

## MANAGING THE COSTS IN GREEN SUPPLY CHAINS – AN ORGANISATIONAL CHALLENGE

Greening of Industry Conference, 23<sup>rd</sup>-26<sup>th</sup> June 2002 in Göteborg/Sweden

---

Maria Goldbach

Diplom-Ökonomin, Diplômée de l'INSEEC Bordeaux

Chair for Production and the Environment

Institute of Business Administration

Carl von Ossietzky University Oldenburg

Postfach 2503

26111 Oldenburg

Germany

Tel.: +49 441 798-4172

Fax: +49 441 798-5852

E-Mail: [maria.goldbach@uni-oldenburg.de](mailto:maria.goldbach@uni-oldenburg.de)

---

### ABSTRACT

Cost management in green supply chain is of crucial importance as green products still often remain in market niches. One of the major reasons is their significantly higher price in comparison to conventional ones. The greening of products implies an ecological optimisation along the entire value-adding process of the product. This greening process is susceptible to cause higher costs on all levels of the supply chain. These ecological optimisations have important impacts on the design and structure of the chain as a whole. Greening does not merely consist in substituting conventional material through green one, but it incurs two important effects:

1. The objective of providing an economically competitive product to final customer is extended to the objective of an economically and ecologically competitive product
2. The set of involved actors is extended in greening supply chains. Both actors responsible for economic aspects as well those driving ecological optimisation have to be taken into consideration. This implies that diverging interests may not only occur between companies, i.e. in interfirm supply chains, but equally between different departments within companies, i.e. intrafirm supply chains.

The challenge of managing costs in greening both interfirm and intrafirm supply chains therefore lies in the identification of coordination scenarios which allow to manage costs in green supply chains, taking into account ecological requirements and considering the organisational settings and interactions between the involved actors along the entire chain.

For tackling this challenge, target costing in supply chains will first be introduced as an appropriate cost management instrument in this paper. It is pointed out that it is of crucial importance not only to focus on how costs have to be managed, but on who manages them, i.e. the organisational settings between the involved actors. Structuration theory is presented as a conceptual framework for analysing interaction between actors in supply chains. These two aspects are linked analysing target costing as an organisational structure in supply chains. The paper identifies power and cooperation as two coordination strategies. These lay the conceptual basis for coordinating relationships in supply chain target costing. The framework is reflected at the example of the textile industry, namely the greening of the cotton chain of German mail-order business OTTO.

The presented conceptual framework is part of the doctoral thesis of the author which will be published at the beginning of 2003.

To be presented at the 10th international conference of the Greening of Industry Network

June 23-26, Göteborg, Sweden

**KEY WORDS**

green supply chains, supply chain relationships, cost management, organisational settings, textile industry

## 1 WHY MANAGING COSTS IN GREEN SUPPLY CHAINS?

Cost management in green supply chain is of crucial importance due to the fact that green, i.e. ecologically optimised, products still often remain in market niches. One of the major reasons is their significantly higher price in comparison to conventional ones. In the clothing industry for example, prices are between 25-100% higher. These higher prices constitute both the effect and the cause of green products remaining in a market niche: On the one hand, small production quantities, related to the niche, lead to higher prices of the products. On the other hand, higher prices of the products inhibit large quantities of customers buying the products which (re-)enforces their positioning in the niche. This phenomenon, which is called the niche trap, is typical for green products.<sup>1</sup> A major problem in successfully introducing green products on the market is due to the fact that final customers are often not willing to pay higher prices for green products, not considering ecological features as a value-added. This implies that higher costs related to the ecological optimisation of the production are not covered by final customer demand.<sup>2</sup>

The greening of products implies an ecological optimisation not only from the point of view of a single company, but along the entire value-adding process of the product, taking into consideration the entire chain of suppliers and suppliers' suppliers as well as customers and customers' customers.<sup>3</sup> Therefore, a product may only be called green, if it has been ecologically optimised from raw materials stage to trade or even beyond to use and disposal. In this context, the greening of the product is susceptible to cause higher costs on all levels of the supply chain. These increased costs may be due to the use of more expensive ecologically optimised material, to smaller production quantities, the necessity of parallel production as well as higher coordination effort resulting from the limited availability of partners and resources.

The ecological optimisation of a supply chain therefore has important impacts on the design and structure of the chain as a whole. Greening does not merely consist in substituting conventional material through green one, but two important effects occur:

1. The objective of providing a economically competitive product to final customer is extended to the objective of an economically and ecologically competitive product<sup>4</sup>. Economic and ecological objectives do not necessarily cause synergies though, so that conflicting interests are susceptible to arise, increasing complexity in the chain.
2. The set of involved actors is extended in greening supply chains. It is not sufficient to take into consideration actors responsible for economic aspects, e.g. buying and sales or controlling departments, but equally those driving the ecological optimisation such as environment departments. This implies that diverging interests may not only occur between companies in the supply chain, i.e. in the interfirm supply chain, but with regards

---

<sup>1</sup> See Meyer 2000.

<sup>2</sup> See Meyer 2001: 131.

<sup>3</sup> For an introduction to supply chain management see Handfield/Nichols 1999.

<sup>4</sup> See Hummel 1997.

to the ecological aspects, equally between different departments within companies, i.e. in the intrafirm supply chain.

The challenge of managing costs in greening supply chains therefore lies in the identification of coordination scenarios which allow to manage costs in green supply chains, taking into account ecological requirements and considering the organisational settings and interactions between the involved actors along the entire chain.

In order to tackle the challenge of managing costs in green supply chains, target costing in supply chains will first be introduced as an appropriate cost management instrument. Second, structuration theory is presented as a conceptual framework for analysing interaction in supply chains. In the following, these two aspects are linked and target costing is analysed as an organisational structure in supply chains. In the next step, power and cooperation are discussed as two coordination strategies in supply chain target costing. Finally these two coordination strategies are reflected at the example of OTTO.

## 2 TARGET COSTING IN SUPPLY CHAINS

A cost management instrument which faces the challenge of integrating final customer orientation to assure the competitiveness of a product, is target costing.<sup>5</sup> It takes up the idea of customer satisfaction, starting from the market conditions and the assumed market price of a product. This market price serves as the analytical basis for the cost-value relations of the product:<sup>6</sup> *“An ideal resource input is therefore to put resources in, the way it corresponds to the desired product value relations of the customer”*<sup>7</sup> Having set the target selling price, e.g. through marketing analyses, competitor analyses etc.<sup>8</sup>, the company fixes the target profit margin it desires to obtain. Subtracting this margin from the target selling price provides the costs a product is allowed to cause, the so-called allowable costs. This procedure is called market-driven costing. In a second step, called product-level target costing, the costs a product is susceptible to cause, called standard or current costs, are calculated. These are confronted to the allowable ones. If a difference occurs, a rather common case in practice, the firm has to take measures in adjusting costs through strategic cost reductions. Generally, the standard costs will exceed the allowable ones, which means that the firm has to take actions to reduce the current costs. The measures of product level target costing can further be broken down to the component level, called component-level target costing. The equivalent to the allowable or current costs on market and product level are the suppliers costs on the component level. These constitute the linkage to the suppliers target costing as shown in the figure below<sup>9</sup>:

---

<sup>5</sup> For an introduction to target costing see Cooper/Slagmulder 1999, Seuring 2001 or Lockamy/Smith 2000.

<sup>6</sup> See Horvath/Seidenschwarz 1992: 143.

<sup>7</sup> Horvath/Seidenschwarz 1992: 145, translation by the author.

<sup>8</sup> Several methods exist to determine this market price. See Freidank 1993: 394.

<sup>9</sup> For a more detailed description see Seuring 2001 or Cooper/Slagmulder 1999.

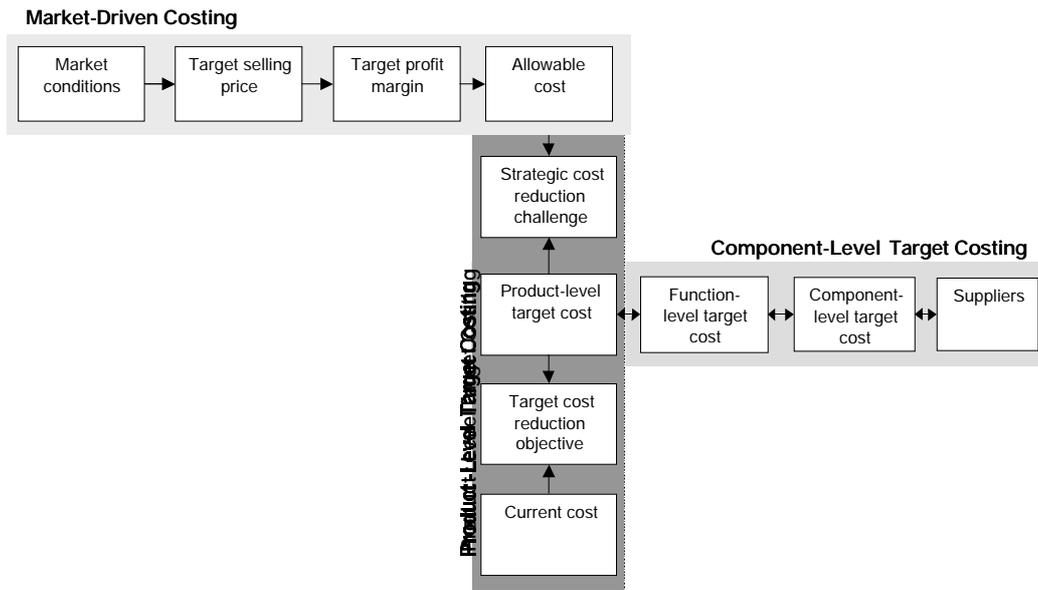
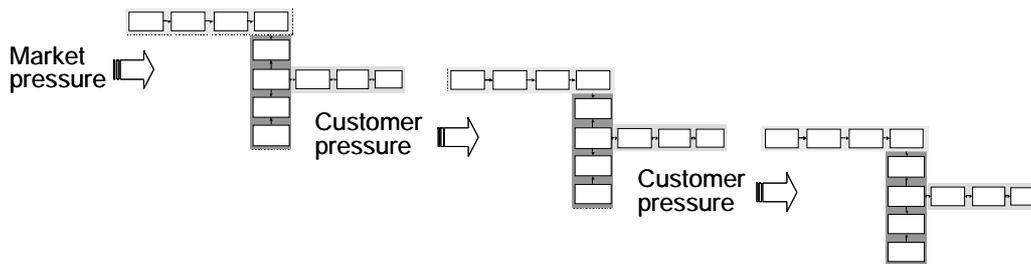


Figure 1: The Concept of Target Costing.<sup>10</sup>

The scope of conventional target costing is a single firm. In order to apply target costing to supply chains, which is the objective in this work, the approach of target costing has to be extended beyond organisational boundaries to the entire interfirm supply chain. Three authors have largely contributed to the development of a concept for chained target costing, namely Cooper/Slagmulder<sup>11</sup> and Seuring<sup>12, 13</sup>. Starting from the conventional procedure of target costing, the scope of action within one firm ends with back end of component level target costing. Here, the chain perspective comes into play. The costs identified on the component level serve as the market target costs for the upstream supplier. This effect goes down all the way through the chain up to the raw materials suppliers.<sup>14</sup>



<sup>10</sup> Cooper/Slagmulder 1999: 166.

<sup>11</sup> See Cooper/Slagmulder 1999.

<sup>12</sup> See Seuring 2001.

<sup>13</sup> Target costing in supply chains has been described several authors such as Lockamy/Smith 2000, Cooper/Slagmulder 1999 and Seuring 2001.

<sup>14</sup> See limits discussed in Cooper/Slagmulder 1999.

Figure 2: The Concept of Supply Chain Target Costing.<sup>15</sup>

In supply chain target costing, final customer requirements are identified on the market level and communicated back along the entire chain. The market pressure, which serves as the basis of the market target price, is translated into customer pressure from the second level in the supply chain.

Supply chain target costing therefore provides an appropriate cost management tool which focuses on final customer demand and integrates cost effects along the entire supply chain, therefore laying the basis for designing a competitive supply chain.

The greening of supply chains requires ecological optimisations, though, which may have an effect on the current costs in the supply chain. Starting from the market conditions and therefore the target selling price, two scenarios are possible:

1. The ecological requirements in green supply chains lead to a value increase from a final customer perspective. This implies that the product can be sold at a higher price than the conventional one. The difference in the target selling price corresponds to the value increase for the final customer, induced through the ecological optimisation of the product.
2. The ecological requirements do not incur a value increase from final customer perspective. In this case, the target selling price for the ecological product needs to be set equivalent to the target selling price for conventional ones. The realisation of this target selling price is only possible on the condition that the ecological optimisation enables cost optimisation, i.e. induces positive cost saving effects. If the ecological optimisations do not have any cost saving effects or even a negative one, the concept of target costing may not be applied in its current design.<sup>16</sup>

When greening supply chains, the cost effects of the ecological optimisation need to be taken into account in order to adjust the application of target costing is necessary.

The preceding reflections have pointed out possibilities of how to manage costs in green supply chains. In cost management it is not only important to consider what is managed, i.e. cost management data, and how it is managed, i.e. through which cost management instruments such as target costing, but to take into account who manages, i.e. the relevant cost management actors.<sup>17</sup> In cost management, the data provide the necessary basis for applying instruments. Both cost management data and instruments need to be implemented and applied by the cost management actors. It is important to keep in mind that the instruments do not allow for cost optimisation due to their mere existence, just as a musical instrument does not make music by itself. They require actors or musicians which know how to use or play the instrument in order to have the desired effect.

---

<sup>15</sup> Based on Cooper/Slagmulder 1999.

<sup>16</sup> An alternative consists in trying to influence the value perception of final customer. This change can hardly be put in practice by a company on its own but rather requires joint efforts of several companies or even societal changes. This alternative will not be further discussed in this paper.

<sup>17</sup> See Håkansson 1989: 196.

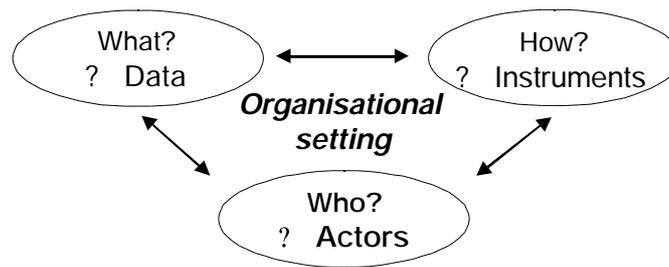


Figure 3: Organizational Settings in Cost Management.

These interactions between cost management data, instruments and actors are embedded in the organisational setting of both the intrafirm and the interfirm supply chain.

Looking at the target costing actors in green supply chains, it is not only important to take into consideration the different firms as in conventional chained target costing. In the light of green supply chains it becomes equally important to consider the actors within a company, especially different departments. This is due to the fact that the various departments within one company may pursue different, if not contradicting interests. The buying or production department may focus on tight cost optimisations, leaving aside ecological considerations, whereas the environment department may focus on ecological requirements without taking into account cost aspects. These conflicting interests within a company may sensitively influence the target costing approach.

The following reflections therefore focus on the crucial question of who manages the costs in supply chains, taking into consideration the underlying organisational setting. This question is particularly relevant in green supply chains, due to the increased complexity and potential conflicting interests between economic and ecological aspects of the responsible actors in the interfirm and intrafirm supply chain.<sup>18</sup>

### 3 STRUCTURATION THEORY AS A CONCEPTUAL FRAMEWORK FOR SUPPLY CHAIN INTERACTION

The preceding reflections have pointed out that the focus of managing costs in (green) supply chains should lie on the actors who manage costs, i.e. the organisational aspects of cost management. This implies analysing the behaviour of actors, the interactions between the actors as well as the organisational settings both within companies and the supply chain. Structuration theory<sup>19</sup> provides a conceptual framework and an interpretative basis for analysing the facets of actors' relationships in the supply chain context. Its basic idea is the duality of structure: structures constitute both the condition for and the result of action.<sup>20</sup> From an action angle this implies that action is influenced by structure while at the same time reinforcing it.

<sup>18</sup> In managing the relationships in supply chains it is of crucial importance to focus on the relevant key actors. These should be selected on the basis of a portfolio approach. In green supply chains, these correspond to the actors which have both high cost as well as high ecological impacts.

<sup>19</sup> See Giddens 1997.

<sup>20</sup> See Giddens 1997: e.g. 25, 29.

Actors can be either individuals or organisations, i.e. collective actors.<sup>21</sup> This work focuses on organisational actors, both within companies and within supply chains. Within companies, the actors to be analysed are the different departments. The buying department of a company takes different actions than the environment department. Within supply chains, the considered actors are the different companies which are supposed to behave differently, too.

*“Organisations are viewed as social systems within which actions are directed and coordinated by the reflection upon the actions’ structuration”*<sup>22</sup> Individual actors in organisations<sup>23</sup> orientate their actions towards organisational practices, i.e. they repeatedly practice certain forms of acting. These organisational practices, if frequently used, accepted and established, turn into generally accepted organisational routines. These organisational practices and routines, referred to as organisational structures in the following, are constituted by action and merely exist in the memories and expectations of the constituting actors. Therefore, according to structuration theory, actors in organisations do not simply interact on their own, but explicitly or implicitly take into consideration other actors actions, i.e. their organisational environment.<sup>24</sup>

A person trying to speak English correctly for example, implicitly and often unconsciously refers to the English vocabulary and grammar structures. In acting (speaking) this person uses the structures of English language which exist in its memories and expectations.<sup>25</sup> Through speaking English, this person at the same time reinforces and updates the existing English vocabulary and grammar structures.<sup>26</sup> The same reflections can be applied to the use of cost management instruments such as target costing. A cost management actor who wants to optimise costs and assure the realisation of the market price of a product, will apply target costing as a cost management instrument which exists as an appropriate structure in his memory, following certain rules. By applying target costing, this same actor strengthens the role of target costing as a cost management structure in its company. This recursiveness is at the very heart of the theory of structuration.

The organisational structure serve as a conceptual framework for explaining actors’ behaviours and actions. Actors may explain their behaviour referring to the structure, if asked. This phenomenon is called rationalisation of action.<sup>27</sup> As the structures, i.e. organisational practices and routines, are based on the actors’ memories and experiences, the actors generally have only an implicit knowledge leading to an implicit application of this knowledge while acting. When asked to justify their actions, they may partly rationalise it on the basis of the perceived structures, but partly action remains linked to unacknowledged conditions of which the actors are

---

<sup>21</sup> For a conceptualisation of collective actors and its application to the theory of structuration see Schneidewind 1998.

<sup>22</sup> Ortmann et al. 1997: 317, translation by Maier/Finger 2001: 90

<sup>23</sup> In this paper, the term organisation is used in a rather open sense, including departments in companies as well as companies in supply chains.

<sup>24</sup> See Giddens 1997: 25

<sup>25</sup> See Giddens 1997: 5.

<sup>26</sup> See Giddens 1997: 8.

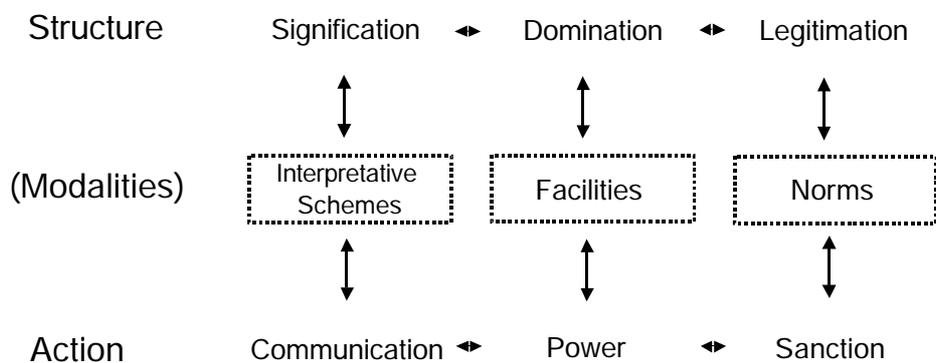
<sup>27</sup> See Giddens 1997: 3ff.

not aware. Apart from a limited awareness of conditions, i.e. structures, action of actors may lead to unintended consequences they could not foresee.

Therefore, structure does not exist independently from action and action not independently from structure. Structures both have a facilitating and a constraining effects upon action. They enable actors to use English language as a communication medium with other actors, providing them with the necessary structures and limit the communication through the given set of vocabulary and grammar rules. Anything which can not be expressed through the given structure may, a priori, not be communicated.

Giddens defines structures as the rules and resources which are integrated in the reproduction of social systems in a recursive way.<sup>28</sup> These rules and resources, which he refers to as modalities, serve as the link between structure and action. Rules are differentiated into two types: interpretative schemes and norms. Interpretative schemes enable actors to make sense of their actions, i.e. to interpret and to rationalise them as well as to communicate this rationalisation to their environment. An example for interpretative schemes are technical terms or concepts such as target costing, for example, which allow for a common understanding of action between actors. Norms serve as the basis for legitimising and sanctioning actions both in a positive and in a negative way. They determine which actions are justified and accepted and which ones are not. Based on the norms, target costing may be considered as an appropriate instrument to manage costs in supply chains according to up to date cost management research and practice. Another example for norms are ecological criteria in supply chains. Resources are equally distinguished into two types: allocative and authoritative resources. Both types of resources generate power. Allocative resources refer to the power of actors over objects, i.e. material and physical things. An example is power to take budget decisions which may influence the target costing process. Authoritative resources provide power over subjects, i.e. over human beings. An important source of authoritative power is ecological or economic know how.<sup>29</sup>

Summing up, structure and action are interrelated, actions are both enabled and constrained by structures - structures are the conditions for as well as the consequences of action. Giddens differentiates three columns which constitute this duality of structure. These are presented in the following figure:



<sup>28</sup> See Giddens 1997: 17ff

<sup>29</sup> See Giddens 1997: 14ff, 28ff.

Figure 4: The three columns in the duality of Structure<sup>30</sup>

The focus of this work is on the modalities, i.e. the interpretative schemes, resources and norms as well as the interaction of these modalities in (green) supply chains.

In the following, target costing is analysed in the light of these modalities, i.e. in its function as an interpretative scheme, a norm as well as an allocative and authoritative resource.

#### 4 TARGET COSTING AS AN ORGANISATIONAL STRUCTURE IN SUPPLY CHAINS

Target costing can be conceptualised as an organisational structure enabling and limiting action of organisational actors in supply chains.

On the level of interpretative schemes in cost management, the actors need instruments which allow them to understand and make sense of their actions as well as to communicate them to their environment. Target costing serves as a tool that enables actors to take cost related decisions and actions as well as to rationalise them. The objective of cost management is to assure economic competitiveness of a firm. Target Costing is a particularly appropriate instrument to achieve this objective as it defines the target selling price of a product which is deducted from the market conditions. The rationalisation of action is mainly realised through customer orientation which is assured by taking into account the market conditions. Target costing implies that the target selling price reflects the willingness of final customer to pay for a product, based on its cost-value relations. If the target price is met, the product will sell well, the consumer being willing to pay for it. Any unnecessary costs are eliminated through the analysis of cost value relations, i.e. any occurring cost components directly reflects the value to final customer. In an ideal case, no costs which are not covered by final customer value, arise. Cost management is based on the economic rationality of cost effectiveness and efficiency. This rationality is reflected in target costing which therefore allows to rationalise actions. Another element of economic rationality in target costing is the target profit margin which is part of the market level target costing. The objective of a company is to realise a high turnover and to achieve gains. The setting of the target profit margin serves as a crucial basis to realise gains and therefore permits to rationalise decisions of actors. In green supply chains, interpretative schemes related to the ecological optimisations equally come into play. The sense making of ecological actions is mainly based on ecological classification. These provide a set of choice from which ecological optimisations may be chosen. These classifications do not only allow for the understanding of ecological optimisations, but equally permit the rationalisation of actions. Norms equally play an important role in cost management. Target costing is considered as an appropriate instrument for managing costs in supply chains according to up to date cost management research and practice. Its legitimisation mainly stems from its market orientation which implies the promise of achieving competitiveness and thus corresponding to the principles of economic rationality. The target selling price in market driven costing is therefore directly legitimised through the market conditions. The cost-value relations concretise this legitimisation. If the cost elements identified on product and component level reflect the cost-value relations,

---

<sup>30</sup> Giddens 1997: 29.

these are legitimised. If there occur any cost elements which do not correspond to customer value, these are sanctioned. The target profit margin equally gains legitimisation through the economic principle of rationality and the objective to achieve gains and to stay competitive. As to the greening of supply chains, the aforementioned ecological classifications do not only allow for an understanding and making sense of action, but they fulfil an important legitimisation function for the actors. The classifications indicate which ecological implications may be accepted and which ones have to be rejected due to their negative impact on the environment. In this context, actors may legitimise their actions towards themselves and others.

Target costing equally sets organisational structures with regards to the allocative resources, enabling the generation of power. In target costing this power is mainly reflected in the setting of the profit margin and partly in the setting of the target selling price. The actors designed to set the profit margin dispose of a high degree in allocative resources through which they may exert power. This power does not only have implications on the other departments within a company, but in chained target costing it equally effects the cost requirements set towards suppliers. The setting of the target selling price may equally be considered as an allocative resource even though it is strongly influenced through the market conditions so that the decision space is at least partly limited. Allocative resources are equally reflected in the technology and machines, a company possesses. This aspect of allocative resources is particularly relevant concerning ecological optimisation. The technological capacities a company possesses determines whether they are able to meet the requirements of ecological optimisation or not.

Just like the allocative resources, the authoritative resources enable the generation of power. In target costing, the authoritative resources mainly lie in the economic and technical know-how. This know-how determines the competence of the actor in the target costing process. The dependence of a small company from an important trader is a form of authoritative resource, too. This aspect will become especially relevant in supply chain target costing. Concerning ecological optimisations, authoritative resources are mainly expressed through ecological know-how and dependence structures between actors.

Even though the different modalities were analytically differentiated by Giddens and are discussed separately in this work, they are interdependent. Target Costing does not exist independently from action, but cost actors refer to its structure in taking cost related decisions and by referring to it, reproduce this structure.

## 5 POWER AND COOPERATION AS COORDINATION STRATEGIES IN SUPPLY CHAIN TARGET COSTING

In supply chain target costing, the setting of the component level target costs, i.e. the costs set to the upstream supplier, strongly depend on the power relation between the involved actors. If the buyer has considerable power over the supplier, the costs will not be negotiated, but just dictated by the buyer according to Cooper/Slagmulder. This strategy will be referred to as the power strategy in the following. If the buyer has no or only little power over the supplier, the setting of the suppliers' costs constitutes the outcome of a real negotiation process, in the following referred to as cooperation strategy.<sup>31</sup> Both strategies may not only be observed on a

---

<sup>31</sup> See Cooper/Slagmulder 1999: 175.

chain level, though, but equally on company level, in green supply chains. The intrafirm power structures strongly determine the setting of the target profit margin. If the cost-focused departments have considerably more power than the environmental department, the target profit margin will be dictated without taking into account ecological requirements. If the ecology-focused departments, namely the environment department, disposes of a stronger power position, the trade-offs between cost and ecology may be negotiated through cooperation on the basis of the target profit margin. The two coordination strategies, power and cooperation, will be discussed in the light of rules and resources in green supply chains in the following.

In the power strategy, the negotiation of the target profit margin and the allowable costs and the on one end and of suppliers target costs on the other hand, is one sided. The sense making and rationalisation merely refers to the organisational structure of target costing but without taking into consideration other actors, neither within the company or along the chain. The target selling price as well as the target profit margin correspond to those in non-chained target costing as no changes occur on the level of market driven costing. The component level target costs which the buyer identifies are merely passed on to the supplier. With regards to ecological requirements, actors merely rationalise economic considerations, leaving aside ecological aspects. Economic competitiveness is the only sense making criterion. The target selling price is legitimated through the market. The target profit margin is only legitimated on the level of the buyer but not reflected from a chain wide perspective. Any surpassing of the suppliers target costs will be sanctioned by the buyer. The legitimisation of the target profit margin is of pure economic nature, leaving aside ecological considerations. The disposition of allocative resources such as machines and technology, both from an economic and from an ecological point of view, gives the buyer the power to set the target price and to dictate it to its suppliers. The same applies to the authoritative resources which consist in both economic and ecological know-how as well as a high degree of dependency of the supplier from the buyer. In the power driven strategy, the focus is generally on economic considerations, the cost-focused departments dominating the environment department. The determination of the allowable and suppliers costs corresponds to target costing on single firm level.

The cooperation strategy is based on true negotiations between actors. Sense making and rationalisation is carried out both referring to the target costing concept as a structure and equally taking into consideration the other actors. This strategy is not characterised by sanctions and control as the power strategy, but by communication and joint problem solving. The target selling price, which is determined by the market is given, but the target profit margin may be negotiated between buyer and supplier. Even though economic competitiveness is a major element of rationalisation, ecological requirements are taken into account in the cooperation strategy. The legitimisation of the target selling price is given through the market, but the view of chain wide cost negotiations affects the target profit margin which is legitimised on the basis of negotiation. Taking into account ecological optimisations, the cooperation strategy equally allows for the consideration of ecological requirements. In cooperative supply chains, both buyers and suppliers possess key technologies and machines which determine the allocative resources, both on an economic as well as on an ecological level. Both partners equally dispose of authoritative resources in form of economic and ecological know-how. Buyers

and suppliers are interdependent of each other and none of the partners has considerable power over the other. The power sharing between actors is more or less equal.

The following table sums up the major differences between a power and a cooperation driven coordination strategy in supply chain target costing:

Supply Chain Target Costing	Power	Cooperation
<b>Interpretative Schemes</b>	<ul style="list-style-type: none"> <li>• Dictation of allowable costs and suppliers' target costs</li> <li>• Target profit margin and suppliers' target costs equal non-chained target costing</li> <li>• Economic aspects as only rationalisation criterion</li> </ul>	<ul style="list-style-type: none"> <li>• Negotiation of allowable costs and suppliers' target costs</li> <li>• Target profit margin and suppliers' costs differ from non-chained target costing</li> <li>• Economic and ecological aspects as rationalisation criteria</li> </ul>
<b>Norms</b>	<ul style="list-style-type: none"> <li>• Buyer cost optimisation</li> <li>• Surpassing of suppliers' target costs controlled and sanctioned</li> <li>• Target profit margin only legitimised through economic aspects</li> </ul>	<ul style="list-style-type: none"> <li>• Chain-wide cost and ecological optimisation</li> <li>• Setting of suppliers' target costs through communication and joint problem solving</li> <li>• Target profit margin legitimised both by economic and ecological aspects</li> </ul>
<b>Allocative Resources</b>	<ul style="list-style-type: none"> <li>• Higher disposition of allocative resources such as machines and technology through buyer</li> <li>• Dominance of economic aspects</li> </ul>	<ul style="list-style-type: none"> <li>• Equal disposition of allocative resources between buyer and supplier</li> <li>• Consideration of both economic and ecological aspects</li> </ul>
<b>Authoritative Resources</b>	<ul style="list-style-type: none"> <li>• Higher disposition of authoritative resources such as know-how through buyer</li> <li>• Dominance of economic aspects</li> <li>• High degree of dependency of supplier from buyer</li> </ul>	<ul style="list-style-type: none"> <li>• Equal disposition of authoritative resources between buyer and supplier</li> <li>• Consideration of both economic and ecological aspects</li> <li>• Equal degree of dependency of supplier from buyer.</li> </ul>

Table 1: Coordination Strategies in Supply Chain Target Costing from a Structuration Theory Perspective

Generally speaking, a cooperation strategy is more favourable towards green products from a chain wide perspective as it allows for a more flexible design of the target costing process. Even if the ecological optimisation does not correspond to an increase in final customer value, partners in the chain may realise the target price through cooperation and negotiation, aiming at joint problem solving and cost optimisation either linked to greening or independent from it. According to the power constellations, linked to resource distribution in the chain, it may not always be possible to pursue a "pure" cooperation or power strategy, but a hybrid strategy may be more appropriate to the structure of the supply chain.

## 6 COORDINATION STRATEGIES IN GREEN SUPPLY CHAIN TARGET COSTING AT OTTO

The preceding findings will be discussed at the example of a supply chain from the textile industry in the following. The textile industry is a particularly interesting sector to discuss the findings for several reasons:

- The textile industry is a quickly changing environment with extremely short market cycles and high fashion requirements which necessitate a high flexibility in textile chains.
- The production of textiles has relevant ecological impacts during the production process along several stages of the chain.
- The cost pressure in the textile industry is particularly high so that target costing, aiming at integrating the cost-value relations of final customer, is an appropriate cost management instrument in textile chains.

The market cycles in the textile industry are increasingly shortening. The traditional differentiation between a spring/summer and an autumn/winter collection is more and more dissolved by interim collections. Some retailers, such as H&M have come down to market cycles of less than 8 weeks<sup>32</sup> so that different collections can hardly be identified and are replaced by continuous collections. This development is linked to the high and quickly changing fashion requirements in the textile industry. The fashion requirements as well as the dynamism of the sector tend to be in contrast with the ecological requirements in textile chains.

The ecological impacts in textile chains are important. In fibre production, taking the example of cotton, the impacts of conventional cotton production lie in the use of chemicals such as pesticides, synthetic fertilizers as well as water intensity in cotton farming. Important impacts are equally be stated on the production levels of dyeing and finishing of textiles. In dyeing, the use of heavy-metal containing dyestuff as well as chlorine bleach in textile chains is still rather frequent. The problems in finishing lie for example in the use of easy-care treatments. These ecological impacts have equally relevant impact on human health. The ecological optimisation of the cotton chain both implies process optimisations in dyeing and finishing as well as in the growth of cotton. Organic cotton is cultivated without pesticides and synthetic fertilizers and is therefore ecologically optimised.<sup>33</sup>

Cost pressure in the textile industry is currently increasing. More and more, cheaper and cheaper textiles penetrate the European textile market from Asia. This cost pressure is not only becoming more and more important in conventional textile chains, but it becomes particularly relevant in greening textile chains as ecological optimisations often cause cost effects. These cost impacts lie e.g. in higher prices for organic cotton or for ecologically optimised dyestuff and additives. Higher costs also occur, at least temporarily, due to switching costs, small production quantities of ecologically optimised textiles as well as the setting up of parallel production.

---

<sup>32</sup> See Meyer 2001: 66.

<sup>33</sup> For a description of the ecological impacts of cotton production as well as the differences in conventional and organic cotton farming, see van Elzaker 1999b and Myers/Stolton 1999.

Finally, higher costs are due to an increased coordination effort in green textile chains which becomes necessary because of the limited availability of green fibres and yarns on the market.<sup>34</sup>

OTTO is a German mail-order business who is very conscious of greening its textiles. Two types of ecological optimisation are identified at OTTO. In the early 1990s, the company started greening its textile chain by limiting the degree of harmful substances on product level. The necessary optimisations to achieve these objectives, were carried out with chosen conventional suppliers which were assessed and developed towards approved eco suppliers. The optimisations in limiting harmful substances did not significantly affect the structure of the chain, in the following referred to as conventional chain/collection. They merely represented an additional quality criterion which was added to the other quality product features. In 1997, OTTO decided not to leave it to product optimisation, but to go one step beyond, extending the optimisations along the entire production process, back to raw materials stage. The optimisations carried out included the optimisation of dyeing and finishing processes as well as the substitution of conventional cotton by organic cotton, which will in the following be referred to as the organic cotton chain/collection. The necessary changes were so important that they fundamentally affected the entire chain structure. The transactions could not just be carried out as for the conventional clothes. The entire chain needed to be coordinated by OTTO. The environment department of the company started searching for and selecting suitable organic cotton traders and spinners as well as clothing producers able to meet the required ecological standards. Such a task is usually not fulfilled by OTTO and resulted in an increased coordination effort in their organic cotton chain. A cost increase was effected through the price of organic cotton which is about 25% higher than conventional one, the process optimisations as well as the occurring coordination costs.<sup>35</sup> The ecological optimisation of the dyeing and finishing processes does not always induce higher costs though, but, depending on the circumstances, may also allow to identify important cost saving potentials on the process level.

Altogether, the current costs for organic cotton clothes turned out to be higher than for those for conventional ones. As OTTO's final customer do not consider ecological features as a value-added, the desired target selling price for ecological clothes was set equal to the target selling price of conventional ones. The challenge was to approach to the conventional price as far as possible. In the following, the use of power and cooperation as coordination strategies in target costing are discussed at the example of OTTO.

In order to discuss the two strategies, the objective and conflicting interest constellations, which have already been mentioned in the first part, need to be considered at the example of the OTTO chain. In the intrafirm chain, the main actors in the organic chain are the buying department on the one hand and the environment department on the other hand. In the buying department, economic criteria such as costs, constitute the predominant rationalisation criterion. This interpretative scheme is also represented in its resources which include an attributed budget as well as the buying know-how for conventional clothes. Quality aspects such as the respect of optimisations concerning harmful substances are equally among the objectives of the

---

<sup>34</sup> For the costs of greening cotton chains see van Elzakker 1999a and Goldbach 2001.

<sup>35</sup> See Goldbach 2001.

department to be taken into account. The environment department pursues mainly ecological objectives, which constitute the predominant rationalisation criterion. The environment department disposes both of an important budget to put into practice ecological optimisations and of the necessary ecological know-how. Even though the focus of the environment department is on ecological objectives, economic criteria such as costs are equally taken into account. These two departments interact on intrafirm level. As the major objective of any company is to assure its competitiveness, the economic objectives, mainly represented by the buying department, are predominant. This means that the degree of dependence of the environment department towards the buying department is stronger than the other way round. In the interfirm supply chain, the major actors are OTTO, i.e. the buyer on the one hand and its supplier<sup>36</sup> on the other hand. OTTO disposes of allocative resources in form of an important buying budget to acquire both conventional and organic clothes from its suppliers. At the same time, OTTO has acquired important know-how concerning the ecological optimisation of the chain, i.e. authoritative resources. The supplier disposes of the necessary machines, technology and know-how, i.e. both allocative and authoritative resources, in conventional production. As to ecological aspects, he disposes of some basic and potential resources which still require developing.

In order to analyse the dependence constellation, the analysis has to be carried out separately for the conventional and the organic cotton chain. In conventional chains, the dependence of the supplier towards OTTO with regards to their transaction relationship is relatively high. The supplier needs OTTO as its customer, but OTTO does not necessarily need its supplier. This is due to the structure of conventional chains which are mainly based on market coordination, linked to a certain degree of power, which partly permits OTTO to dictate price frames to its suppliers. In organic cotton chains, the dependence is inverse. The supplier does not necessarily want to respect ecological objectives and may find alternative customers for its conventional products. OTTO though, may not just replace its supplier as the number of suppliers able to deliver products corresponding to its ecological objectives is very limited. The relationship of OTTO towards its supplier regarding ecology therefore partly relies on goodwill. This can be explained by the fact that the production of organic cotton textiles requires fundamental changes in the supply chain which are based on the coordination of the entire chain by OTTO. Therefore, in organic cotton chains, the resources OTTO disposes of are not sufficient to exert power on its suppliers. This deficit in influence could be eliminated by making use of spill-overs from the conventional chain where OTTO holds a certain degree of power. This spill-over is hindered by the underlying interfirm relations though. Even though the buying department respects certain ecological requirements, the predominant economic interpretative schemes and norms do not permit to realise such a spill-over.

As economic aspects are dominant over ecological ones from the perspective of OTTO's final customers' interpretative schemes, the desired target selling price for ecological products has to be set equal to the one of the conventional products at OTTO. As shown, these economic

---

<sup>36</sup> This supplier is considered to be fully integrated, i.e. that he carries out weaving/knitting, dyeing/finishing as well as confectioning.

aspects do not constitute the unique rationalisation criterion, though. While the buying department puts a stronger focus on economic aspects such as costs, even though equally respecting ecological criteria, the rationalisation of the environment department is dominated by ecological interpretative schemes, even though cost effects are equally reflected. The use of target costing as an interpretative scheme at OTTO therefore aims at integrating cost aspects, characteristic for target costing as well as ecological aspects. The legitimisation of the target profit margin, even though dominated by economic criteria, is equally influenced by ecological aspects. While at OTTO economic and ecological interpretative schemes co-exist, this is not necessarily the case for its suppliers, who often mainly consider economic aspects.

The textile chain at OTTO therefore may be characterised by a hybrid power/cooperation strategy. On the interfirm level, the interest conflicts between economic and ecological aspects become relevant in the personalised form of the buying and the environment department. The environment department is dependent on the buying department from an economic point of view which is the predominant interpretative scheme to assure the overall competitiveness of the company. This is due to the fact that the interpretative schemes of final customers are characterised exclusively by economic aspects. Therefore, the target profit margin of organic products has to be similar to the one of economic products. The allowable costs are partly dictated to the environment department even though this approach is currently replaced by a more negotiation oriented one.

Towards the suppliers, the strategy is more power oriented in the conventional chain, allowing to dictate prices to suppliers and more cooperation oriented in the organic cotton chain. This can be explained by the fact that OTTO is dependent on its suppliers regarding ecological aspects. Therefore, the suppliers' costs are negotiated trying to make the supplier integrate ecological aspects through communication and joint problem solving.

## 7 CONCLUSION AND PERSPECTIVES FOR FURTHER RESEARCH

In this paper, power and cooperation were presented as two coordination strategies allowing to manage the costs in green supply chains referring to target costing as an organisational structure. They do not only serve as a basis for coordination in intrafirm supply chains, i.e. between different companies in a supply chain, but equally in intrafirm supply chains, i.e. between different departments within a company. These two strategies should not be considered as exclusive alternatives, but they can coexist both within companies as well as within supply chains. The cooperation strategy has been identified as being more appropriate to integrate green aspects and to be more flexible. This means that cooperation is the first choice, but power is a good choice if cooperation is not available for whichever reasons.<sup>37</sup>

Future research should focus on how the use of the cooperation strategy may be encouraged both within companies and supply chain in order to allow for an appropriate integration of ecological requirements while maintaining chain flexibility.

---

<sup>37</sup> See Bachmann who states that "*power may generally be the second best choice, but it is a good choice if [cooperation, in the original 'trust'] is not affordable*" (Bachmann 2001: 351).

## ACKNOWLEDGEMENTS

This article was written in the context of the research project EcoMTex (Ecological Mass Textiles), which is funded by the German Federal Ministry for Education and Research (BMBF) and administrated by the National Research Center for Environment and Health (GSF). I would like to express my gratitude to both the BMBF and the GSF for their financial support. Moreover I would like to thank Simone Back, OTTO, for helpful information and comments.

## BIBLIOGRAPHY

- Bachmann, Reinhard (2001): Trust, Power and Control in Trans-Organizational Relations, in: *Organization Studies*, Special Issue: Trust and Control in Organizational Relations, Vol. 22 No. 2, p. 337-365.
- Chaudhry, M.R. (1996): Cost of Producing a Kilogram of Cotton, *Proceedings from the 23<sup>rd</sup> International Cotton Conference*, Bremen.
- Cooper, Robin; Slagmulder, Regine (1999): *Supply Chain Management for the Lean Enterprise - Interorganisational Cost Management*, Montvale: IMA Foundation for Applied Research.
- Freidank, Carl-Christian (1993): Die Prozesskostenrechnung als strategisches Instrument des Kostenmanagements [Activity-based costing as a strategic instrument in cost management], *Die Unternehmung* 5/1993, p. 387-405.
- Giddens, A. (1997): *The Constitution of Society*, reprinted, Cambridge: Polity Press
- Goldbach, M. (2001): Managing the Costs of Greening - A Supply Chain Perspective, *The 2001 Business Strategy and the Environment Conference*, September 10th and 11th, University of Leeds, *Conference Proceedings*, p. 109-118.
- Håkansson, Håkan; Snehota, Ivan (1989): No Business is an Island – The Network Concept of Business Strategy, in: *Scandinavian Journal of Management*, Vol. 5 No. 3, p. 187-200.
- Handfield, Robert B.; Nichols, Ernest L. Jr. (1999): *Introduction to Supply Chain Management*, Prentice Hall, Upper Saddle River/New Jersey.
- Horvath, Peter; Seidenschwarz, Werner (1992): Zielkostenmanagement [Target Costing], *Controlling*, Heft 3, Mai/Juni 1992, p. 142-150.
- Hummel, Johannes (1997): *Strategisches Öko-Controlling [Strategic Eco-Controlling] – Konzeption und Umsetzung in der textilen Kette*, Wiesbaden: Gabler-Verlag.
- Lockamy, Archie; Smith, Wilbur I. (2000): Target costing for supply chain management: criteria and selection, *Industrial Management and Data Systems* 100/5 (2000), p. 210-218.
- Maier, Simone; Finger, Matthias (2001): Constraints to organizational change processes regarding the introduction of organic products – Case findings from the Swiss food industry, in: *Business Strategy and the Environment*, 10 (2001), p. 89-99.
- Meyer, Arnt (2001): *Produktbezogene ökologische Wettbewerbsstrategien [Product-related ecological competitive strategies] - Handlungsoptionen und Herausforderungen für den schweizerischen Bekleidungsdetailhandel*, Wiesbaden: Gabler-Verlag.
- Meyer, Arnt (2000): What's in it for the customers? – Successfully Marketing Green Clothes, in *Conference Proceedings Business Strategy and the Environment*, Leeds 2000.
- Myers, Dorothy; Stolton, Sue (1999): *Organic cotton – From field to final product*, London: Intermediate Technology Publications.
- Ortmann, Günther; Sydow, Jörg; Windeler, Arnold (1997): Organization als reflexive Strukturierung [Organization as Reflexive Structuration], in: Ortmann, G.; Sydow, J.; Türk, K. (eds): *Theorien der Organisation: die Rückkehr der Gesellschaft*, Opladen: Westdeutscher Verlag, p. 315-354.
- Schneidewind, Uwe (1998): *Die Unternehmung als strukturpolitischer Akteur [The Corporation as an Actor of Structural Policy]*, Marburg: Metropolis.

Seuring, Stefan (2001): Supply Chain Costing, München: Vahlen-Verlag.

Van Elzakker, Bo (1999a): Comparing the costs of organic and conventional cotton, in: Myers, Dorothy; Stolton, Sue (1999): Organic cotton – From field to final product, London: Intermediate Technology Publications, p. 86-100.

Van Elzakker, Bo (1999b): Organic cotton production, in: Myers, Dorothy; Stolton, Sue (1999): Organic cotton – From field to final product, London: Intermediate Technology Publications, p. 21-35.