties of both benchmark solutions will be shown and examined more closely in the following subchapters.

4.1.3.1 Solution to the first-best problem

In order to be able to discuss the solution to the first-best problem in greater detail, the net consumers' surplus

$$NCS({}^{i}p_{jk}) = CS({}^{i}p_{jk}) - [1 - s^{i}]F^{i}$$

has to be introduced as the relevant decision variable. Its suitability can be illustrated by the fact that it contains the portion of fixed costs which is recoverable in case of a shutdown. Furthermore, it is important for determining the point in time at which an invitation of entry and a shutdown have to take place. (Cf. id., p.84f.)

"Lemma 1. The solution to the first-best problem has the following properties:

(i) $\quad {}^{I}p_{j} = c_{j}^{I}; \quad {}^{I}p_{jk} = c_{j}^{I}; \quad {}^{E}p_{jk} = c_{k}^{E}; \quad j,k = 1,2;$

(ii) $\quad {}^{I}r_{j} = 1 \quad if \quad NCS({}^{I}p_{jk}) \geq 0,$
$\qquad \quad = 0 \quad otherwise;$

(iii) $\quad {}^{I}r_{jk} = 1 \quad if \quad 0 \leq NCS({}^{I}p_{jk}) \geq NCS({}^{E}p_{jk}),$
$\qquad \quad {}^{E}r_{jk} = 1 \quad if \quad 0 \leq NCS({}^{E}p_{jk}) > NCS({}^{I}p_{jk}),$
$\qquad \quad {}^{0}r_{jk} = 1 \quad otherwise;$

(iv) $\quad e_{j} = 1 \quad if \quad \sum_{k=1}^{2} \frac{\phi_{jk}}{\phi_{j1} + \phi_{j2}} \sum_{l=I,E} {}^{l}r_{jk} NCS({}^{l}p_{jk}) - {}^{I}r_{j} NCS({}^{I}p_{j}) > s^{E}F^{E} + \overline{\Pi}^{E},$

$\qquad \quad = 0 \quad otherwise.$ "(Id., p.85)

As shown in Lemma 1, if information is shared by the purchaser, entry may take place or not. The new supplier will be invited if the expected net surplus in case of entry exceeds the one to be expected without entry by an amount that is higher than the direct costs of entry. The price then equals the marginal cost of the supplier with the largest NCS. In such a situation the suppliers will not gain rents and will not produce at the same time due to economies of scale.

The above said can be intensified in reference to the assumptions made. Under Assumption 4, a strictly positive NCS can be presumed when price equals marginal cost. Therefore, the purchaser always decides in favour of production. With regard to Assumption 1, entry only takes place in case of a high-cost report by the incumbent as the entrant is the more efficient supplier just then. "Moreover, with net consumers' surplus and marginal cost perfectly (negatively) aligned under Assumption 5" (Ibid.), the lowest-marginal-cost supplier is the selected producer at any time. (Cf. ibid.)

4.1.3.2 Solution to the auditing problem

Generally, the difference between the above described first-best and the auditing problem is that the purchaser cannot observe the costs of the suppliers. The incumbent's costs can be monitored for a constant expense of $s^E F^E + \overline{\Pi}^E$ with the help of an audit. In this case, the buyer has to take the production costs as well as the control costs that induce truthful reporting into consideration.

The following subchapters cover several main issues associated with the auditing problem in greater detail. The therein used variables with hats symbolise the solution to the problem. (Cf. ibid.)

4.1.3.2.1 No role for auditing

At first, the situation in which auditing independently of its costs does not play a beneficial role will be considered. This is the case "when the bankruptcy bound, $-s^I F^I$, is sufficiently low that the incumbent's rents can be eliminated without productive distortions and without the threat of an audit" (Ibid.). To avoid cost exaggeration by the supplier after a high-cost report (critical incentive problem), a setting of his profit at a lower level is necessary, i.e.

$$\hat{\Pi}_2^I(c_2^I) \equiv \left[\hat{p}_2^I - c_2^I\right]Q(\hat{p}_2^I) - F^I - \hat{T}_2^I = -s^I F^I.$$

A sufficient rise in profit that initiates true cost reports by a supplier with low costs would then be

$$\hat{\Pi}_2^I(c_1^I) - \hat{\Pi}_2^I(c_2^I) = \left[c_2^I - c_1^I\right]Q(\hat{p}_2^I).$$

When this rise "is sufficiently small relative to $\overline{\Pi}^I$ even with efficient pricing (i.e., $\hat{p}_2^I = c_2^I$), then the purchaser can hold the incumbent to his reservation level of expected profit and maximize total expected surplus" (Id., p.86). The meaning of 'sufficiently small' is that the inequality

$$-s^I F^I + \left[\phi_{11} + \phi_{12}\right]\left[c_2^I - c_1^I\right]Q(c_2^I) \leq \overline{\Pi}^I \tag{8}$$

holds. If so, an audit is not required as the purchaser can guide the supplier by rewarding him generously in case of c_1^I and rather meagrely $(-s^I F^I)$ in case of c_2^I. The above said will be formally shown in Lemma 2: (Cf. id., p.85f.)

"Lemma 2. If inequality (8) and Assumptions 1-4 hold, the solution to the auditing problem will have

$$\hat{e}_j = 0, \qquad {}^I\hat{r}_j = 1, \qquad \textit{and} \qquad {}^I\hat{p}_j = c_j^I \qquad \forall j = 1, 2. \text{"}$$ (Id., p.86)

This reinforces the fact that the problem of cost exaggeration is less binding in the event of large sunk costs. Additionally, the situation of the purchaser is facilitated if there is just a small cost advantage for an established supplier with low costs and if low costs are rather improbable for him. (Cf. ibid.)

4.1.3.2.2 Nontrivial role for auditing

In the following, the case where auditing plays a nontrivial role will be examined. The therewith related insights can be found in Proposition 1. Below used $\hat{\lambda} \geq 0$ stands for the Lagrange multiplier linked to the individual rationality constraint. (Cf. ibid.)

"Proposition 1. Suppose that Assumptions 1-5 hold. If inequality (8) is not satisfied, the solution to the auditing problem has the following properties:

(i) $\displaystyle {}^I\hat{p}_1 = c_1^I; \qquad {}^I\hat{p}_{21} = c_2^I + \left[1 - \hat{\lambda}^I\right]\frac{\phi_{11}}{\phi_{21}}\left[c_2^I - c_1^I\right] >$

$\displaystyle {}^I\hat{p}_2 = c_2^I + \left[1 - \hat{\lambda}^I\right]\frac{\phi_{11} + \phi_{12}}{\phi_{21} + \phi_{22}}\left[c_2^I - c_1^I\right] > {}^I\hat{p}_{22} = c_2^I + \left[1 - \hat{\lambda}^I\right]\frac{\phi_{12}}{\phi_{22}}\left[c_2^I - c_1^I\right] > c_2^I;$

(ii) $\displaystyle {}^I\hat{r}_1 = 1, \qquad {}^I\hat{r}_2 \begin{cases} = 1 \\ \in [0,1] \\ = 0; \end{cases} \textit{as} \qquad NCS({}^I\hat{p}_2) \gtreqless 0;$

(iii) $\displaystyle {}^I\hat{r}_{2k} \begin{cases} = 1 \\ \in [0,1] \\ = 0; \end{cases} \textit{as} \qquad NCS({}^I\hat{p}_{2k}) \gtreqless 0, \qquad k = 1, 2;$

(iv) $\hat{e}_1 = 0,$

$\displaystyle \hat{e}_2 \begin{cases} = 1 \\ \in [0,1] \\ = 0; \end{cases} \textit{as} \quad \sum_{k=1}^{2}\frac{\phi_{2k}}{\phi_{21} + \phi_{22}}{}^I\hat{r}_{2k}NCS({}^I\hat{p}_{2k}) - {}^I\hat{r}_2 NCS({}^I\hat{p}_2) \gtreqless \overline{\Pi}^E + s^E F^E;$

(v) $\displaystyle {}^I\hat{\Pi}_2^I(c_2^I) = {}^0\hat{\Pi}_2^I(c_j^I) = {}^0\hat{\Pi}_{2k}^I(c_m^I) = {}^I\hat{\Pi}_{2k}^I(c_2^I) = -s^I F^I, \qquad k, m, j = 1, 2;$

(vi) $${}^l\hat{\Pi}_1^I(c_1^I) = \hat{e}_2\left[\sum_{k=1}^{2}\frac{\phi_{1k}}{\phi_{11}+\phi_{12}}\sum_{l=0,I}{}^l r_{2k}\,{}^l\hat{\Pi}_{2k}^I(c_1^I)\right] + \left[1-\hat{e}_2\right]\sum_{l=0,I}{}^l r_2\,{}^l\hat{\Pi}_2^I(c_1^I);$$

(vii) $\hat{\lambda}^I \in [0,1)$." (Id., p.86f.)

One of the most important objectives of the purchaser is to avoid cost exaggeration with the help of the instruments available to him. It is therefore optimal to offer an incumbent with low costs the amount of rents he was to gain in case of a high-cost report (property (iv)). This can be achieved by the use of price distortions, shutdown probabilities and auditing as described below.

At first, price distortions will be examined. Properties (i) and (v) go into the same direction. The former reports that price (and quantity) distortions only take place in case of high costs. The latter informs that true reporting of high costs leads to a minimal profit. Under the assumption that a high-cost supplier will neither be shut down nor audited, the profit of a low-cost one is as high as the amount that was to be gained with a high-cost report,

$$-s^I F^I + \left[c_2^I - c_1^I\right]Q({}^I\hat{p}_2).$$

A rise of ${}^I\hat{p}_2$ results in a reduction of quantity $Q({}^I\hat{p}_2)$ and consequently of the related rents to which the price distortion can be traced back. Anyway, no price distortion occurs after a low-cost report. This can be deduced from the fact that a supplier with high costs has no incentive to understate costs. It is therefore not beneficial to distort $Q({}^I\hat{p}_1)$.

Next, shutdown probabilities will be contemplated. That it is not in the buyer's interest to shut down a supplier with low costs is noted by property (ii). It also reports, analogue to property (iii), that a shutdown of a high-cost one is possible. Accordingly, the risk a low-cost supplier takes by reporting high costs is a possible shutdown and therewith related a minimum level of profit. "As with the price distortions, a commitment to reduce consumers' surplus limits the information rents of the low cost supplier." (Id., p.87) Like in the first-best case, a shutdown only takes place if the NCS is continuously negative. Here, endogenous prices can be found.

Lastly, auditing will be considered. As mentioned above, there is no need to prevent a supplier with high costs from the exaggeration of his costs. This leads to the conclusion that a low-cost reporting firm must not be audited. An audit will be carried out after projection of high costs if the increase in NCS is greater than the auditing costs (property (iv)). "The audit report is used to structure a lottery on prices (and therefore quantities) for the supplier. These prices determine the expected increase in net

consumers' surplus that results from an audit." (Ibid.) The intention of this lottery is to lower the incentive of an incumbent with low costs to exaggerate his costs. Regarding this matter, a small expected output after reported costs of c_2^I leads to a smaller incremental profit as well. Furthermore, the costs of the incumbent and the signal provided by an audit are positively correlated as it is the case with the suppliers' cost structures. Hence, the incentive of a low-cost supplier to report falsely is diminished due to a high price set and the therewith linked low quantity in response to an audit signalling low costs. The resulting implication on total expected surplus can be compensated by a reduction of the price established after the verification of a high-cost report of the incumbent through the audit.

The prices set after an audit ($^I\hat{p}_{21}$ and $^I\hat{p}_{22}$) are chosen in a way that the expected consumers' surplus is equivalent to the one to be expected in case of a price set after a report of c_2^I and no audit. (Cf. id., p.87f.)

In summary, price, shutdown and audit are used in order to restrict the supplier's rents which arise out of his information advantage. These desired restrictions can be induced by quantity distortions which again are caused by price distortions or shutdown decisions. (Cf. id., p.88) "The quantity distortions may be informed by an outside audit, depending upon a comparison of the costs of this audit and its expected benefits in controlling the information rents of the incumbent producer." (Ibid.)

4.1.4 The optimal procurement policy in case of private information and the possibility of an entry

In this chapter, the change of the optimal procurement policy will be contemplated when the identified suppliers have private information and an entry is possible. At first, the corresponding proposition will be shown and is followed by its interpretation. (Cf. ibid.)

"Proposition 2. Suppose that Assumptions 1-5 hold and that inequality (8) is not satisfied. Then the solution to (1)-(7) has the following properties:

(i)　　$^I p_1 = c_1^I;$　　　$^I p_2 = c_2^I + \left[1 - \lambda^I\right]\dfrac{\phi_{11} + \phi_{12}}{\phi_{21} + \phi_{22}}\left[c_2^I - c_1^I\right] > {}^I p_{22}$

$$= c_2^I + \left[1 - \lambda^I\right]\dfrac{\phi_{12}}{\phi_{22}}\left[c_2^I - c_1^I\right] > c_2^I;$$

$$^E p_{21} = c_1^E; \qquad ^E p_{22} = c_2^E + \frac{\phi_{21}\left[\phi_{21} + \phi_{22} - \lambda_2^E\right]}{\phi_{22}\left[\phi_{21} + \phi_{22}\right]}\left[c_2^E - c_1^E\right] \geq c_2^E;$$

(ii) $\qquad ^I r_1 = 1; \qquad ^I r_2 \begin{cases} = 1 \\ \in [0,1] \\ = 0; \end{cases} \qquad as \qquad NCS(^I p_2) \gtreqless 0$

(iii) $\qquad ^I r_{21} = 0; \qquad ^E r_{21} = 1;$

$$^I r_{22} \begin{cases} = 1 & 0 \leq NCS(^I p_{22}) > NCS(^E p_{22}) \\ \in (0,1] & as \qquad 0 \leq NCS(^I p_{22}) = NCS(^E p_{22}) \\ = 0 & NCS(^I p_{22}) < NCS(^E p_{22}); \end{cases}$$

$$^E r_{22} \begin{cases} = 1 & 0 \leq NCS(^E p_{22}) > NCS(^I p_{22}) \\ \in [0,1] & as \qquad 0 \leq NCS(^E p_{22}) = NCS(^I p_{22}) \\ = 0 & NCS(^E p_{22}) < NCS(^I p_{22}); \end{cases}$$

$$^0 r_{22} \begin{cases} = 1 & if \qquad \max\{NCS(^I p_{22}), NCS(^E p_{22})\} < 0, \quad ^{IE} r_{22} = 0 \\ = 0 & otherwise; \end{cases}$$

(iv) $\qquad e_1 = 0;$

$$e_2 \begin{cases} = 1 \\ \in [0,1] \\ = 0; \end{cases} \qquad as \qquad \sum_{k=1}^{2} \frac{\phi_{2k}}{\phi_{21} + \phi_{22}} \sum_{l=I,E} {}^I r_{2k} NCS(^I p_{2k}) - {}^I r_2 NCS(^I p_2)$$

$$\gtreqless \frac{\lambda_2^E}{\phi_{21} + \phi_{22}}\left[s^E F^E + \overline{\Pi}^E\right]$$

(v) $\qquad ^I \Pi_2^I(c_2^I) = {}^0 \Pi_2^I(c_j^I) = {}^0 \Pi_{2k}^I(c_m^I) = {}^I \Pi_{2k}^I(c_2^I) = -s^I F^I, \qquad k, m, j = 1, 2;$

(vi) $\qquad ^I \Pi_1^I(c_1^I) = e_2\left[\sum_{k=1}^{2} \frac{\phi_{1k}}{\phi_{11} + \phi_{12}} \sum_{l=I,E,0} {}^I r_{2k} {}^I \Pi_{2k}^I(c_1^I)\right] + [1 - e_2]\sum_{l=0,I} {}^I r_2 {}^I \Pi_2^I(c_1^I);$

(vii) $\qquad ^E \Pi_{22}^E(c_2^E) = {}^0 \Pi_{22}^E(c_k^E) = {}^I \Pi_{22}^E(c_k^E) = -s^E F^E, \qquad k = 1, 2;$

(viii) $\qquad \lambda_2^E \in [0, \phi_{21} + \phi_{22}]; \qquad \lambda^I \in [0,1); \qquad \lambda_1^I = [\phi_{11} + \phi_{12}][1 - \lambda^I].\,"$ (Id., p.88f.)

There are several parallels between the solutions to the auditing and the purchaser's problem (1)-(7). As already noted, only in case of stated high costs price distortions take place. Since a report of low costs is the most beneficial setting, a second supplier will not be invited to enter in this situation. The decisions regarding entry and shutdown are dependent on the identical net consumers' surplus calculus. In case of no entry, the

incumbent will be shut down if the NCS is negative. In contrast, the supplier with the highest NCS will be chosen in case of entry. Hence, if the costs reported by the entrant are lower than those reported by the incumbent, the former becomes the sole supplier. "Entry will occur only when the net consumers' surplus that is expected to result exceeds the amount that is ensured absent entry by an amount in excess of the costs of entry

$$\left\{\lambda_2^E \left[s^E F^E + \overline{\Pi}^E\right]/(\phi_{21} + \phi_{22})\right\}.$$

Of course, what makes these observations nontrivial is the fact that the prices that determine the magnitude of net consumers' surpluses are again endogenous." (Id., p.89) But, as will be shown in the following, these prices vary from those constituted in the auditing problem. (Cf. ibid.)

The mix of policy instruments chosen by the purchaser differs depending on whether entry or audit is used to verify the cost projection. Unlike auditing, a second supplier provides information but is also a possible source. Therefore, entry is more advantageous for two reasons: 1. A shutdown of the incumbent must not result in an output of zero. 2. There is another supplying source with potentially lower costs.

Accordingly, the following corollary can be drawn: If the accomplishment of an audit is optimal with a strict positive probability ($\hat{e}_2 > 0$), also a decision in favour of entry takes place with positive probability ($e_2 > 0$). In contrast, in case of always deciding against entry ($e_2 = 0$), auditing will not be taken into consideration either ($\hat{e}_2 = 0$). Based on this, one may deduce that entry is able to imitate an audit. It has to be mentioned that moral hazard is no problem in the alternative supplier's sphere if he is used as a monitor only. Then, the costs of both verifying means correspond to each other. From this it follows that using auditing nontrivially implies the efficiency of entry. (Cf. id., p.89f.)

Additionally, it has to be mentioned that under certain conditions, i.e.

$$\frac{\phi_{21}}{\phi_{21} + \phi_{22}}\left[NCS(c_1^E) - NCS(c_2^I)\right] > s^E F^E + \overline{\Pi}^E,$$

an alternative supplier would indeed be invited to enter with positive probability ($e_2 = 1$) but the same does not apply for an audit ($\hat{e}_2 = 0$). This can again be attributed to the additional benefit of an alternative source. Even though the elimination of the established supplier's rents is possible without productive distortions and auditing, entry plays a crucial role concerning an expected gain resulting from lower costs. "Note that it is more likely that the purchaser will invite entry with strictly positive probability while the optimal probability of auditing is zero, the less highly correlated are c^I and

c^E, ceteris paribus." (Id., p.90) In case of little correlation, the insight gained into the course of an audit is just a weak indicator of the established supplier's costs. Moreover, the attractiveness of the supplier lottery is greater due to limited correlation as the chance of a low-cost report (c_1^E) on the part of the entrant is higher in case of entry ($c^I = c_2^I$). (Cf. ibid.)

Heading in the same direction, it is easily possible to show that the decision in favour of an additional supplier happens with higher probability than of an audit, "even when $\hat{e}_2 > 0$ in the solution to the auditing problem" (Ibid.). In this case, entry is the stronger instrument and is applied leastwise as much as auditing. On the other hand, also the contrary is feasible. Under certain settings the optimum would be to use entry with a lower probability. Intuitively, the reason therefore is that entry can guide the established supplier in the desired direction more effectively. Consequently, the more powerful policy instrument of entry can be used with lower probability but still results in the favoured discipline. Accordingly, to gain complete understanding of the purchaser's permission of entry, the mix of instruments available has to be analysed. (Cf. ibid.)

In the following, "a setting in which the optimal auditing probability exceeds the optimal entry" (Ibid.) one ($\hat{e}_2 > e_2$) will be illustrated by introducing a numerical example. Its basis is formed by the following assumptions:

"probability structure: $\phi_{11} = \phi_{22} = .4$; $\phi_{12} = \phi_{21} = .1$;

cost structure: $s^E = s^I = .5$; $F^E = F^I = 100$;

                           $c_2^I = 20$; $c_2^E = 20.5$;

                           $c_1^I = 5$; $c_1^E = 15$;

demand structure: $Q(p) = 100 - p$;

reservation profits: $\overline{\Pi}^E = \overline{\Pi}^I = 200$."(Id., p.91)

The higher probability of using an audit can be explained by the example's three subsequent features:

1. The correlation between c^E and c^I is high: The difference of

    $$\phi_{11}\phi_{22} - \phi_{12}\phi_{21}$$

    is relatively large. Consequently, the monitoring of the actual costs of the incumbent via the second supplier's costs is quite precise. Hence, an audit is a proper instrument to limit the established supplier's rents.

2. To control the rents of the incumbent is harder compared with those of the entering supplier. This results from the fact that the differential between the former's high and low production costs is greater than that of the latter:

$$c_2^I - c_1^I = 15 > 5.5 = c_2^E - c_1^E.$$

The result in the event of an optimal entry policy if both supplying companies are high-cost providers is as follows: The price set in case of production on the part of the incumbent exceeds the marginal cost to a greater extent than if the entrant was the chosen producer:

$$^I p_{22} - c_2^I > {}^E p_{22} - c_2^E.$$

3. In case of realised high costs, a small cost disadvantage on the part of the entrant can be observed:

$$c_2^I - c_2^E = 0.5 . \text{ (Cf. Ibid.)}$$

A combination of the last two features guarantees that, after inviting a supplier to enter, the optimal price if the new provider produces is lower than the corresponding price would be if the old one was to produce. Thus, due to the fact that the fixed and sunk costs of both are equal, the highest NCS can be gained if the entrant is the chosen producer without exception. This is valid even if he has higher costs.

Here, entry is a powerful instrument to deter the established supplier from the exaggeration of his costs. A shutdown of the incumbent always takes place in case of entry. Accordingly, if the invitation to enter would always be the logical consequence of reported costs of c_2^I, "the incumbent could be held to a net payoff of $-s^I F^I$, regardless of his cost. To restore the requisite profit level ($\overline{\Pi}^I$) to the incumbent and to conserve on entry costs ($s^E F^E + \overline{\overline{\Pi}}^E$)" (Ibid.), the use of entry is restrained by the buyer. It is invited with lower probability than an audit with the same costs and information content. (Cf. ibid.)

Next, the above made statement that the entrant is rather chosen as sole producer - despite the fact that he has higher costs ($e_2 > 0$ and $^E r_{22} = 1$) - will be examined. In this situation, the decision in favour of an entering high-cost producer is advantageous. This results from the fact that the additional, in the present case rather low, production costs are easily compensated by the gains resulting from having influence on cost exaggeration. This influence can be attributed to the risk of a shutdown the established supplier may face after a false report of c_2^I. A reduction of his rents is the resultant consequence. In other words, both the direct production and the control costs affect the supplier choice. Therefore, the supplier with the lowest direct costs will not be selected since he falls behind as soon as control costs are taken into account as well.

Consequently, efficient procurement does not exclude high-cost sourcing. Again, this highlights that the mix of policy instruments as a whole is essential for the understanding of using supplier switching in an optimal way. (Cf. id., p.91f.)

4.1.4.1 Different price levels in case of entry and auditing

The proximate step after analysing the factors determining the intensities of the instruments entry and auditing has to be the examination of other policy instruments available to the buyer including their optimal configuration. Particularly, the different price levels in case of entry and auditing will be considered. The first comparison in this vein can be found in Corollary A as quoted below. (Cf. id., p.92)

"Corollary […] [A]. Suppose that Assumptions 1-4 hold, that inequality (8) is not satisfied, and that the incumbent is shut down only when the entrant reports low cost: $^E r_{21} = {}^I r_{22} = 1$ *in the solution to (1)-(7). Then the expected postentry price in the solution to (1)-(7) is strictly less than the price announced when entry is not permitted:*

$$\frac{\phi_{21}}{\phi_{21} + \phi_{22}} \, {}^E p_{21} + \frac{\phi_{22}}{\phi_{21} + \phi_{22}} \, {}^I p_{22} < {}^I p_2 \,. \text{"(Ibid.)}$$

The advantageous side effect of entry, an entrant being a potential low-cost source, is reflected in here. The purchaser can determine a lower price due to the low-cost supplier's cost advantage but this is not valid in general. Under certain conditions, there is a possibility of identical prices assigned to an established supplier with high costs in the entry and auditing regime or higher prices in the former regime. This can be traced back to the dual role of prices as a key to profit and to truly reported costs.

"Recall that prices may be raised above marginal cost to reduce the associated production levels, and (with accompanying subsidy reductions) thereby limit the rents to the supplier. On the basis of only a comparison of the lower total surplus versus the better incentives for truthful cost projections that price increases provide, however, prices may be raised to such an extent that the supplier's rents are reduced below the level necessary to attract him into the industry." (Ibid.) In this instance, the optimal way of restoring rents is a reduction of prices in order to raise the output and not just a rise of subsidies. This reduction towards marginal cost leads to an augmentation of total surplus that is greater than the supplier's increasing rents.

"Analytically, whether prices must be lowered toward marginal cost from their optimal levels solely on the basis of considerations of eliciting truthful cost projections depends

upon whether the individual rationality constraints bind in the solution to the purchaser's problem." (Ibid.) In the situation of binding constraints, the further role of prices as rent providers becomes apparent. Higher prices can be found under the entry respectively auditing regime. This is reported by Corollary C respectively D. In contrast, Corollary B shows the event when they neither bind in the solution to the auditing nor to the purchaser's problem. In this case, there are identical prices in both regimes. The purpose of Lemma 3 and 4 is to accurately define the binding of the individual rationality constraints (in a way that the further role of prices is nontrivial). (Cf. id., p.92f.)

"Lemma 3. Suppose that Assumptions 1-5 hold, that inequality (8) is not satisfied, and that inequality (9),

$$-s^{I}F^{I} + e_{2}\phi_{12}{}^{I}r_{22}\big[c_{2}^{I} - c_{1}^{I}\big]Q({}^{I}p_{22})$$
$$+ [1-e_{2}]{}^{I}r_{2}\big[\phi_{11} + \phi_{12}\big]\big[c_{2}^{I} - c_{1}^{I}\big]Q({}^{I}p_{2}) \geq \overline{\Pi}^{I}, \qquad (9)$$

is satisfied when prices, entry probabilities, and shutdown probabilities are recorded as in Proposition 2 with $\lambda^{I} = 0$ *and* $\lambda_{2}^{E} = \phi_{21} + \phi_{22}$. *Then* $\lambda^{I} = 0$ *at the solution to (1)-(7)."* (Id., p.93)

Looking at inequality (9) in Lemma 3, its left-hand side can be identified as the minimum level of expected profit offered to the incumbent in the solution to the purchaser's problem. This level is induced in case of incumbent's cost of c_{2}^{I} by a profit amounting to $-s^{I}F^{I}$. In case of c_{1}^{I} it originates from an indifference on the part of the incumbent regarding reporting truthfully or falsely ($c^{I} = c_{2}^{I}$). Obviously, the individual rationality constraint is not binding if the incumbent's reservation level is exceeded by his minimum expected profit. (Cf. ibid.)

Lemma 4 sets out the corresponding condition in case of an audit. Here, the difference is that expected extra rents potentially accrue to the established supplier. This can be traced back to the fact that a shutdown must not necessarily take place when $c^{E} = c_{1}^{E}$ is reported. (Cf. ibid.)

"Lemma 4. Suppose that Assumptions 1-5 hold, that inequality (8) does not hold, and that inequality (10),

$$-s^{I}F^{I} + \hat{e}_{2}\big[\phi_{11}{}^{I}\hat{r}_{21}Q({}^{I}\hat{p}_{21}) + \phi_{12}{}^{I}\hat{r}_{22}Q({}^{I}\hat{p}_{22})\big]\big[c_{2}^{I} - c_{1}^{I}\big]$$
$$+ [1-\hat{e}_{2}]{}^{I}\hat{r}_{2}\big[\phi_{11} + \phi_{12}\big]\big[c_{2}^{I} - c_{1}^{I}\big]Q({}^{I}p_{2}) \geq \overline{\Pi}^{I}, \qquad (10)$$

is satisfied when prices, entry probabilities, and shutdown probabilities are as recorded in Proposition 1 with $\hat{\lambda}^I = 0$. Then $\hat{\lambda}^I = 0$ at the solution to the auditing problem.

These lemmas lead immediately to Corollary […] [B].

Corollary […] [B]. When the conditions of Lemmas 3 and 4 hold, prices play no meaningful role in delivering profit to the suppliers, and we have:

(i) $\quad {}^I p_2 = {}^I \hat{p}_2 \, ; \, {}^I p_1 = {}^I \hat{p}_1 \, ; \, {}^I p_{22} = {}^I \hat{p}_{22} \, ; \, {}^E p_{21} < {}^I \hat{p}_{21} \, ;$

(ii) $\quad {}^I r_2 = {}^I \hat{r}_2 \, ; \, {}^I r_1 = {}^I \hat{r}_1 \, ; \, {}^I r_{22} \leq {}^I \hat{r}_{22} \, ; \, {}^I r_{21} \leq {}^I \hat{r}_{21} \, ;$

(iii) $\quad {}^0 r_{22} \leq {}^0 \hat{r}_{21} \, ; \, and$

(iv) $\quad e_2 \geq \hat{e}_2 \, .$ " (Ibid.)

To recapitulate, if it is not necessary to reduce the prices of the established supplier towards marginal cost to accord a higher profit, there are identical prices (and therewith also quantities) in the solutions to both problems. In this case, the same shutdown probability can be found in the absence of audit and entry across regimes. Because of the feature of entry to be a potential low-cost source, the probability of being chosen is higher compared to an audit. The following can be attributed to the same feature: After knowing the cost report of the established supplier, leastwise one of the suppliers being allowed to produce is (slightly) more likely in the entry regime. But it is less probable that the incumbent is the producer. As a limitation of the incumbent's rents is more effective in case of entry, more profit has to be assigned to him in case of auditing. "Consequently, there will be ranges of parameter values for which inequality (10) holds, but inequality (9) does not, and thus lower prices will be realized in the entry regime." (Ibid.) This is increasingly possible

- when the correlation between c^I and c^E is low and therefore auditing is just a very limited information provider and
- when there is a slight cost disadvantage on the part of the entrant and hence the additional supplier's productive role is of great importance.

Then, if production will be carried out by the incumbent, lower prices can be found in the entry regime (compared to the auditing regime) and it is, accordingly, less probable that he will be shut down. (Cf. id., p.93f.)

"Corollary […] [C]. Suppose that Assumptions 1-5 hold, that inequality (10) holds, and that inequality (9) does not hold. Then

(i) $\quad {}^I p_2 < {}^I \hat{p}_2 \, ; \, {}^I p_{22} < {}^I \hat{p}_{22} \, ; \, and$

(ii) $^I r_2 \leq {}^I \hat{r}_2 ; {}^I r_{22} \leq {}^I \hat{r}_{22} .$ " (Id., p.94)

It has to be considered that the situation of lower prices on the part of the incumbent in case of entry is not just restricted to the class of examples of Corollary C. Its shown pricing patterns also arise under the numerical example stated before although the individual rationality constraints are binding in the solutions to both problems. (Cf. ibid.) Furthermore, it shows "that the pattern of relative prices across regimes" (Ibid.) must not conform to those in Corollary C. In particular, there is even the possibility that a rise of prices would be optimal in case of entry. Corollary D responds to this with regard to the conditions of a further numerical example: (Cf. ibid.)

"probability structure: $\phi_{11} = .25 ;$ $\phi_{12} = .40 ;$ $\phi_{21} = .05 ;$ $\phi_{22} = .30 ;$

cost structure: $s^E = s^I = .5 ;$ $F^I = 30 ;$ $F^E = 22 ;$

$c_2^I = 30 ;$ $c_2^E = 65 ;$

$c_1^I = 5 ;$ $c_1^E = 15 ;$

demand structure: $Q(p) = 2{,}500{,}000 / p^3 ;$

reservation profits: $\overline{\Pi}^I = 80 ;$ $\overline{\Pi}^E = 50 .$

Corollary […] [D]. Under the conditions of [the second numerical] example, the price offered to the incumbent after a verification of his high cost projection will be higher under the entry regime than under the auditing regime:

$^I p_{22} > {}^I \hat{p}_{22} .$ " (Ibid.)

Under the features of the second numerical example the elastic demand curve has to be highlighted as being the most important one. Here, in case of entry, the entrant will be chosen as the producer if he has low costs (c_1^E). If he has high costs, the incumbent remains as supplier. Despite the threat of being shut down in the entry regime in case of c_1^E, the rents the incumbent can expect are greater in comparison to the auditing regime. This is valid for the solution when the prices' role as profit provider will be disregarded ($\lambda^I = \hat{\lambda}^I = 0$). (Cf. ibid.) "The extra rents under entry arise because

$$\left[\phi_{12} \, Q(^I p_{22}) / (\phi_{11} + \phi_{12}) \right] > Q(^I \hat{p}_2) ,$$

largely owing to the presumed elasticity of demand. Thus, with $\overline{\Pi}^I$ established to leave the incumbent with zero rents in the entry regime, prices must be lowered in the auditing regime to restore the requisite rents to the supplier." (Ibid.)

All in all, it can be stated that innumerable patterns of relative prices are conceivable. This can be traced back to the fact that prices take on distinct roles and represent one of the policy instruments available to the purchaser only. The optimal application of every single instrument depends on the ideal configuration of all others. (Cf. ibid.)

4.2 Wagner and Friedl (2007)

In their paper 'Supplier switching decisions' Stephan M. Wagner and Gunther Friedl developed a model "to support firms in making the best possible supplier switching and sourcing strategy decision for a product they demand. [...] [Its primary intention is] to gain more knowledge about supplier switching decisions in the presence of information asymmetry, switching costs, competitive reactions, and economies of scale." (Wagner et al., 2007, p.702)

Their model will be described and examined more closely in the following. The mathematical terms used when describing the model are taken from the paper of Wagner and Friedl (2007). Again, it will be referred to the original paper regarding detailed calculations and corresponding proofs.

4.2.1 Model

Present matter is a one-period model in which the initial situation is an intended purchase of quantity $\bar{x}$ of a good by buyer B. There is an incumbent supplier $S1$ being able to supply the right quantity for a per-unit price of p.

If the buyer decides in favour of switching, he can choose between two alternatives, namely a partial or a complete switch. The entrant supplier's ($S2$) unit cost for the product demanded amount to c.

With the help of decision variable $d \in [0,1]$, the decision to switch is formulated and if:

- $d = 1$, a complete switch takes place;
- d takes a value between zero and one, a partial switch occurs;
- $d = 0$, there is no switching taking place.

In the former two cases ($d \neq 0$), switching costs of s arising to the buyer are a function of the switching decision: (Cf. id., p.702f.)

$$s(d) = \begin{cases} s & if \quad d > 0 \\ 0 & if \quad d = 0. \end{cases}$$

In summary, the following assumptions have been made:

- The quality of the product required is well-defined.
- The quantity demanded is predetermined and fixed.
- The per-unit price is exogenously given, not negotiable and independent of quantity. These assumptions will be relaxed afterwards to demonstrate their significant effects.
- The alternative supplier's unit costs are not precisely known by the buyer. He is only informed that it is drawn from a probability distribution with positive values in the interval $[\overline{c}, \underline{c}]$ and 0 outside. The cumulative distribution function is denoted as $F(c)$, the density function as $f(c)$. "This distribution satisfies a usual regularity condition. The inverse hazard rate $h(c) = F(c)/f(c)$ increases in c over its support." (Id., p.703)
- The alternative supplier can provide the demanded quality and quantity. (Cf. id., p.702f.)

The potential new supplier's objective is to maximise his profit π. It is defined as "the quantity of money t, he receives from the buyer net of his costs for producing the required quantity of the product, i.e.

$$\pi = t - d \cdot \overline{x} \cdot c \text{ ". (Id., p.703)}$$

As the accurate unit costs of $S2$ are unknown by the purchaser, a mechanism that leads to minimum overall purchasing costs has to be conceived by him.

Following a first thought, a possibility would be that if the entrant's price was set in a way that the amount of switching plus new purchasing costs was lower than the costs in case of delivery by the incumbent, a switch would be carried out. But a potential supplier knowing the incumbent's purchasing and switching costs would select a price slightly lower than the one at which the buying company would not switch. Moreover, he would just contact the buyer if his unit costs were lower. If this was the case, he could gain substantial profit whereas the other party's benefit would only be marginal.

Obviously, the above described way is not the most favourable one. By comparison, more advantageous would be the configuration of a mechanism that leads to true cost reporting by the potential supplier pursuant to the revelation principle. Accordingly, the purchaser demands a cost report $\hat{c}$ of the entrant and has to make sure that saying the

truth is more profitable than lying. This report is the basis for the buyer's decisions regarding switching ($d(\hat{c})$) and the transfer payment ($t(\hat{c})$). The application of this mechanism leads to a reduction of the purchasing costs. (Cf. ibid.)

*"The buyer's problem is to choose both the value of the switching variable and the payment to $S2$ such as to minimize his total purchasing costs according to the following program **P**:*

$$\min_{d(\hat{c}), t(\hat{c})} \int_{\underline{c}}^{\overline{c}} t(c) + (1 - d(c))\overline{x} \cdot p + s(d(c))] f(c) \, dc$$

such that

(PC)	$\pi(c) \geq 0$	$\forall c$,
(IC)	$\pi(c) \geq \pi(\hat{c}, c)$	$\forall c, \hat{c}$,
(DC)	$d(c) \in [0;1]$	$\forall c$." (Id., p.704)

"The objective function reflects the expected value of the buyer's total costs as a sum of three components. [These are:] the payment to the entrant supplier, [...] the payment to the incumbent supplier according to his volume, and [...] the switching cost.
The participation constraint (PC) ensures that $S2$ receives at least his reservation profit of zero. [...] The incentive compatibility constraint (IC) guarantees that $S2$ finds it optimal to report his costs truthfully. Finally, the decision constraint (DC) restricts the set of possible decisions for the buyer to values between 0% and 100%." (Ibid.)

Additionally, further assumptions have been made:

- The total quantity the purchaser demands will be normalised, i.e. $\overline{x} = 1$.
- The commitment to any contractual term by the buying party is possible until the end of the moves. It is necessary to guarantee a true cost report. (Cf. ibid.)

4.2.2 Analysis

In the following subchapters, the case of observable costs (first-best situation) by the buyer will be examined, followed by the case of unobservable costs (second-best situation). The corresponding quantities to be switched and transfer payments are shown by the respective propositions.

4.2.2.1 Benchmark case: Symmetric cost information

The benchmark case is referred to as first-best solution and generally does not mirror reality as it assumes the alternative supplier's costs are known by the buyer. This allows him to offer a transfer payment such that an exceeding profit cannot be gained by the entrant. The quantity to be switched and the transfer payments will be shown in the following proposition. (Cf. id., p.704f.)

"Proposition 1: The first-best quantity to be switched and the optimal transfer payments to the entrant supplier are given by

$$d^0(c) = \begin{cases} 1 & \text{if } c \leq c^0, \\ 0 & \text{if } c > c^0, \end{cases}$$

$$t^0(c) = \begin{cases} c & \text{if } c \leq c^0, \\ 0 & \text{if } c > c^0, \end{cases}$$

where $c^0 = p - s$." (Id., p.704)

Proposition 1 displays the following:

A complete switch takes place if the costs of the new supplier go below a certain threshold c^0 which is made up of the price of the incumbent supplier minus switching costs. This means the old supplier-buyer relationship will be terminated. The purchaser accepts to bear the entire switching costs since the total of transfer payment and switching costs is lower than the amount he was to pay to the incumbent. The payment the entrant supplier receives is as high as his costs.

No switching occurs if the sum of the entrant's switching and unit costs is higher than the amount the buyer was to pay to the incumbent. In this case, a transfer payment must not be paid and the second supplier can be entitled as high-cost supplier. (Cf. id., p.705)

According to Mayer, Pfeiffer and Schneider (2005), the aforesaid can be illustrated with the following diagram. Switching costs are set to zero in order to enable the graphical realisation.
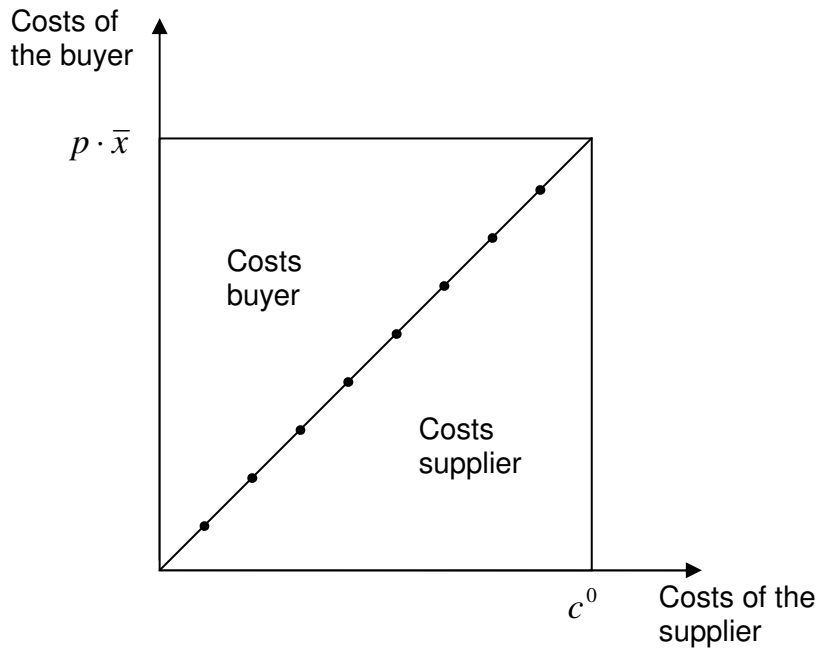
Figure 4: Costs within the context of the first-best situation
Modified according to: Mayer et al., 2005, p.503

4.2.2.2 Asymmetric cost information

In case of asymmetric information, it is assumed that the alternative supplier's costs are not observable by the buyer. Here, only the case of true reporting will be examined in consideration of the revelation principle. The purchaser's decisions regarding the quantity to be switched and the transfer payment are made for the purpose of minimising his total costs and base on the reported costs. At this point, Proposition 2 has to be presented: (Cf. id., p.705)

"Proposition 2: The optimal quantity to be switched and the optimal transfer payments to the entrant supplier are given by

$$d^{*}(c) = \begin{cases} 1 & \text{if } c \leq c^{*}, \\ 0 & \text{if } c > c^{*}, \end{cases}$$

$$t^{*}(c) = \begin{cases} c^{*} & \text{if } c \leq c^{*}, \\ 0 & \text{if } c > c^{*}, \end{cases}$$

where c^{*} is defined by the solution to the equation $c + h(c) = p - s$." (Ibid.)

The dependence of $d^*(c)$ and $t^*(c)$ on the costs reported by the new supplier is shown in Proposition 2. This can be obtained by the purchaser by offering a menu of two contracts determining these two values as functions of these costs. The menu is made up by two different regions:

In one region, a complete switch will be carried out if the reported costs are lower than the threshold. As the true costs have no influence on the delivery quantity, the willingness of providers with costs lower than c^* to supply can be assured with the help of transfer payments only. As a result, a constant transfer payment will be offered independently of the costs.

In the other region, the existing supplier-buyer relationship remains unchanged (no switching) when the reported costs exceed the threshold c^*. The sum of switching costs and transfer payment would exceed the amount the buyer was to pay to the incumbent supplier. Therefore, switching would not be taken into consideration. Hence, $d^*(c)$ and $t^*(c)$ amount to zero. (Cf. ibid.)

According to Mayer, Pfeiffer and Schneider (2005), the following diagram illustrates the above said. The corresponding calculations can be found in the Appendix.
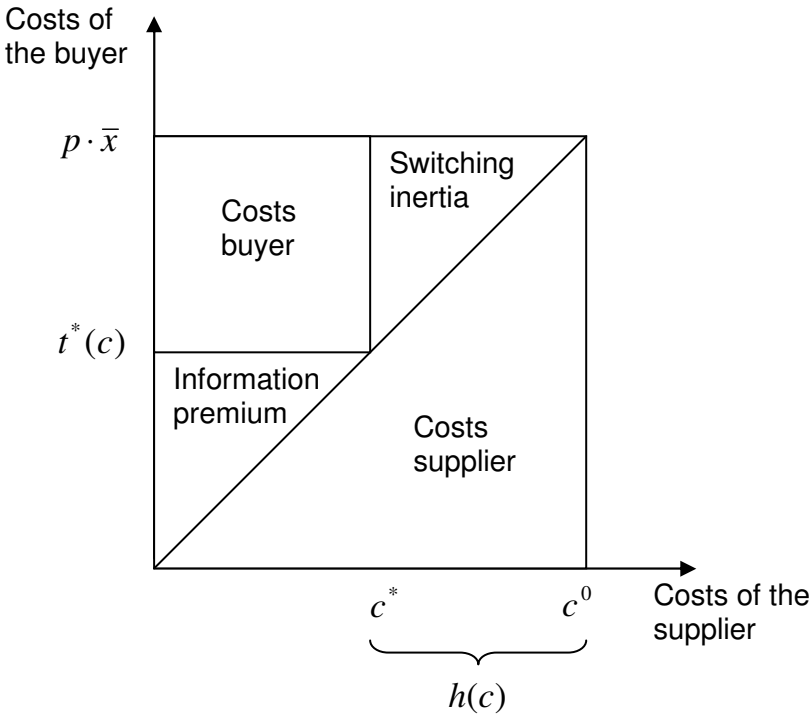

Figure 5: Costs within the context of the second-best situation
Modified according to: Mayer et al., 2005, p.504

The next chapter highlights the phenomenon of switching related inertia which becomes apparent when looking at and comparing c^0 and c^* from Proposition 1 and 2.

4.2.2.3 Switching inertia

Comparing the definitions of c^0 and c^* shows that cost boundaries (which separate the cost regions) are smaller in case of asymmetric information. This means the switching decision has been hesitantly made. In other words, there is some inertia in this decision. (Cf. id., p.705) This may be illustrated by the following example: "If the true unit costs of $S2$ are higher than c^*, but below c^0, the buyer would not switch to the alternative supplier, although it would be advantageous for him from an ex-post perspective." (Ibid.)

To better understand the aforesaid, the transfer payments have to be examined. An information premium paid by the purchaser is used to make sure that the alternative supplier reports truthfully. If it was not paid, it would be beneficial to notify higher costs. For limiting reasons regarding the premium, the above mentioned boundaries have to be lowered. This leads to a reduction of both the information rent and the switching probability despite the possibility of a cost-cutting. (Cf. id., p.706) "The optimal cutoff-level balances this tradeoff, and is defined at the point, where the marginal benefits of further lowering the boundaries equal the costs." (Ibid.)

As mentioned above, waiting for a price offered by a potential supplier is not optimal. Here, a mechanism dealing with this subject matter and leading to a minimisation of the purchasing costs despite the payment of an information premium will be presented. (Cf. ibid.)

4.2.3 Advanced model: Competition and economies of scale

So far, the assumption has been made that the incumbent does not react to a change in quantity and to the entry of an alternative supplier with an alteration in price. Now, the more realistic situation of a price change caused by an additional supplier's entry and partial switching will be examined. The latter leads to a decrease of quantity delivered by $S1$ and, consequently, to a loss of economies of scale. To address both competition and partial switching, the unit price charged by the established supplier

consists of two additive effects, the competitive and the economies-of-scale effect. Being a function of quantity, it may be described as follows:

$$p(d) = p_c(d) + p_e(d).$$ (Cf. ibid.)

Denotation $p_c(d)$ captures the competitive effect and is a result of competition encouraged by the buyer through the procurement of the quantity needed from multiple (in the present case two) suppliers allowing him to profit from lower prices. The underlying principle applying is: The larger the quantity switched to the new supplier, the lower is the price offered by the established supplier. The price of the competitive effect is composed as shown below:

$$p_c(d) = \frac{\theta}{1 + \alpha \cdot d}.$$

The positive parameter θ symbolises the price in case no competition takes place. Parameter α represents the importance level of the competitive effect, more precisely the price-cutting due to a larger quantity delivered by the new supplier. (Cf. ibid.)

The economies-of-scale effect, denoted by $p_e(d)$, is a result of reduced unit costs due to increased production or distribution size of a company. A reduction of the established supplier's quantity delivered leads to an increase of the unit costs and therewith to a revocation of quantity discounts and a rise in prices. The price of the economies-of-scale effect is composed as follows:

$$p_e(d) = \beta \cdot \frac{d}{1 - d}.$$

The positive parameter β represents the importance level of the economies-of-scale effect. (Cf. id., p.706f.)

The following two assumptions concerning the parameter values have been made:

- The first one,

$$\frac{\theta}{1 + \alpha} > \beta,$$

  should guarantee that in case of small values of d the competitive effect is the stronger of both effects. If not, the results would be the same the basic model showed.

- The second one,

$$s < \frac{\alpha \cdot \theta}{1 + \alpha},$$

should limit the switching costs upwardly since partial switching is just beneficial in case of relatively low switching costs in comparison to the competitive effect. (Cf. id., p.707)

Again, the buyer aims to minimise his overall purchasing costs. Now, the problem below has to be solved:

$$\min_{d(\hat{c}),t(\hat{c})} \int_{\underline{c}}^{\overline{c}} t(c) + (1-d(c)) \cdot p(d(c)) + s(d(c))] f(c) \, dc.$$

The substitution of p by $p(d(c))$ is the only change to the former program. The constraints remain the same. (Cf. ibid.)

Primarily, the case of symmetric cost information will be contemplated, followed by that of asymmetric cost information. The respective propositions show the corresponding quantities to be switched as well as the transfer payments.

4.2.3.1 Benchmark case: Symmetric cost information

At first, the benchmark case will be examined, assuming the existence of observable costs. (Cf. ibid.) Additionally, a distinction is made "between

- a low-cost entrant supplier, where $c \in [\underline{c}, c_1^0]$,
- an intermediate-cost entrant supplier, where $c \in (c_1^0, c_2^0)$, and
- a high-cost entrant supplier, where $c \in [c_2^0, \overline{c}]$.

The following proposition presents the first-best degree of switching and the corresponding transfer payments to the entrant supplier." (Ibid.)

"Proposition 3: The first-best quantity to be switched and the optimal transfer payments to the entrant supplier are given by

$$d_c^0(c) = \begin{cases} 1 & \text{if } c \leq c_1^0, \\ \dfrac{1}{\alpha}\left(\sqrt{\dfrac{\theta(1+\alpha)}{c+\beta}} - 1\right) & \text{if } c_1^0 < c < c_2^0, \\ 0 & \text{if } c \geq c_2^0, \end{cases}$$

$$t_c^0(c) = \begin{cases} c & \text{if } c \le c_1^0, \\ \dfrac{1}{\alpha}\left(\sqrt{\dfrac{\theta(1+\alpha)}{c+\beta}} - 1\right) \cdot c & \text{if } c_1^0 < c < c_2^0, \\ 0 & \text{if } c \ge c_2^0, \end{cases}$$

where $c_1^0 = -\beta + \dfrac{\theta}{1+\alpha}$ *and* $c_2^0 = -\beta + \theta(1+\alpha) + \alpha s - 2\sqrt{\theta \alpha s(1+\alpha)}$ *." (Ibid.)*

Proposition 3 shows that the buyer chooses between three alternative strategies depending on the entrant supplier's cost level.

The buyer decides in favour of a complete switch and, hence, a termination of the old supplier-buyer relationship if the new supplier has low costs. The fact that he has to bear the whole switching costs does not matter as the resulting amount of transfer payment plus switching costs is lower than price times quantity he was to pay to the former supplier. The transfer payment obtained by $S2$ amounts to his costs.

A partial switch takes place in case of an entrant with intermediate costs. To partition the quantity delivered among the providers is favourable due to a price reduction on the part of the incumbent induced by competition. "Therefore, the buyer's total purchasing costs become a convex function of the quantity of products purchased from $S2$." (Id., p.708) The quantity to be switched decreases linearly in the costs of the entrant and in the parameters α and β. The amount of the transfer payment results from the costs of $S2$ times the quantity needed.

No switching occurs if the entrant's costs are high. This can be traced back to the fact that the established supplier's price is lower than the total of switching and unit costs of the potential supplier. Therefore, transfer payments must not be paid. (Cf. id., p.707f.)

In the following, the impact of changes of the switching cost s and the parameters α and β on the boundaries c_1^0 and c_2^0 between the different cost types of the entrant supplier will be analysed.

A rise of s has no influence on the boundary between a low- and an intermediate-cost supplier. But it has on the boundary between an intermediate- and a high-cost one; namely, it leads to a reduction. This means that it would not impact the decision to switch completely but the partial-switching region would be diminished, making the persistence of the old supplier-buyer relationship more likely.

A reduction of the boundary between a low- and an intermediate-cost supplier and an increase of the boundary between an intermediate- and a high-cost one is to be caused

by a rise of α. A stronger competitive effect (symbolised by the increase of α) makes partial switching more beneficial.

A rise of β reduces the boundary between a low- and an intermediate-cost supplier as well as between an intermediate- and a high-cost one. A higher β causes an enlarged region where the existing supplier-buyer relationship remains unchanged and therefore switching is less probable. (Cf. id., p.708)

4.2.3.2 Asymmetric cost information

The assumptions made in this case regarding the entrant supplier's costs, true reporting and the buyer's decision match those in Chapter 4.2.2.2. Again, a distinction is made between low-, intermediate- and high-cost suppliers. At this point, Proposition 4 has to be presented:

"Proposition 4: The optimal quantity to be switched and the optimal transfer payments to the entrant supplier are given by

$$
d^*(c) = \begin{cases}
1 & \text{if } c \leq c_1^*, \\
\dfrac{1}{\alpha}\left(\sqrt{\dfrac{\theta(1+\alpha)}{c+h(c)+\beta}} - 1 \right) & \text{if } c_1^* < c < c_2^*, \\
0 & \text{if } c \geq c_2^*,
\end{cases}
$$

$$
t^*(c) = \begin{cases}
c_1^* + \dfrac{1}{\alpha}\displaystyle\int_{c_1^*}^{c_2^*}\left(\sqrt{\dfrac{\theta(1+\alpha)}{b+h(b)+\beta}} - 1 \right) db & \text{if } c \leq c_1^*, \\
\dfrac{1}{\alpha}\left(\sqrt{\dfrac{\theta(1+\alpha)}{c+h(c)+\beta}} - 1 \right)\cdot c + \dfrac{1}{\alpha}\displaystyle\int_{c}^{c_2^*}\left(\sqrt{\dfrac{\theta(1+\alpha)}{b+h(b)+\beta}} - 1 \right) db & \text{if } c_1^* < c < c_2^*, \\
0 & \text{if } c \geq c_2^*,
\end{cases}
$$

where c_1^* is defined by the solution to equation $c+h(c)=-\beta+\dfrac{\theta}{1+\alpha}$ and c_2^* is defined

by the solution to equation $c+h(c)=-\beta+\theta(1+\alpha)+\alpha s - 2\sqrt{\theta\alpha s(1+\alpha)}$." (Id., p.708f.)

Proposition 4 shows the dependence of $d^*(c)$ and $t^*(c)$ on the potential supplier's reported costs. This can be obtained by the purchaser by offering a menu of contracts

determining these two values as functions of these costs. The mentioned menu consists of the three regions described below.

When the entrant's costs are below c_1^*, the different cost types cannot be separated. The costs are low and, therefore, a complete switch is beneficial for the buyer. In this case, the quantity to be delivered does not depend on the true costs. With the help of transfer payments the buyer can only make sure that every supplier with costs smaller than c_1^* wants to deliver. In general, the transfer payment should be constant and independent of the buyer's costs for this reason.

Partial switching takes place when the alternative supplier's costs are above the threshold c_1^* but below c_2^*. The quantity delivered by $S2$ is the lower the higher his costs are. Furthermore, the total transfer payments received by him diminish and the unit price rises with his costs. Quantity to be delivered and transfer payments are instruments used by the purchaser to guarantee true cost reports. A reduction of both instruments with increasing costs prevents from cost exaggeration by the new supplier. Although a higher price per unit could be achieved with an overstatement, the entrant leaves it undone since it is more advantageous for him. Quantity and price are instruments used by the purchaser to restrain the new supplier from reporting falsely. The reaction of the buyer to a cost exaggeration on the part of the entrant would be a quantity reduction. The gain deriving from a false report will exactly be balanced by the loss as a result of this reduction. The utilisation of these instruments allows the purchaser to distinguish the different cost types in the intermediate region.

In case of exceeding the threshold c_2^* by the reported costs, the old supplier-buyer relationship will be preserved by the buyer (no switching). As prevention serves the fact that the sum of switching costs and transfer payment is higher than the amount that has to be paid to $S1$. Consequently, $d^*(c)$ and $t^*(c)$ amount to zero. (Cf. id., p.709)

At this point, the presence of an intermediate region has to be highlighted. It is optimal from the buyer's view to change his strategy from single to dual sourcing due to a price reduction on the part of the incumbent referable to competition. The reason therefore can be illustrated by a comparison with the basic model described above. The competitive effect is causal for partial switching. If there was no competition, just complete or no switching would take place. This leads to the conclusion that dual sourcing is the better solution in case of competition between suppliers. (Cf. ibid.)

According to Chapter 4.2.2.3, the advanced model comprises a closer examination of switching inertia as well.

4.2.3.3 Switching inertia

A comparison of Propositions 3 and 4 illustrates that the particular cost boundaries become smaller in case of unobservable costs ($c_1^* < c_1^0$ and $c_2^* < c_2^0$) due to a positive inverse hazard rate for all values of c. Again, inertia is inherent in the decision to switch. (Cf. ibid.)

The information premium paid should guarantee true reporting by the new supplier. Its value depends on the regions mentioned above.

- "In the case of high costs, no switching occurs and consequently no information premium has to be paid.
- In the case of intermediate costs, the information premium is determined by the integral from the true costs to the boundary of the intermediate and the high cost region.
- In the case of low costs, the information premium is given by the sum of two terms. The first is the difference between the true cost and the boundary costs to the intermediate level. The second is the integral over the marginal information premium that would be obtained in the intermediate region." (Id., p.709f.)

The disadvantage of paying a premium is that it raises switching costs and, as a result, makes switching a less beneficial option for the buyer. (Cf. ibid.)

4.3 Concluding remarks

To complete Chapter 4, a summary of the results obtained and observations made will be given in the following.

The model of Demski, Sappington and Spiller (1987) has been described first. In order to identify how and when it is optimal to replace the incumbent supplier, the authors examine the structuring of policy instruments available to a purchaser which should constrain the cost exaggeration of suppliers. (Cf. Demski et al., 1987, p.77f.) The mix of instruments, such as shutdown probabilities, entry probabilities, prices, taxes and production shares, changes depending on whether entry or auditing has been used as means to verify a cost projection. Not only is entry able to imitate an audit but, in addition, provides the advantage of being both information provider and potential

source. Therefore, a shutdown of the incumbent must not result in an output of zero and another supplying source with potentially lower costs is available. Thus, the optimal auditing strategy differs from the optimal entry one.

For instance, it becomes apparent that a decision in favour of entry can be more probable than a decision in favour of auditing. Anyway, the opposite cannot be excluded either. Depending on the conditions, the invitation probability of entry will be higher when the entrant's cost disadvantage is small and when the incumbent can expect high rents emerging from his information advantage in case of non-use of a cost-verifying instrument.

Furthermore, the model shows that production by the entrant is optimal even in case of high costs on his part. This can be traced back to the fact that the supplemental production costs are easily compensated by the gains resulting from having influence on cost exaggeration. In general terms, both direct production and control costs affect the supplier choice. Therefore, the supplier with the lowest direct costs will not be selected since he represents a low-cost source only until control costs are taken into account.

In addition, the different price levels in case of entry and auditing were examined. It showed that the prices in the entry regime might be higher or lower than in the auditing regime, again depending on the conditions. (Cf. id., pp. 89-92)

Finally, it has to be considered that the optimal application of every single instrument depends on the ideal configuration of all others (Cf. id., p.94). This is essential for being able to use supplier switching in an optimal way (Cf. id., p.92).

The model of Wagner and Friedl (2007) aims to render assistance to companies in case of decision-making with regard to the best possible sourcing strategy and, in particular, supplier switching. (Cf. Wagner et al., 2007, p.702)

At first, the authors examine whether a company decides in favour of entire or partial switching in case of symmetric and asymmetric cost information on the part of the purchaser. Then, the factors competition and economies of scale are introduced to show their impact on the established supplier and the switching decision. Again, an examination under symmetric and asymmetric information is carried out. (Cf. id., p.700)

It shows that an information premium has to be paid by the buyer in order to get a cost report from the entrant supplier which corresponds to his true costs. (Cf. id., p.702) The appearance of inertia on the part of rational purchasers in the course of a switching decision becomes obvious when the suppliers' costs are unobservable. As a result, the full potential of minimising the total purchasing costs cannot be exploited. The information rent that has to be paid by the buyer bears the possibility of making him

decide against switching even though the price charged by the new supplier is below the incumbent's price less switching costs.

When competition and effects of economies of scale are taken into account, partial switching and thus multiple sourcing is to be preferred when the entrant is an intermediate-cost supplier. Competition can be instilled or cost-reducing efforts be triggered by pursuing a dual sourcing strategy.

To summarise, in reality (where asymmetric information is the standard) the optimal decision can be achieved by offering a menu of contracts. It determines both the quantity to be delivered and the transfer payments according to the potential cost structures of the new supplier. This represents the best solution possible despite the fact that some switching possibilities having been identified as beneficial ex-post were not taken by the buyer. (Cf. id., p.711)

The most evident differences of the two models examined are that

1. Demski, Sappington and Spiller (1987) consider auditing, in addition to entry, as a possible instrument for cost verification and that

2. Wagner and Friedl (2007) take competitive reactions and partial switching into account.

Despite these differences, the results of both models, in their own ways, go along the same lines. Both come to the conclusion that switching to another supplier, depending on the conditions, can be an advantageous option. Nonetheless, the findings acquired have to be examined critically since they heavily rely on the assumptions made. Basically, with regard to supplier switching a general directive cannot be predefined. Instead, considerations on an individual basis have to be carried out to find the best possible decision. Above all, the basic principle will always have to be that an established supplier-buyer relationship should be terminated after careful consideration only.

5 Factors retarding or inhibiting supplier switching

Factors of a variety of kind can have considerable influence on the decision to switch the supplier. The following chapters try to give an insight into this subject matter.

5.1 Barriers to supplier switching

"Switching barriers [...] refer to the difficulty of switching to another provider that is encountered by a [...] [buyer] who is dissatisfied with the [...] [actual performance] or to the financial, social and psychological burden felt by a [...] [buyer] when switching to a new [...] provider. In brief, switching barriers represent any factor that makes it more difficult or costly [...] to change providers." (Mei-Fang et al., 2006, p.546) Such barriers protect incumbent suppliers from potential rivals and create a competitive advantage on their part. Thus, overcoming a barrier will be made difficult for an alternative provider. (Cf. Li et al., 2006, p.548) In the following, different kinds of barriers will be examined.

The first barrier refers to those people of the buying company who are authorised to make decisions in this regard. Since wrong decisions may have serious negative influences on further career steps, deciders usually prefer to continue and improve actual supplier-buyer relationships (voice strategy) instead of opting for unknown sources which may perform just as good as or even worse than the former one. This may result in a long-run phase of weak performance on the part of the vendor and, at the same time, a reduced performance of the buying company. An even bigger performance gap may arise in the course of the transition period of switching when the process itself does not run as smooth as planned.

In fact, estimating the actual dimension of such a gap in advance is possible to a very limited extent only. The decision maker's uncertainty gets even higher against this background. Consequently, the uncertainty regarding the performance of a new supplying source is one of the most significant barriers existing. (Cf. Kirst, 2008, p.63f.)

In this regard, the hidden characteristics of a potential new supplier have to be examined more precisely. Since the buyer is not able to fully assess all information necessary concerning the supply object in question (like the true cost or quality), the purchasing company tends to refrain from changing the supplier. The potential vendor's

cost structure being effective prior to the initiation of the supplier-buyer relationship can be seen as a hidden characteristic. Therefore, the buyer has to deal with the possible risk of selecting a new provider with properties which are undesired. Still, the supplying company can be induced to reveal these characteristics providing incentives on the part of the purchaser. (Cf. Wagner et al., 2007, p.701f.)

A tendency to continue the relationship with an incumbent supplier is to be observed when members of the purchasing company can look back on beneficial experiences concerning (Cf. Kirst, 2008, p.64) "past businesses or social relationships" (Ibid.). Efficient routines arising out of long-term collaboration within a supplier-buyer relationship are of particular importance in this context. For example, knowing the contact person in the event of problems or sharing of knowledge fall in this category. (Cf. Li et al., 2006, p.554)

Power structures within the buying organisation may constitute a barrier which is difficult to overcome in case diverging interests between departments are present.

"Habit and an aversion to change can cause strong inertia, since employees are used to the way of doing business with the old supplier and do not want to modify their processes." (Kirst, 2008, p.64)

Social interests which are inconsistent with the buyer's interests and which arise out of personal relations existing between members of the purchasing and the supplying company can hamper the replacement of an incumbent supplier.

Limited information exchange and communication make it difficult to estimate the real performance of the potential new supplier or to examine the process of switching. This results in an extension of time having to be spent.

Another factor which can give rise to further troubles and may lead to an increase of the performance gap is opportunistic behaviour on the part of the former vendor, starting as soon as the termination of the business relationship is announced.

In the majority of cases, specific investments have to be made by the purchaser at the beginning of the supplier-buyer relationship to adjust to the supplied good. They represent further barriers of great importance in matters of switching as they turn into sunk costs in case of the termination of this relationship. Consequently, the following rule applies: In case of low asset specificity, switching tends to be easier than it would be the other way round. (Cf. ibid.) In addition to these investments, the arising switching costs constitute a significant exit barrier as well. The simultaneous appearance of both can make a replacement of the supplier even more unattractive or, at worst, impossible. (Cf. id., p.54) "Buyers frequently face switching costs, as a result of earlier commitments to particular product technologies or vendors". (Heide et al.,

1995, p.30) These can be seen as one-time costs arising when the buying company switches completely or partially. (Cf. Kirst, 2008, p.67)

All of these barriers retard the decision process concerning exit or voice strategy. As long as no activities are undertaken, neither towards a performance improvement nor towards switching, the purchasing company will pursue the loyalty strategy. In consideration of uncertainty, switching costs and other barriers, the replacement of suppliers can be characterised as challenging, complex and costly. (Cf. id. p.65) Generally speaking, changing the vendor becomes the more difficult the higher the number of switching barriers within a supplier-buyer relationship is. (Cf. Mei-Fang et al., 2006, p.547) "Consequently, systematic supplier switching activities that aim for a decline of uncertainty and additional costs as well as a reduction of the time needed for a supplier replacement can lower the barriers for supplier switching." (Kirst, 2008, p.65) Thus, switching may become a viable option for a purchaser facing supplier weaknesses. (Cf. ibid.)

As the incurred switching costs influence the supplier's decision to switch in a significant way, this subject matter will be covered separately.

5.1.1 Switching costs

Switching costs arise when the purchaser makes a decision in favour of switching the supplier. These costs not only consist of directly effective monetary costs, such as those emerging from the search of alternative sources. They also include further potential costs like, for example, costs for quality assurance during the transitional phase or opportunity costs (e.g. loss of the former supplier's know-how). Specific investments made in the course of the supplier's vertical integration are of particular importance when determining switching costs. In case of a replacement of the supplier, a transfer of these usually irreversible specific investments to other providers will not be possible. This is known as so-called sunk costs. On the other hand, new supplier-buyer relationships have to be integrated in value-added processes as well, and consequently cause specific investments on their part. This particular mechanism constitutes a hurdle concerning the termination of a suboptimal supplier relation for the buying company frequently. Investment needs and potential costs of new sources are hard to assess. Thus, the risk of an overcompensation of the inherent potential savings of alternative relations arises. (Cf. Arnold, 2007, p.224)

5.1.1.1 Types of switching costs

The classification of switching costs by Burnham et al. (2003) with regard to provider switching of final customers can, in adapted form, be used for the present subject matter. According to this, switching costs can be classified as procedural, financial or relational switching costs. (Cf. Burnham, 2003, p.112)

The procedural switching costs mainly refer to investments in matters of time and effort. This includes the following costs:

- The "economic risk costs are the costs of accepting uncertainty with the potential for a negative outcome when adopting a new provider about which the […] [buyer] has insufficient information". (Id., p.111) Three kinds of consumption risks are included here, performance, financial and convenience risk.

- In order to make proper switching decisions, information about potential new suppliers has to be gathered to carry out an evaluation. The therewith related time and effort costs are called evaluation costs.

- Learning costs may accrue in the course of the supplier replacement since the buyer may be required to acquire new skills and know-how in connection with the usage of the new good supplied. Mostly, learning investments are supplier-specific which means that the adaptation to the selected vendor is accompanied by the need to make new investments.

- Finally, setup costs arise which can be traced back to the process connected with the initiation of the new supplier-buyer relationship or to activities necessary for the initial use of a new product. (Cf. ibid.)

The financial switching costs are related to "the loss of financially quantifiable resources" (Id., p.112). Benefit and monetary loss costs belong to this category.

- The advantage of a persistent supplier-buyer relationship lies in the potential possibility of discounts and other economic benefits. When changing the supplier these advantages may get lost, creating the so-called benefit loss costs.

- The monetary loss costs comprise the entire one-time costs not connected with the buying of the good itself (the costs arising due to the replacement of transaction-specific assets, for example). (Cf. id., p.111)

The relational switching costs involve "psychological or emotional discomfort due to the loss of identity and the breaking of bonds" (Id., p.112) and include personal and brand relationship loss costs. The latter will not be addressed in greater detail at this point since it is related to final consumers basically. The former refers to the affective losses arising due to the dissolution of the bonds of identification which have been established

between members of the buying and supplying company. The familiarity with responsible contact persons in the supplying organisation creates a certain comfort level which cannot be existent at the very beginning of a new supplier-buyer relationship. (Cf. id, p.111f.)

5.2 Switching inertia

Switching inertia can be defined as the buyer's persistence within the present supplier-buyer relationship. (Cf. Li et al., 2006, p.549) As long as the practices pursued in a company are efficient, inertia is not costly to a vast extent. But as soon as efficiency decreases, the related costs begin to increase. (Cf. id., p.554)

The main sources of inertia and two phenomena connected with each other, status quo effect and decision avoidance, help to explain inertia with regard to supplier switching. (Cf. Wagner et al., 2007, p.701) For this reason, both will be examined more closely in the following subchapters.

Consecutively, it will shortly be dealt with investments made to improve the incumbent supplier's performance since this topic is related to switching inertia. Following this, a strategy recommended to a buyer in the presence of inertia will be highlighted.

5.2.1 Main sources

Referring to Rumelt (1995), distorted perception, dulled motivation, failed creative response, political deadlocks and action disconnects can be stated as sources of inertia; a closer look at these sources should contribute to a better understanding of switching inertia. (Cf. Rumelt, 1995, p.105f.)

Perception serves as the starting point of change and, therefore, in case of perceptual distortion, it may happen that change is constrained. The sources of such distortion causing "organizational inertia are: myopia, hubris and denial, and grooved thinking" (Id., p.106). Myopia within an organisation addresses the problem that the decisions made and the activities taken are not directed to the future. Denial can be explained as "the rejection of information that is contrary to what is desired or what is believed to be true […] [and] may stem from hubris - overweening pride in past accomplishments - or it may derive from fear." (Id., p.107) Grooved thinking describes the behaviour of rejecting information and ideas that are characterised by a strong deviation from orthodoxy. (Cf. id., pp.106-108)

A company's need to change may be missing in spite of a precise perception. This can be traced back to insufficient motivation; here, the term 'dulled motivation' is used. The motivational dampers mainly include different types of cost which arise due to change. (Cf. id., p.108)

Even if the difficulties with regard to perception and motivation are missing, change may not be induced in some cases. This is referred to as 'failed creative response' and may result from the fact that analysing the situation or generally making a choice is problematic for the organisation. Here, a blocking of change can occur if decisions have to be made within a very short time, a complex situation is on hand, decision makers opine that they have to deal with natural and unavoidable problems and if the direction chosen is inadequate. (Cf. id., pp.109-111)

A further source of inertia is political deadlocks of which three different types can be distinguished. A very common type is the politics of self interest which implies that a decision maker refrains from making a decision which potentially harms him, even if it was the only proper way. Another reason for a deadlock can be traced back to divergent beliefs concerning the problem's nature or solution on the part of organisational members involved in the decision-making process. Furthermore, great difficulties are associated with vested values which can be described as "strong emotional or value attachments to products, policies, or ways of doing things" (Id., p.112f.) inherent in individuals. (Cf. ibid.)

Action disconnects, representing the last source to be examined, can be attributed to "leadership inaction, embedded routines, collective action problems, and capabilities gaps" (Id., p.113). In order not to impede change, a leader has to express the vision of change, give incentives, act and assign power. Here, a big problem is that leadership is attached to status quo due to various reasons like, for instance, uncertainty in relation to the unknown. The ways how things are done (in other words the processes) form business and the more complex a process is, the greater is inertia. Another blocking factor is represented by collective action problems such as the first mover problem. If the management demands change, subordinates may ask themselves if it is worth to be the first mover, resulting in no action taking place in many cases. A further problem in this context is related to the culture that prevails within an organisation. (Cf. id., pp.113-115) If it is characterised by its resistance to change or does not conform to the company's objectives, it might constitute an insuperable source of inertness. As culture is contingent upon mutual expectations, a change cannot be induced easily. Being the last reason for action disconnects examined at this point, the so-called capability gap can be described as the difference between an organisation's capabilities and the actions having to be taken in the course of running an organisation. (Cf. id., p.117)

5.2.2 Status quo effect and decision avoidance

Different fields of research have identified that buying companies act sluggish with regard to making decisions in favour of replacing the incumbent supplier. In this context, the term status quo effect will be used, representing the tendency to adhere to present or preceding decisions. With reference to supplier switching, this means that the buyer orders the entire amount needed from the incumbent supplier. Thus, the situation remains unchanged. In contrast, a deviation from the status quo is on hand when the purchaser decides to switch to a new provider fully or partially. The norm theory used in psychology indicates that in case of changing the status quo or performing actions diverging from the norm, individuals tend to feel a higher degree of regret. Switching inertia on the part of the buying company can be observed if it is the norm to retain the status quo. (Cf. Wagner et al., 2007, p.701)

The second phenomenon to be discussed at this point is decision avoidance which "manifests itself as a tendency to avoid making a choice by postponing it or by seeking an easy way out that involves no action or no change" (Anderson, 2003, p.139). Different forms of decision avoidance can be distinguished: status quo and omission bias, choice deferral and, finally, inaction inertia which overlaps with the aforementioned.

As noted before, the former can be defined as the dominant preference to leave the situation unchanged, i.e. to maintain the status quo, even if the responsible person is advised to make a decision. (Cf. id., p.142f.) The status quo bias's degree depends on the strength of the buyer's preference and the number of potential suppliers. In this context, the following rules apply:

1. the stronger the preference for a new provider, the weaker the bias, and
2. the more alternative suppliers available, the stronger the relative bias. (Cf. Samuelson et al., 1988, p.8)

Strongly linked to the status quo bias, omission bias can be described as the dominant preference to select options which do not demand action.

Choice deferral - as the third form - is on hand when a decision is postponed temporarily. This comprises to take the time necessary in order to look for more advantageous possibilities, to decide not to choose one of a number of options or to try not to be responsible for the decision in question. (Cf. Anderson, 2003, p.143-144)

Being the last form examined in this context, inaction inertia "refers specifically to the tendency of a person to omit action when he or she already has passed up a similar, more attractive opportunity to act […]. This occurs especially when the subsequent

opportunity is somehow less attractive, even if it still represents a gain from one reference point." (Id., p.146)

On the basis of consumer research studies, it has been detected that the probability for consumers to choose the default option is higher when they "are asked to anticipate the regret and responsibility for making the wrong purchase decision" (Wagner et al., 2007, p.701). Here, switching inertia can be observed if a decision against the replacement of the incumbent supplier is seen as the default option. This statement can, for instance, be deemed appropriate if the knowledge a purchaser has of the established supplier's performance exceeds the knowledge he has of a potential one's performance. (Cf. ibid.)

5.2.3 Investments to improve the incumbent supplier's performance

Another frequently observed behaviour associated with switching inertia is that buying companies spend large amounts of resources and time to improve the incumbent supplier's performance despite having identified its weakness beforehand. This tendency may be decreased at the outset by practicing the activities described subsequently.

In case of a decision in favour of a supplier-development initiative, the buyer has to spend his resources and time without knowing whether his effort is crowned with success. Therefore, using certain instruments to analyse the adequacy of such initiatives is recommendable. A quantified assessment to examine whether the opportunity given to the established supplier to improve his performance is advantageous facilitates the decision in favour of voice or exit strategy and helps to overcome the tendency of sticking to the established supplier. Besides, the buyer is advised to specify the investments needed before deciding on pursuing the voice strategy. This should be done in order to prevent continuing sluggish behaviour if the situation remains unchanged and to limit the resources and the time spent.

Right at the appearance of a supplier weakness, the buyer should take the replacement of the incumbent into consideration. Initiating the activities associated with the switching option at an early stage results in a substantial saving of time. Contrary, by deferring this possibility and deciding to pursue the voice strategy, the buyer could get caught in a vicious circle. As time and resources would be invested in the actual supplier-buyer relationship, the bias towards the incumbent would increase whereas

the will to change the provider would decrease. In the end, the pursuit of the exit strategy would be hampered again.

Continuous monitoring of the supply market keeps the buying company informed regarding potential suppliers available. This becomes evident in case of an absolute weakness on the part of the actual supplier since the time needed to find a new provider can be reduced substantially. Additionally, detailed knowledge of the market makes it more likely to identify a relative weakness which harms the purchaser's competitiveness.

As already mentioned, the disengager's sluggish behaviour with regard to switching decisions can be traced back to the uncertainty related to the actual performance level of the potential exchange partner. Auditing and assessment methods, like test runs in the run-up to contracting, should lead to a reduction of these uncertainties and provide better insights into the alternative partner's real performance. (Cf. Kirst, 2008, p.202f.)

5.2.4 Strategic orientation

Before concluding the present chapter, some thoughts on a potential entrant supplier's strategic orientation have to be made. Following Li, Madhok, Plaschka and Verma (2006), it would be best for a potential entrant supplier to pursue strategic positioning instead of operational effectiveness. (Cf. Li et al., 2006, p.568) Whereas the latter "means performing similar activities better than rivals […] [the former embraces] performing different activities from rivals or performing similar activities in different ways". (Id., p.554)

By following the operational effectiveness strategy, a potential supplier offers a similar value configuration compared to his rival. Since the established provider occupies his position by performing particular activities, it is likely that offering an improved performance will not be enough for the challenging supplier when switching inertia is existent. Additionally, it is greatly disadvantageous in such cases that competition takes place under the incumbent's terms. This might deviate from the competencies of the potential entrant.

If, in contrast, a potential supplier follows strategic positioning, he offers a divergent activity configuration in order to provide a differing value mix. This complies with the competencies of the entrant to a higher degree. Therefore, the incumbent's response becomes more challenging.

To summarise, as supplying companies try to gain competitive advantage, greater value has to be offered to customers. In the presence of switching inertia this is,

however, hard to achieve when following the operational effectiveness strategy. (Cf. id., p.554f.)

6 Conclusion

The work at hand dealt with the subject matter of supplier switching and, in particular, with buying companies' decision whether a supplier switch should be carried out or not. Since the process of switching is affected by various factors, their examination and analysis is of great importance to establish clarity within this topic.

First of all, a consideration of factors triggering the replacement of an incumbent supplier and thus the need for switching and factors influencing the switching procedure's level of difficulty and thus the easiness of switching has been carried out to help create a fundamental understanding for the subject matter. The former is reflected in motives causing switching, such as lower prices, poor quality and performance, new technologies, the bankruptcy of a supplying company and the discovery of a better source, and contingencies or characteristics of products, processes or industries creating the need. The influencing factors of the latter are related to different sourcing strategies (e.g. single vs. multiple and individual vs. cooperative sourcing), conditions of the switching environment (relationship-specific investments, high dependency on the actual supplier, the number of potential suppliers and switching costs) and design decisions of a supply chain (governance, choice of actors, coordination and processes). In conclusion, the balancing of the need for and the easiness of switching shapes an organisation's switching behaviour. The need as well as the easiness may be high or low, entailing different situations and reactions on the part of the company concerned.

The consideration of the different phases which have to be run through in the course of a supplier switch, the activities to be performed in this regard and their constituents' interrelation allows gaining a comprehensive picture of a supplier switch. The first phase, the supplier-switching decision phase, comprises the identification of a supplier weakness through evaluating the satisfaction with the current supplier-buyer relationship, the decision either to pursue loyalty, voice or exit strategy and, in case of deciding in favour of the latter, the final decision to switch. Representing the major tasks of the second phase, denominated as supplier-switching execution phase, the planning, steering and monitoring of the supplier switch should help to guarantee a smooth switching process. Finally, the supplier-switch success evaluation phase comprises the evaluation whether a performed switch has been successful or not. For this purpose, three different success dimensions (economic, technological and switching-related success) were measured to obtain more differentiated evaluation

results. Put together, these dimensions constitute the overall switching success which indicates the degree of satisfaction of the buying company following an executed switch. The disengager can look back at a successful switch when his supply situation has improved and therewith his competitive position.

Two models designed to support companies in their decision-making process preceding a potential supplier switch were introduced to provide clarity regarding this topic. Accordingly, both come to the conclusion that switching, depending on the conditions, can be an advantageous option.

Demski, Sappington and Spiller (1987) focus on the comparison of entry and auditing as instruments to verify the reported costs of the incumbent supplier. Their model shows that entry is not only able to imitate an audit but, in addition, provides the advantage of being both information provider and potential source. Depending on the conditions, the invitation probability of entry will be higher when the entrant's cost disadvantage is small and when the incumbent can expect high rents emerging from his information advantage in case of non-use of a cost-verifying instrument. It shows that production by the entrant is optimal even in case of high costs on his part as the supplemental production costs are easily compensated by the gains resulting from having influence on cost exaggeration.

Wagner and Friedl (2007) examine whether a company decides in favour of entire or partial switching in case of symmetric and asymmetric cost information on the part of the purchaser. By incorporating the factors competition and economies of scale, their impact on the established supplier and the switching decision is highlighted. It shows that an information premium has to be paid by the buyer in order to get a true cost report. Furthermore, it was found that the optimal decision in case of asymmetric information can be achieved by offering a menu of contracts that determines both the quantity to be delivered and the transfer payments according to the new supplier's potential cost structures. This applies despite the fact that some switching possibilities having been identified as beneficial ex-post were not taken. When costs are unobservable, the buyer decides in favour of a complete switch if the reported costs are lower than a threshold determined and against it if costs exceed this threshold. By way of comparison, if competition and effects of economies of scale are taken into account, partial switching and thus dual sourcing is to be preferred when the entrant is an intermediate-cost supplier. In contrast, the buyer decides in favour of a full switch if the new supplier has low costs and in favour of no switching if his costs are high.

In general, the findings acquired heavily rely on the assumptions made and, therefore, a general directive cannot be predefined. Thus, finding the best possible decision demands considerations on an individual basis.

At last, factors having a hindering impact on the decision to replace the established supplier were considered. Being aware of these factors from the outset may facilitate the decision-making process.

On the one hand, the act of switching is made more difficult or costly by certain barriers. These barriers include, amongst others, the behaviour of decision makers and other persons of the buying company involved, uncertainty, specific investments and switching costs. The latter is, without doubt, one of the most important aspects that has to be taken into account when considering the replacement of an established supplier. Directly effective monetary costs, such as costs for the search of alternative sources as well as further potential costs like opportunity costs (e.g. loss of the former supplier's know-how), can be seen as switching costs. Furthermore, specific investments related to the integration of suppliers are of particular importance when determining switching costs as these investments become sunk costs.

On the other hand, the tendency of buying companies towards inertial behaviour concerning supplier switching can be observed. The main sources of inertia are distorted perception, dulled motivation, failed creative response, political deadlocks and action disconnects. Status quo effect and decision avoidance are explicatory psychological phenomena in this context. Whereas the former means to adhere to present or preceding decisions, the latter represents the tendency to avoid a decision by suspension or by looking for alternatives not presuming action or change.

Finally, having examined the subject matter of supplier switching closely, it becomes apparent that this topic is underrepresented in scientific literature despite its particular significance. Thus, additional research is required to clarify issues still in question.

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Appendix

Referring to Chapter 4, the calculations corresponding to Figure 5 can be found in the following.

In case of asymmetric information, a complete switch takes place when $c \leq c^*$. The reported costs of the entrant do not exceed the threshold c^* with probability $P(c \leq c^*) = F(c^*)$. In this case, a constant transfer payment $(t^*(c) = c^*)$ will be offered by the buyer independently of the entrant's costs. The reduction of the buyer's costs amounts to $p - t^*(c)$ and thus to $p - c^*$. Hence, the subsequent optimisation problem has to be solved:

$$\max \left\{ (p - c^*)F(c^*) \right\}.$$

To differentiate with respect to c^* results due to $f(c^*) = 1$ and $F(c^*) = c^*$ in the first order condition:

$$(p - c^*)f(c^*) - F(c^*) = 0$$
$$(p - c^*) \cdot 1 - c^* = 0$$
$$p - c^* - c^* = 0$$
$$p - 2c^* = 0$$
$$p = 2c^*$$
$$c^* = \frac{p}{2}$$

Consequently: $(p - c^*)F(c^*) = (p - c^*)c^* =$

$$= pc^* - c^{*2} =$$
$$= p \cdot \frac{p}{2} - \left(\frac{p}{2}\right)^2 =$$
$$= \frac{p^2}{2} - \frac{p^2}{4} =$$
$$= \frac{2p^2}{4} - \frac{p^2}{4} =$$
$$= \frac{p^2}{4}$$

Information premium, switching intertia and costs of the buyer are split up as follows:

Costs of the buyer:

$$E\left[(p-c^*)\cdot F(c^*)\right]=(p-c^*)\cdot c^* = pc^* - c^{*2}$$

Information premium ($c \sim U_{[0,c^*]}$):

$$E\left[(c^*-c)\cdot F(c^*)\right]=(c^* - \frac{c^*}{2})\cdot c^* = \frac{c^*}{2}\cdot c^* = \frac{c^{*2}}{2}$$

Switching inertia:

First-best ($c \sim U_{[0,p]}$): $\qquad E\left[(p-c)\right]=(p-\frac{p}{2})=\frac{p}{2}$

Switching inertia: $\qquad \dfrac{p}{2} - \dfrac{c^{*2}}{2} - \left[pc^* - c^{*2}\right] = \dfrac{p}{2} - \dfrac{c^{*2}}{2} - pc^* + c^{*2} =$

$$= \frac{p}{2} + \frac{c^{*2}}{2} - pc^* =$$

$$= \frac{p + c^{*2} - 2pc^*}{2}$$

To demonstrate the split-up conclusively, p and therewith c^0 are normalised to 1. Consequently $c^* = \dfrac{1}{2}$.

Costs of the buyer:

$$(p-c^*)c^* = \left(1-\frac{1}{2}\right)\cdot\frac{1}{2} = \frac{1}{4}$$

Information premium:

$$(c^* - \frac{c^*}{2})\cdot c^* = \left(\frac{1}{2} - \frac{\frac{1}{2}}{2}\right)\cdot\frac{1}{2} = \frac{1}{8}$$

Switching inertia:

$$\frac{p}{2} - \frac{c^{*2}}{2} - \left[pc^* - c^{*2}\right] = \frac{1}{2} - \frac{\left(\frac{1}{2}\right)^2}{2} - \left[1 \cdot \frac{1}{2} - \left(\frac{1}{2}\right)^2\right] = \frac{1}{8}$$

Abstract

The work at hand deals with the subject matter of supplier switching. At first, the need for and the easiness of switching are examined. The need for switching is reflected in motives causing switching, such as lower prices and poor quality, and contingencies or characteristics of industries, processes or products creating the need. The easiness of switching is influenced by a great number of factors related to different sourcing strategies, conditions of the switching environment and design decisions of a supply chain. In conclusion, the balancing of the need for and the easiness of switching delivers insights into the switching behaviour of buying companies.

In order to structure the whole switching process, the different phases which have to be run through in the course of a supplier switch are dealt with thereafter. Supplier-switching decision, execution and success evaluation phase comprise activities ranging from actions taken prior to the switching decision as, for example, the identification of a supplier weakness, to the final success evaluation succeeding the performed switch.

The work's main part examines two models which deal with the option of replacing the incumbent supplier using different approaches in order to find out when and how it is optimal to switch. Demski, Sappington and Spiller (1987) focus on the comparison of entry and auditing as instruments to verify the reported costs of the established supplier against the background of changing the supplier or remaining with the present one. Their model shows that, depending on the conditions, a decision in favour of entry is more probable than in favour of auditing and that production by the entrant is optimal even in case of high costs on his part. Wagner and Friedl (2007) examine whether a company decides in favour of entire or partial switching in case of symmetric and asymmetric cost information on the part of the purchaser. It shows that full or no switching takes place and that inertia appears on the part of rational purchasers in course of a switching decision when the suppliers' costs are unobservable. Then, the factors competition and economies of scale are introduced to highlight their impact on the established supplier and the switching decision. Here, it becomes obvious that, depending on the conditions, a decision in favour of no, partial or complete switching will be made.

Finally, factors having a hindering impact on the decision in favour of supplier switching are examined. They include barriers attributable to the behaviour of decision makers and other persons of the buying company involved, uncertainty, specific investments and switching costs. Strongly related to those psychological phenomena denominated as status quo effect and decision avoidance, switching inertia is highlighted as being another greatly important factor in this regard. The chapter is completed by a short

description of activities which should help to avoid spending too large amounts of resources and time to improve the incumbent supplier's performance and, lastly, by the recommendation of pursuing strategic positioning.

Zusammenfassung

Die vorliegende Arbeit ist der Thematik des Lieferantenwechsels gewidmet. Im Vordergrund stehen dabei zunächst Fragestellungen zur Notwendigkeit und Durchführbarkeit solcher Wechsel („need for and easiness of switching"). Während erstere sich in spezifischen Motiven wie Preisvorteilen und Qualitätssteigerungen, die einen Lieferantenwechsel auslösen, widerspiegeln und auf Charakteristika von Produkten, Arbeitsabläufen und Branchen zurückzuführen sind, wird letztere maßgeblich von Faktoren wie der gewählten Beschaffungsstrategie bzw. der Beschaffenheit des Umfelds und der Ausgestaltung der Lieferantenkette beeinflusst. Allgemein lässt sich festhalten, dass die Wechselbeziehung beider Einflussfaktoren zueinander das Verhalten eines zukaufenden Unternehmens in maßgeblicher Weise bestimmt.

Im nächsten Schritt werden die Abläufe eines Lieferantenwechsels näher beleuchtet und anhand einer Erörterung der dabei zu durchlaufenden Phasen der Entscheidungsfindung, der Ausführung im engeren Sinn und der Erfolgsevaluierung strukturiert. Diese umfassen vor der eigentlichen Entscheidung zugunsten oder gegen einen Lieferantenwechsel liegende Vorgänge und Maßnahmen, etwa das Feststellen von Defiziten auf Seiten des Lieferanten, als auch solche, die dem Wechsel im engeren Sinn zeitlich nachfolgen (Evaluierung ex-post).

Das umfangreichste Kapitel ist der Betrachtung zweier Modelle gewidmet, die sich bei der Beantwortung der Frage nach dem optimalen Zeitpunkt bzw. der bestmöglichen Umsetzung eines Lieferantenwechsels unterschiedlicher Herangehensweisen bedienen. Im Zentrum des von Demski, Sappington und Spiller (1987) entwickelten Modells steht der Vergleich zweier Instrumente zur Prüfung der vom bestehenden Lieferanten berichteten Kosten (Eintreten eines alternativen Lieferanten und Verwendung eines Kontrollinstruments). Ihr Ziel ist es, der Entscheidung für oder gegen eine weitere Zusammenarbeit eine fundierte Grundlage zu geben. Zu den dabei gewonnenen Erkenntnissen zählt, dass eine Entscheidung zugunsten eines Eintritts, abhängig von den jeweiligen Gegebenheiten, wahrscheinlicher ist als eine solche zugunsten der Verwendung des Kontrollinstruments. Es erweist sich darüber hinaus, dass die Produktion eines neu eintretenden Lieferanten auch dann optimal ist, wenn dieser höhere Kosten hat. Wagner und Friedl (2007) untersuchen, ob sich ein Unternehmen im Falle asymmetrischer bzw. symmetrischer Kosteninformation für einen partiellen oder kompletten Lieferantenwechsel entschließt. Dabei zeigt sich, dass eine Entscheidung zugunsten eines kompletten Wechsels oder zugunsten des bestehenden Lieferanten gefällt wird. Andererseits wird evident, dass im Falle von nicht

zu beobachtenden Kosten Trägheit („inertia") seitens des zukaufenden Unternehmens auftritt. Eine Erweiterung des Modells um die Faktoren Wettbewerb und Skaleneffekte berücksichtigt deren Einfluss auf das Verhalten des bestehenden Lieferanten und die Entscheidung des Käufers. Hier zeigt sich, dass, abhängig von den jeweiligen Gegebenheiten, eine Entscheidung zugunsten einer Fortsetzung oder einer Beendigung der Zusammenarbeit bzw. der Inanspruchnahme beider Lieferanten getroffen wird.

Schließlich werden jene Faktoren beschrieben, die den Entschluss zugunsten eines Lieferantenwechsels erschweren. Hierzu zählen den Entscheidungsträgern bzw. anderen involvierten Personen zuschreibbare Hemmnisse, Unsicherheiten, notwendige Investitionen und durch den Wechsel entstehende Kosten. Als wesentlicher Faktor zu berücksichtigen ist darüber hinaus die Trägheit, einen Wechsel zu vollziehen, die ihrerseits wesentlich von psychologischen Phänomenen, insbesondere dem Status-Quo-Effekt und der Tendenz, Entscheidungen nach Möglichkeit auszuweichen („decision avoidance"), geprägt ist. Die Arbeit schließt mit einer kurzen Darstellung von Aktivitäten, die dazu beitragen sollen, unnötig hohe Aufwendungen, sowohl in Bezug auf die eingesetzten finanziellen Mittel als auch die in Anspruch genommene Arbeitszeit, zu vermeiden und gibt abschließend die Empfehlung zur strategischen Positionierung des zuliefernden Unternehmens.

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